SCIENTIFIC PRODUCTION REPORT 2023

UNIVERSIDAD Panamericana

SCIENTIFIC PRODUCTION REPORT 2023

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UNIVERSIDAD
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Numbers

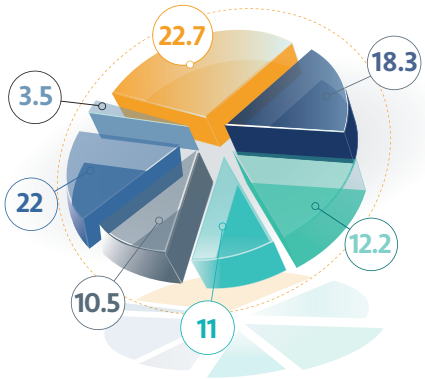
With data to December 31, 2023

QUALITY 2021, 2022 and 2023

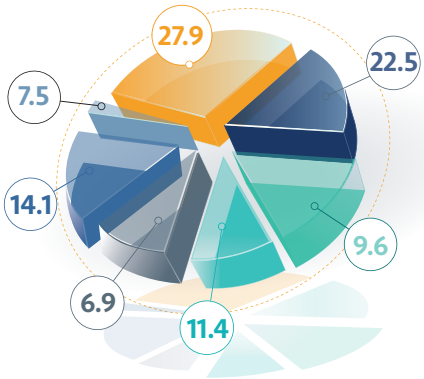
Source: own preparation with data from Scopus

- JOURNAL Q1
- JOURNAL Q2
- JOURNAL Q3
- JOURNAL Q4
- CONFERENCE PAPER
- BOOK & BOOK CHAPTER
- OTHERS

2021

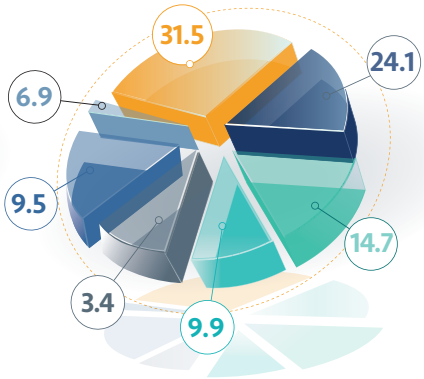


2022



2023

More than half of the production is in Q1 and Q2



Conference Papers are decreasing, and increasing the quality of products

MEMBERS OF THE NATIONAL SYSTEM OF RESEARCHERS

Source: own preparation with data from Scopus

2021

LEVEL III	8
LEVEL II	14
LEVEL I	79
CANDIDATE	38

TOTAL 139

2022

LEVEL III	6
LEVEL II	14
LEVEL I	88
CANDIDATE	29
EMERITUS	1

TOTAL 138

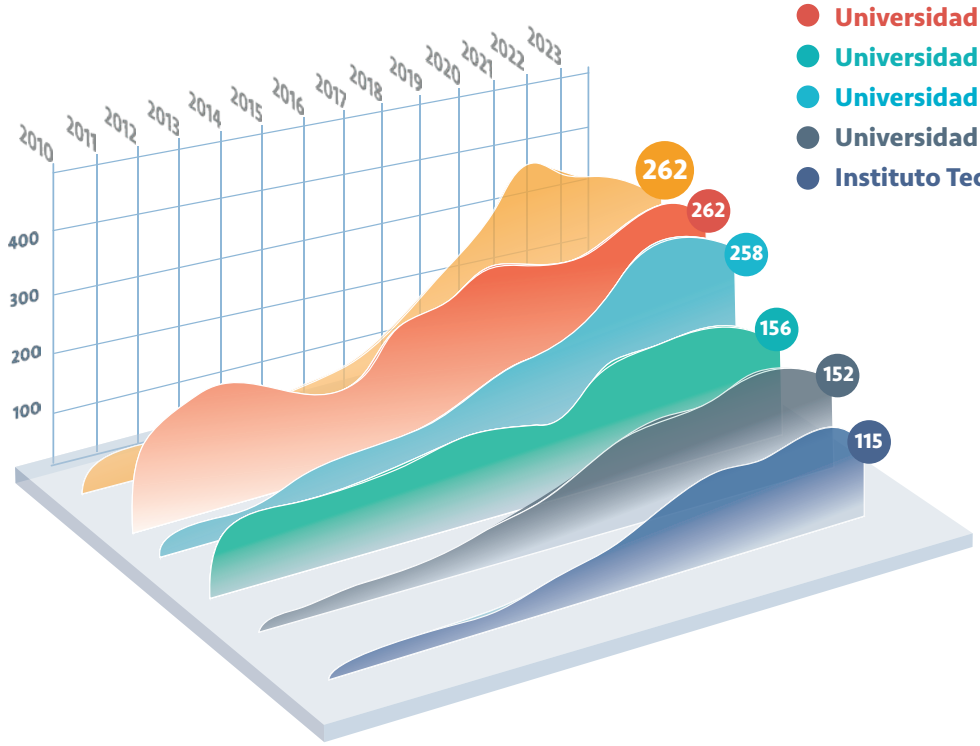
2023

LEVEL III	7
LEVEL II	19
LEVEL I	102
CANDIDATE	26
EMERITUS	1

TOTAL 155

BRENCHMARK PUBLICATIONS

Source: Scopus, private universities with less than 1000 publications per year



- Universidad Panamericana
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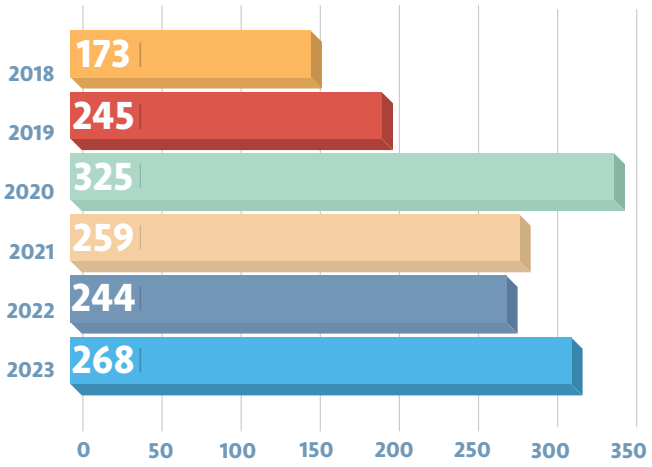
- Universidad de las Américas Puebla
- Universidad Anáhuac
- Universidad de Monterrey
- Instituto Tecnológico Autónomo de México

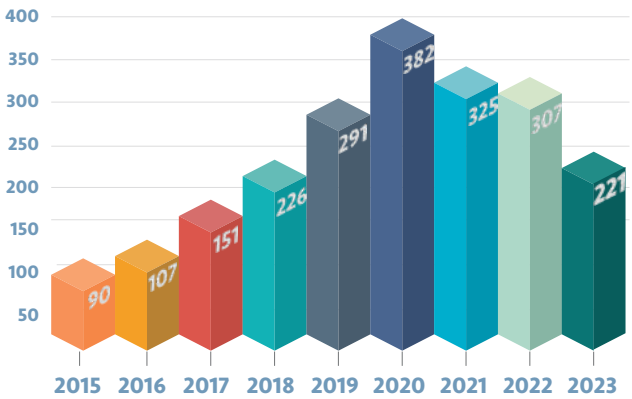
INDEXED PUBLICATIONS IN THE LAST SCIENTIFIC REPORTS

Source: own preparation



HISTORICAL PUBLICATIONS

Source: own preparation with data from Scopus



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PRESENTATION

Dear university community,

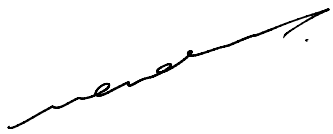
It is with profound pride that we present this Scientific Production Report 2023. True to our pathway in previous years, it is a source of great satisfaction to report that we have not only maintained, but also intensified our commitment to the generation of high-quality knowledge with a significant social impact.

We would like to highlight that 55% of our scientific production this year was indexed in high quality journals (Q1 and Q2) in Scopus and Web of Science indexes, consolidating our position as an outstanding reference in this sphere. In addition, and for the fifth consecutive year, we continue to be the second private university with the highest production in the aforementioned indexes. These figures attest to the hard work and dedication of our researchers.

Likewise, we have made significant progress in the area of Intellectual Property, obtaining four new patents. This achievement underscores our university's strong commitment to innovation and technological advancement.

Consistent with our strategy to strengthen research, we have scaled up our efforts to encourage our professors to participate in the search for external funding through research projects both nationally and internationally. Recognizing the materiality of promoting an internal cultural change in this respect, we have established specialized training programs. These programs are designed to provide our researchers with the key tools and competencies in the field. We are convinced that these actions will have a substantial positive impact on our ability to conduct state-of-the-art research and provide innovative solutions to the challenges faced by our society.

We would like to express our deepest gratitude to all those who have been essential to our achievements. With optimism and great expectation, we look into the future, ready to embrace the challenges and opportunities that lie ahead.



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MARÍA LUISA AZPÍROZ MANERO

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¿EXISTE UNA DIPLOMACIA DIGITAL EN LOS PAÍSES DEL GRUPO MENA? ANÁLISIS DE LAS WEBS DE SUS EMBAJADAS EN ESPAÑA

ABSTRACT. Esta investigación analiza las páginas web de embajadas de países del grupo MENA con presencia en España, con el fin de comprobar si practican la diplomacia digital. Dicha actividad es una herramienta de diplomacia pública de bajo coste y amplio alcance. El análisis abarca dos años (2020-2022) protagonizados por la pandemia COVID, que impulsó la digitalización de muchos sectores. El artículo contribuye a la literatura sobre diplomacia digital árabe e israelí y sobre diplomacia digital ejercida por embajadas. Se realiza un análisis exploratorio de las páginas web y un análisis más detallado del contenido de las webs de las embajadas de cuatro países: Arabia Saudí, Israel, Marruecos y Catar. Se eligen estos países porque son los que presentan páginas más funcionales y en español, unido a ser los primeros del grupo cuyos gobiernos utilizaron Twitter como instrumento de diplomacia digital. El artículo examina de qué temas hablan y qué interpretaciones aportan las notas de prensa publicadas en las webs de las embajadas. Se aplica el método de análisis del discurso con referencias a las fuentes originales. Temas y argumentos se clasifican en cuatro tipos de diplomacia pública: mediática, cultural, de nicho y de marca-país. Se concluye que la diplomacia digital de las páginas web de las embajadas del grupo MENA en España está descuidada. Se desaprovechan las oportunidades que esta actividad representa. Las cuatro embajadas aparentemente más digitalizadas tienen errores en sus páginas y se limitan en gran parte a publicar mensajes de las cancillerías, centrándose en cuestiones de tipo regional e internas y más en la relación bilateral con España. Esto ocurre especialmente en los casos de Arabia Saudí y Catar.

Azpíroz M., L. (2023). ¿Existe una diplomacia digital en los países del grupo MENA? Análisis de las webs de sus embajadas en España. *Communication and Society*, *36*(2), 271-289. doi: 10.15581/003.36.2.271-289. Article.

ÓSCAR COLORADO NATES

Research Professor

VERNACULAR PHOTOGRAPHY: TOWARDS A SYNTHETIC ELEMENTARY DEFINITION

[FOTOGRAFÍA VERNÁCULA: HACIA UNA DEFINICIÓN SINTÉTICA Y ELEMENTAL]

ABSTRACT. Through a literature/newspaper inquiry, this research seeks to answer the question: How to offer a synthetic elementary definition of Vernacular Photography that includes commonalities in concepts by specialized authors, galleries, and museums interested in this iconographic genre? Twenty-five definitions of Vernacular Photography were analyzed to answer this question, choosing 13 from the last ten years that were issued by prestigious academics interested in this genre, such as Geoffrey Batchen and Clément Chéroux, or institutions with Vernacular Photography collections, such as the Museum of Modern Art in New York or the Swann Galleries. Studying these definitions has allowed us to find convergent and divergent elements to propose an integrating defining concept. The conclusions section highlights the challenges of finding a synthetic elementary definition of Vernacular Photography.

Colorado, O. (2023). Vernacular Photography: Towards a Synthetic Elementary Definition [Fotografía vernácula: hacia una definición sintética y elemental]. *Palabra Clave*, *26*(2). doi: 10.5294/pacla.2023.26.2.3. Article.

JUAN CARLOS CARRILLO CAL Y MAYOR

Research Professor

APPROPRIATION OF AUDIOVISUAL PRODUCTION IN CHILEAN COLLEGE STUDENTS' CREATIVE WRITING AND THEIR REPRESENTATION OF FAMILY

[APROPIACIÓN DE LA PRODUCCIÓN AUDIOVISUAL EN LA ESCRITURA CREATIVA DE UNIVERSITARIOS CHILENOS Y SU REPRESENTACIÓN DE LA FAMILIA]

ABSTRACT. This study is based upon an undergraduate course taught at the School of Journalism at the Universidad de los Andes in Chile (2018). In order to write from scratch a story over the semester, the fifty students enrolled in the Creative Writing class developed collectively fiction novels. Although there were no previous prompts regarding the content, all the stories represented the family whether in a central or a secondary role. Relying on the nine novels produced, this article analyzes the family representations in the fictional stories of college students. Fictional audiovisual material appears as very influential in the corpus analyzed. After conducting a content analysis on the stories, the results show that all writings reinforce the role of the family as a desirable environment for the individuals' well-being, regardless of the topic or frame of each novel.

Carrillo, J., & Feijoo, B. (2020). Appropriation of audiovisual production in Chilean college students' creative writing and their representation of family [Apropiación de la producción audiovisual en la escritura creativa de universitarios chilenos y su representación de la familia]. *Comunicacion y Medios*, *29*(41), 144-157. doi: 10.5354/0719-1529.2020.56480. Article.

ELBA DÍAZ CERVERÓ

SNII Level II

HOW DO MEXICAN JOURNALISTS INTERPRET AND CONTEXTUALIZE THE NEWS ON ORGANIZED CRIME THAT THEY PUBLISH? THE AMPLIFIED SUBJECTIVITY

[¿CÓMO INTERPRETAN Y CONTEXTUALIZAN LOS PERIODISTAS MEXICANOS EN LAS NOTAS QUE PUBLICAN SOBRE CRIMEN ORGANIZADO? LA SUBJETIVIDAD AMPLIADA]

ABSTRACT. Introduction: The notion of objectivity is the cornerstone of the liberal model of journalism. Following that scheme, one of the aims of news stories is to foster citizens' understanding of the world they live in, but this can only be achieved through journalists' vision. In that sense, the aim of this article is to analyze the level of interpretation and contextualization that Mexican journalists deliver when they report on organized crime. Methodology: In doing so, this paper draws on 24 in-depth interviews with news workers who cover this beat across the country. Results and discussion: The findings suggest that journalists do interpret and contextualize the information. This is because they are interested in helping their audiences to better understand this highly complex phenomenon. Although most of the informants said that they separate facts from opinion, they constantly interpret the information by relying upon their amplified subjectivity; which represents the main contribution of this inquiry. Conclusions: The main conclusions suggest that criminals' pressure

constrains reporters' freedom to interpret the information they publish. Therefore, despite journalists' efforts, the average Mexican news consumer cannot fully understand the organized crime phenomenon.

Díaz-Cerveró, E., Barredo-Ibáñez, D., & González Macías, R. A. (2024). How do mexican journalists interpret and contextualize the news on organized crime that they publish? The amplified subjectivity [¿Cómo interpretan y contextualizan los periodistas mexicanos en las notas que publican sobre crimen organizado? La subjetividad ampliada.]. *Revista Latina de Comunicacion Social*, *2024*(82). doi: 10.4185/rlcs-2024-2170. Article.

ELBA DÍAZ CERVERÓ

SNII Level II

UNITED OR FRAGMENTED? JOURNALISTS' ORGANISATIONS AS A RESPONSE TO ANTI-PRESS VIOLENCE IN MEXICO

[¿UNIDOS O FRAGMENTADOS? ORGANIZACIONES DE PERIODISTAS COMO RESPUESTA A LA VIOLENCIA CONTRA LA PRENSA EN MEXICO]

ABSTRACT. Due to the existing conditions of violence and insecurity in Mexico, the practice of journalism is a high risk activity. As an outcome of the increasing diversity of attacks, some news workers have found that the collective action through journalists' associations is a way to improve their working conditions. Therefore, the aim of this article is to analyse reporters' perceptions of those groups. In doing so, the study draws on a set of 93 semi-structured interviews with reporters located in the 23 most dangerous states of the country. The findings suggest that there is a favourable opinion regarding the associations, but their structure and operation also raise questions amongst the interviewees. Nonetheless, several journalists also criticise those groups' performance and limited results.

González, R. A., Diaz-Cervero, E., & Ibañez, D. B. (2022). United or fragmented? Journalists' organisations as a response to anti-press violence in Mexico [¿Unidos o fragmentados? Organizaciones de periodistas como respuesta a la violencia contra la prensa en Mexico]. *Estudios sobre el Mensaje Periodístico*, *28*(2), 305-315. doi: 10.5209/ESMP.78672. Article.

ÍÑIGO FERNÁNDEZ FERNÁNDEZ

***Senior Researcher B**, SNII Level I*

IDENTITY AND AUTHORITY IN THE SOCIETY OF JESUS IN MEXICO (1816-1929)

[IDENTIDAD Y AUTORIDAD EN LA COMPAÑÍA DE JESÚS EN MÉXICO (1816-1929)]

ABSTRACT. A inicios de la década de los años cuarenta del siglo pasado, el historiador francés Marc Bloch (2001) se refirió al tiempo histórico en los siguientes términos "[…] es, por naturaleza, un continuo. También es cambio perpetuo. De la antítesis de estos dos atributos provienen los grandes problemas de la investigación histórica" (p. 58). Estas tensiones, propiasdel devenir histórico entre "lo que se es" y "lo que se ha sido", también hacen las veces de marco en el que, tanto los individuos como los grupos, van moldeando su identidad a la par que la percepción que tienen de sí mismos.

En el presente libro, la historiadora María Luisa Aspe nos ofrece un análisis novedoso de la historia de la Compañía de Jesús en México desde su restauración, en 1816, y hasta el final de la Guerra Cristera, en 1929. Lejos de ser una mera revisión histórica, presenta una perspectivacrítica que parte de la premisa de que mientras que la historiografía tradicional –alimentada en gran medida por los propios jesuitas– establece la existencia de una unidad identitaria entre la congregación de la época virreinal y aquella que operó en el México independiente, lo cierto es que ésta ni ha sido una, ni tampoco la misma; en vista de lo cual, el problema de la identidad jesuítica en México es una cuestión más de ruptura que de continuidad.

Fernández, I. F. (2023). Identity and Authority in the Society of Jesus in Mexico (1816-1929) [Identidad y autoridad en la Compañía de Jesús en México (1816-1929)]. *Secuencia. Revista de Historia y Ciencias Sociales*, (101). doi: 10.18234/sequence.v0i0.2267. Review.

ÍÑIGO FERNÁNDEZ FERNÁNDEZ

***Senior Researcher B**, SNII Level I*

FROM THE HEROIC DEED TO THE "SPARKS" OF HUMOR. REPRESENTATIONS OF HERNÁN CORTÉS IN THE PRESS OF MEXICO CITY (1900-1910)

[DE LA GESTA HEROICA A LOS «CHISPAZOS» DE HUMOR. REPRESENTACIONES DE HERNÁN CORTÉS EN LA PRENSA DE LA CIUDAD DE MÉXICO (1900-1910)]

ABSTRACT. As the conqueror of Mexico, Hernán Cortés has been a controversial figure in Mexican history and the press. We will present an overview of what the Mexico City newspapers pub-lished about him between 1900 and 1910 to answer the following questions: what was written about Cortés? linked? And what were the publications trying to do with it? Through the Framing theory, we will review, segment and study a documentary corpus of newspaper articles to show a process of distension around his figure as a journalistic subject in which, without denying the dis-cussions of the past, although qualifying them, he began to be linked more to anecdotal and some-what trivial issues as a result of a change in the framing by the newspapers that was linked to the Mexican government agenda.

Fernández, I. F. (2023). From the heroic deed to the "sparks" of humor. Representations of Hernán Cortés in the press of Mexico City (1900-1910) [De la gesta heroica a los «chispazos» de humor. Representaciones de Hernán Cortés en la prensa de la Ciudad de México (1900-1910)]. *Historia Contemporánea*, *71*, 91-120. doi: 10.1387/hc.22700. Article.

PAULA MARÍA GÁRGOLES SAES

Research Professor

GABRIELA AMBÁS SOSA

Research Professor

THE POWER OF CONSUMERS ON SOCIAL MEDIA: A CASE STUDY OF BALENCIAGA'S CRISIS COMMUNICATION

ABSTRACT. The French luxury brand, Balenciaga, recently faced its most important communication crisis. On November 16th 2022, the brand released its holiday gifting campaign featuring children surrounded by sadomasochism-inspired teddy bears/handbags and received immediate backlash from the public, who accused the brand of sexualizing children and promoting pedophilia. The outrage went viral on social media - mainly on Tiktok - with the hashtags #burnbalenciaga and #cancelbalenciaga, which have accumulated more than 300 million views. Balenciaga suffered an incalculable damage on its reputation, having two flagship stores vandalized and a viral online boycott. This investigation follows the case study methodology, by analyzing the timeline of events, the brand's statements and response, the viral effect of the boycott on social media and the ultimate affectations that the brand underwent due to the crisis. The conclusions reveal that on one hand there are some social anethical boundaries that not even

well-positioned and beloved brands can afford to cross, and that slow, unclear and unaccountable answers compose a terrible strategy of crisis management, and on the other hand, the power of consumers on social media has gained enough strength to damage brands like Balenciaga.

Gárgoles, P., & Ambás G. (2023). The Power of Consumers on Social Media: A Case Study of Balenciaga's Crisis Communication. In Sabatini, N., Sádaba, T., Tosi, A., Neri, V., & Cantoni, L. (Eds.), *Fashion Communication in the Digital Age. FACTUM 2023. Springer Proceedings in Business and Economics* (pp. 3-13). Springer. doi: 10.1007/978-3-031-38541-4_1. Conference Paper.

BRENDA VERÓNICA LEDESMA PÉREZ

SNII Candidate Level

TECHNIQUE AND PHOTOGRAPHIC GENRES IN TRANSITION INSTANTANEOUS PHOTOGRAPHY (1871-1900)

[TÉCNICA Y GÉNEROS FOTOGRÁFICOS EN TRANSICIÓN LA FOTOGRAFÍA INSTANTÁNEA (1871-1900)]

ABSTRACT. This article approaches the transformation of aesthetic values and photographic genres caused by the use of silver bromide gelatin dry plate, which is manifested in manuals of photography circulated in Mexico between 1871 and 1900. The high sensitivity of the dry plate allowed the capture of moving objects in photography, this generated new relations between painting and photography that need to be reconsidered. History affirms that the snap shot impelled photography to take distance from aesthetic precepts of fine arts and to formulate precepts of its own. Other sources however reveal that some photographers found in rapid exposures a new opportunity to get back to pictorial models through a retrieval of the scenes of genre painting.

Ledesma Pérez, B. V. (2023). Technique and Photographic Genres in Transition Instantaneous Photography (1871-1900) [Técnica y géneros fotográficos en transición La fotografía instantánea (1871-1900)]. *Anales del Instituto de Investigaciones Estéticas*, *45*(123), 265-311. doi: 10.22201/iie.18703062e.2023.123.2821. Article.

MARIANO EMMANUEL NAVARRO ARROYO

***Senior Researcher A**, SNII Candidate Level*

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ENACTIVE APPROACH TO SOCIAL INTERACTIONS IN RELIGIOUS MEDIA ECOLOGIES

ABSTRACT. In this article we examine the role of the body in constituting specific social interactions via religious media ecologies from the perspective of the enactive embodied cognition. Religious media ecologies give affordances for conversation and interaction which amplify not only religious but also social beliefs and turn subjective judgements into an intersubjective reality. Hence, despite the traditional emphasis on rational, verbal forms of social interaction, we consider the human body to be something of a cognitive pattern or map, representing important social senses and relations. Thematizing the proximity between embodied cognition and religious media ecologies can bring together philosophy and sociology, while addressing a range of prominent thinkers in an original way.

Navarro, M. & Briedis, M. (2023). Enactive approach to social interactions in religious media ecologies. *Explorations in Media Ecology*, *22*(3), 275-287. doi: 10.1386/eme_00170_1. Article.

JOSÉ RAFAEL SANTANA VILLEGAS

Research Professor

MBAS IN MEXICO AND THEIR IMPACT ON CORPORATE REPUTATION EXECUTIVE TRAINING

[LOS MBA EN MÉXICO Y SU APORTE A LA FORMACIÓN EN REPUTACIÓN CORPORATIVA]

ABSTRACT. Introduction: This research analyzes whether the executive training offered by the MBA courses in Mexico provides reputation management training to future CEOs. The goal is to know the opinion of the heads of these programs regarding the object of study, as well as to delve into the design of the curriculums and the role of reputation. Methodology: An exploratory deductive research has been carried out where methodological triangulation is applied through two research techniques: the theoretical framework and the in-depth interview. The in-depth interviews were carried out with the academic managers of the MBAs to find out in detail the contents of the curricula and the criteria used to keep them updated, to determine if there is content related to corporate reputation, as well as the reasons for including them or not. Results: The academic managers of the MBAs understand the importance of managing properly, but they do not consider that it should include specific subjects in the study plans but treat it in a transversal way. Conclusions and discussion: There is a vision of reputation linked to economic results. The core of the studies is in the development of the dimensions linked to traditional business practice.

Santana Villegas, J. R., Fernández Linares, P., Gonzálvez Vallés, J. E., & Viñarás Abad, M. (2023). MBAs in Mexico and their impact on corporate reputation executive training [Los MBA en México y su aporte a la formación en reputación corporativa]. *Revista Latina de Comunicacion Social*, *2023*(81), 423-445. doi: 10.4185/RLCS-2023-1923. Article.

MARÍA FERNANDA VIDAL CORREA

SNII Level I

ARE MEDIA COVERING WHILE WOMEN ARE CAMPAIGNING? A STUDY OF MEXICAN MUNICIPAL ELECTIONS

ABSTRACT. Studies on media coverage have found that female nominees receive unequal treatment regarding their visibility and portrayal of their agendas. To assess how media cover women, municipal elections in Mexico are analysed. By focusing on municipal elections, this research advocate for the study of local phenomena and their discourses. The study questions whether women have received equal media exposure compared to men. The research analyses how women are portrayed and explores how print news media present stories about women and the narratives included in their stories. Findings suggest that female and male candidates are equally visible, but men are singled out more often as likely winners. News reports focus mostly on 'male' issues, but coverage does not focus disproportionally on female candidates' personality traits.

Vidal-Correa, F. (2022). Are media covering while women are campaigning? A study of Mexican municipal elections. *Journal of Multicultural Discourses*, *17*(3), 203-219. doi: 10.1080/17447143.2022.2102640. Article.

ALMA DELIA ZAMORANO ROJAS
SNII Level I

ONCE UPON A TIME IN HOLLYWOOD. THE ADVENTURE OF WALT DISNEY AND THE 1ST. VISUAL EDUCATION SEMINAR

[ÉRASE UNA VEZ EN HOLLYWOOD. LA AVENTURA DE WALT DISNEY Y EL I SEMINARIO DE EDUCACIÓN VISUAL]

ABSTRACT. In 1944, Walt Disney launched the Reading for the Americas project, an ambitious plan for literacy in Latin America promoted by the Office of the Coordinator of Internal Affairs (OCAIA), which tries to solve the idea of goodwill and neighborhood proclaimed by the United States in middle of war. This article aims to document an almost unknown chapter in this adventure: the organization of the I Seminar on Visual Education, which was designed from the Disney studios in Hollywood, outlined based on the Mexican experience and a precursor to initially literate adults of all of Latin America through the use of 16mm cinema. Through the compilation of specialized archives in Mexico and based on a chronological follow-up of the activities that took place in said seminar, two paradigms raised at this meeting became triggers for the failure of the Disney project and its implementation in the American continent: teaching methodologies and projection without a proper understanding of what that region really was, coupled with political propaganda that was tried to filter by any means in all areas.

Zamorano-Rojas, A. D. (2023). Once Upon a Time in Hollywood. The Adventure of Walt Disney and the 1st. Visual Education Seminar [Érase una vez en Hollywood. La aventura de Walt Disney y el I Seminario de educación visual]. *Paginas*, *15*(39). doi: 10.35305/rp.v15i39.812. Article.

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[1] Collaboration in two articles in the School of Engineering, pp. 84-85.
[2] Collaboration in one article in the School of Engineering p. 85.

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DIAGNOSIS OF SOCIO-EDUCATIONAL NEEDS IN THE FACE OF THE COVID-19 PANDEMIC: FAMILY SITUATION IN THE STATE OF AGUASCALIENTES (MEXICO)

[DIAGNÓSTICO DE NECESIDADES SOCIOEDUCATIVAS FRENTE A LA PANDEMIA DE LA COVID-19: SITUACIÓN FAMILIAR EN EL ESTADO DE AGUASCALIENTES (MÉXICO)]

ABSTRACT. The general purpose of this study is to identify and diagnose the family situation, the main socio-educational needs and government services of support and advice required by the families of the State of Aguascalientes (Mexico), in order to guide the process of analysis and redesign of public policies in family matters, by the Strategic Consultative Body (OCE) of the State Government. For this, a study with a non-experimental design, of a transactional type and with an exploratory and descriptive scope, was carried out, in which a sample of 2,488 families answered an instrument designed to measure sociodemographic indicators, social cohesion and socio-educational needs in a context where the confinement promoted by the state and federal governments respectively due to the contingency of COVID-19 was just beginning. The analysis of the results showed an adequate level of reliability in the items analyzed for the purposes of this study. Likewise, it was revealed that in the State the priority socio-educational needs are those related to substance addictions, depression and sadness, psychological or verbal aggression, physical aggression and other addictions (social networks, video games, gambling, pornography, among others). Regarding the government services with the highest demand, family psychological care, learning assertive communication processes with children, as well as care and prevention of domestic violence were identified. The previous results are relevant for the fact of reflecting a diagnosis of the family situation in a context affected by the COVID-19 pandemic, as well as for the contribution they imply for the process of analysis and redefinition of state public policies on family matters as a result of the work of the OCE and the State Government. © SIPS.

Fernández-De-Castro J., Ramírez-Ramírez L.N. (2022). Diagnosis of Socio-Educational Needs in the Face of The Covid-19 Pandemic: Family Situation in the State of Aguascalientes (Mexico) [Diagnóstico de necesidades socioeducativas frente a la pandemia de la covid-19: situación familiar en el estado de Aguascalientes (México)]. *Pedagogía Social*, *41*, 95-109. doi: 10.7179/PSRI_2022.41.07. Article.

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FAMILY-SCHOOL LINK: ANALYSIS OF SOCIAL NEEDS FROM THE PERSPECTIVE OF PARENTS IN AGUASCALIENTES, MEXICO

[VÍNCULO FAMILIA-ESCUELA: ANÁLISIS DE LAS NECESIDADES SOCIALES DESDE LA PERSPECTIVA DE PADRES DE FAMILIA EN AGUASCALIENTES, MÉXICO]

ABSTRACT. The family is an educational agent with a great impact on social processes; the link between schools and the community has become relevant for different countries due to the context of the covid-19 crisis. The present exploratory research paper aimed to carry out an analysis of the perceptions of mothers and fathers about the social needs they present for the upbringing of their children in the context of Aguascalientes, Mexico. Was carried out under a multi-method approach with a non-experimental cross-sectional design. A total of 141 publicly funded secondary schools from the state of Aguascalientes, Mexico participated and were selected through stratified probability sampling. The total sample collected was 2,488 participants. A questionnaire was designed expressly, using the telephone technique. Results were analyzed through the qualitative content analysis strategy with MAXQDA2020. Finally, seven categories of analysis were obtained: (1) Judicial / legal advice, (2) Health and disease prevention, (3) Education, (4) Therapy or psychological counseling, (5) Family coexistence, (6) Public safety and (7) Scholarships and financial support. © 2023 Research Center of Universidad Pedagogica Nacional. All rights reserved.

Ramírez-Ramírez, L. N., & de Castro, J. F. (2023). Family-School Link: Analysis of Social Needs from the Perspective of Parents in Aguascalientes, Mexico [Vínculo familia-escuela: Análisis de las necesidades sociales desde la perspectiva de padres de familia en Aguascalientes, México]. *Revista Colombiana de Educación*, *87*, 81-110. doi: 10.17227/rce.num87-12903. Article.

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REVIEW BY MAURICE NÉDONCELLE: A PHILOSOPHY OF HISTORY. BENITEZ MESTRE, P. (2019). EDITORIAL UNIVERSITY NOTES, MEXICO CITY, 342 PP.

[RESEÑA DE MAURICE NÉDONCELLE: UNA FILOSOFÍA DE LA HISTORIA. PEDRO A. BENÍTEZ MESTRE, EDITORIAL NOTAS UNIVERSITARIAS, CIUDAD DE MÉXICO, 2019, 342 PP.]

ABSTRACT. Una de las corrientes filosóficas más importantes y estudiadas del siglo XX es el personalismo. Grandes autores desfilan en este grupo, como Gabriel Marcel, Karol Wojtyla, Emmanuel Mounier, Simone Weil, entre otros pensadores. De esta corriente viva sobresale Maurice Nédoncelle (1905-1976). de origen francés, filósofo, teólogo y sacerdote católico, que puede considerarse una figura filosófica importante, pero poco conocida. Este pensador se formó en el Seminario de San Sulpicio y La Sorbona. Recibió la influencia de Bergson, Blondel, Brunschvicg y Max Scheler. Conoció a Mounier y dialogó con él. De hecho, fue invitado a publicar textos en la revista Esprit y a ser miembro del círculo personalista, pero se rehusó a ello en virtud de que no compartía con el grupo todos sus puntos de vista sociales y políticos. Impartió clases en la Universidad de Estrasburgo, de cuya facultad de teología fue decano. Entre sus temas más destacados se encuentran el acercamiento de la antropología a la fenomenología, la reflexión sobre lo intersubjetivo desde la racionalidad, así como el estudio del amor entendido desde la interpersonalidad en el seno de la teología católica. © 2022 Centro de Investigación Social Avanzada. All rights reserved.

González Nares, G. (2022). Review by Maurice Nédoncelle: A philosophy of history. Benitez Mestre, P. (2019). Editorial University Notes, Mexico City, 342 pp. [Reseña de Maurice Nédoncelle: Una filosofía de la historia. Pedro A. Benítez Mestre, Editorial Notas Universitarias, Ciudad de México, 2019, 342 pp.]. *Open Insight*, *13*(29), 205-210. Review.

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WILLIAM OF CONCHES' DE DOCTRINA: A SCHOLASTIC SYNTHESIS ON PHILOSOPHY OF EDUCATION

[EL DE DOCTRINA DE GUILLERMO DE CONCHES: UNA SÍNTESIS ESCOLÁSTICA DE FILOSOFÍA DE LA EDUCACIÓN]

ABSTRACT. The Cathedral School of Chartres, during the XIIth Century retrieved a fertile tradition of scientific and humanistic studies. And with that it retained and articulated notion of education, which it inherited from classical antiquity. Thanks to this heritage, the notion of education was kept encyclopedic and flexible to its public. William of Conches, teacher at Chartres, wrote in his encyclopedic treatise Dragmaticon, a section devoted to the nature of education, postumously called De doctrina. In this paper is offered an introduction study on the text, its proposal of education and its elements, as well as a translation into Spanish. © 2022 Centro de Investigacion Social Avanzada. All rights reserved.

Nares, G. G., & del Carmen Meza Mejía M. (2022). William of Conches' De doctrina: a Scholastic Synthesis on Philosophy of Education [El De doctrina de c de Conches: una síntesis escolástica de filosofía de la educación]. *Open Insight*, *13*(28), 57-84. Article.

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WOMEN AND LEADERSHIP IN HIGHER EDUCATION: A SYSTEMATIC REVIEW

ABSTRACT. The theoretical postulates of gender studies demonstrate that inequality, when it comes to women, is more of a sociocultural construct than the result of nature. Gender inequality is typical of higher education, where inclusion of women was a milestone and where the "female advantage" phenomenon refers to the rise of women at this level. Thus, this study aims to investigate the patterns of action that women take in academia when exercising leadership positions. It aims to understand the social behavior related to this phenomenon based on scientific research. The study followed a quantitative method, systematizing the process based on the PRISMA. 2020 guidelines to work with the bibliographic material identified in the Scopus database, and another qualitative method was used in conjunction for a resulting descriptive documentary analysis of the results obtained. This study concludes that women exercise leadership in higher education in teaching, research, and management roles with unequal participation in each of them. © 2023 by the authors.

Meza-Mejía, M. C., Villarreal-García, M. A., & Ortega-Barba, C. F. (2023). Women and Leadership in Higher Education: A Systematic Review. *Social Sciences*, *12*(10). doi: 10.3390/socsci12100555. Review.

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RESEARCH TRENDS ON LEADERSHIP AND SCHOOL MANAGEMENT. SYSTEMATIC REVIEW OF SCIENTIFIC PRODUCTION

[TENDENCIAS INVESTIGATIVAS SOBRE LIDERAZGO Y DIRECCIÓN ESCOLAR. REVISIÓN SISTEMÁTICA DE LA PRODUCCIÓN CIENTÍFICA]

ABSTRACT. The school management and leadership field, in addition to generating new knowledge, creates new spaces for reflection around these issues and the educational context. Therefore, the work presented seeks to answer this research question: What are the trends in scientific production around school leadership and management? The objectives of the study are, on the one hand, to describe the scientific production on these topics and, on the other, to analyze their trends. A quantitative methodology was followed, systematizing the process based on the verification guidelines of the PRISMA 2020 statement for the work with the bibliographic material identified in the Scopus database; as well as other qualitative one for a subsequent descriptive documentary analysis of the results obtained. Regarding the findings, in the foreground, it is identified that the countries with the highest Spanish-speaking scientific productivity around these issues are, firstly, Spain and, secondly, Chile. Also, the research trend around school leadership and direction is fundamentally oriented to recording the experience, meaning and the actor's perception, which is why the qualitative approach primarily characterizes this type of study. Likewise it is also underlined the need to continue advancing in the construction of the field of leadership and school management based on theoretical constructs that connect the experience of reality. © 2022 Facultad de Ciencias de la Educacion. All rights reserved.

Meza Mejía, M. C., Ortega Barba, C. F., & Cobela Vargas, J. F. (2022). Research trends on leadership and school management. Systematic review of scientific production [Tendencias investigativas sobre liderazgo y dirección escolar. Revisión sistemática de la producción científica]. *Revista Fuentes*, *24*(2), 234-247. doi: 10.12795/revistafuentes.2022.19797. Article.

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FRIENDSHIP AND CHARACTER EDUCATION: A SYSTEMATIC REVIEW

[AMISTAD Y EDUCACIÓN DEL CARÁCTER: UNA REVISIÓN SISTEMÁTICA]

ABSTRACT. This paper presents a systematic review of scientific articles on friendship and character education (CE) published between 2007 and 2021. It seeks to identify the dominant theories from which CE is approached, how friendship is understood in the studies, and what specific relationship is built between friendship and character; in other words, the extent to which it is posited that friendship can be harnessed to acquire virtues. Results indicate a prevalence of a psychological approach to CE, linked to an instrumentalist perspective on friendship, which associates it with certain benefits. However, this approach is closely followed by a philosophical–moral view that understands friendship as a good in itself and, consequently, highlights its humanizing potential. The Aristotelian framework for understanding friendship and character stands out within this approach. The relationship between friendship and character in the selected articles is explored through 5 categories that emerged in the analysis: 1) friendship for char-acter; 2) character for friendship; 3) friendship and transgressions;

4) teachers' and students' perceptions of the influence of friendship; and 5) analysis of programmes that include friendship in the curriculum.

Espinosa Zárate, Z., Ahedo Ruiz, J., & Rumayor, M. (2023). Friendship and character education: A systematic review [Amistad y educación del carácter: una revisión sistemática]. *Revista Española de Pedagogía*, *81*(284), 143-169. doi: 10.22550/REP81-1-2023-08. Article.

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LA INFLUENCIA PERSONAL COMO PRINCIPIO BIOGRÁFICO, EDUCATIVO Y EVANGELIZADOR EN JOHN HENRY NEWMAN

ABSTRACT. This article is a study of the meaning and scope of personal influence in John Henry Newman. This principle is proposed as a hermeneutical key to his biography, evangelizing work and educational vision in the university, and it is contrasted with his studies and doctrine in the historical-theological and philosophical fields. It is possible to draw a parallel between the principles of influence and discipline—which for Newman encapsulate the essence and integrity of the university—and personal influence and real assent in the development of his biography. This interpretation is illuminating for understanding the author's life and teaching on self-formation.

Fernández-Castiella, J. A., Rumayor, M., & Rodríguez, J. G. (2022). La influencia personal como principio biográfico, educativo y evangelizador en John Henry Newman. *Teologia y vida*, *63*(4), 463-492. doi: 10.7764/TyV634.E1. Article.

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SCRUTON, ROGER SOBRE LA NATURALEZA HUMANA, RIALP, MADRID, 2018, 145 PP.

ABSTRACT. Sin duda alguna esta obra, cuyo tema y título versa Sobre la Naturaleza Humana, es una buena noticia editorial. El autor, Roger Scruton, es un eminente filósofo y profesor de universidad. La novedad que presenta el escrito no es tanto por el tema que aborda, un concepto frecuentemente tratado en la filosofía clásica, sino por atreverse a hacerlo valiéndose de una metodología original en la segunda década del siglo XXI. Además, se agradece en su lectura la calidad literaria de la traducción realizada por Josemaría Carabante. El libro consta de cuatro apartados, tres de los cuales fueron previamente presentados como conferencias en la universidad de Princeton, más un capítulo añadido a tales textos. Eso otorga al lector la posibilidad de realizar una lectura no secuencial de la obra.

Scruton se define a sí mismo como un intelectual conservador y se jacta en algunas entrevistas de haber conseguido entrar con rango de Visiting Professor, cual caballo de Troya bajo el auspicio del College dominico Blackfriars, en la prestigiosa y ahora liberal Universidad de Oxford. Tal vez a eso se deba el talante que impregna Sobre la Naturaleza Humana, orientada en cierto modo a actuar como piedra de escándalo entre intelectuales que dirigen el main stream en la filosofía anglosajona. Ya que el autor aborda algunos temas propios de ese espacio intelectual como son la genética, la culpa, el Yo, la identidad o la risa, para a través de estos pergeñar conceptos fundamentales de la antropología clásica como son la esencialidad del ser humano y su constitución trascendente o la originalidad y deferencia de nuestra especie frente a otras.

Rumayor, M. (2019). Scruton, Roger Sobre la naturaleza humana, Rialp, Madrid, 2018, 145 pp. *Anuario Filosófico*, *52*(1), 214-217. doi: 10.15581/009.52.36820. Review.

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CHANGES IN THE SENSORY ODOR PROFILE DURING CHORIZO MATURATION AND THEIR RELATIONSHIP WITH VOLATILE COMPOUND PATTERNS BY PARTIAL LEAST SQUARE REGRESSION (PLS)

ABSTRACT. Odor is one of the most important attributes to determine the overall acceptance of a product. The aim of this investigation is to evaluate the changes in the odor profile and the volatile compounds during thirty-three days of ripening to obtain the pattern of volatile compounds necessary to integrate the odor profile of chorizo (fermented sausage), using Partial Least Squares (PLS). The chili and pork meat odors were predominant during the first five days, vinegar and fermented odors at days twelve and nineteen days, and finally a rancid odor predominated at the end. Only the vinegar, rancid, and fermented odors could be predicted with a good fit model, with the R2 coefficient above 0.5, using linear PLS, and the pork meat odor using logarithmic PLS. Each group of volatile compounds interacted in different ways; esters had a positive influence on the vinegar and rancid odors, but a negative on the fermented odor. Some volatile compounds contributed to more than one odor, such as hexanal, ethanol, and ethyl octanoate. This work allowed us to understand the pattern of volatile compounds required to generate some of the specific odors of chorizo; further studies are required to explore the effect of other food components on these patterns of odors.

Carmona-Escutia, R. P., Ponce-Alquicira, E., García-Parra, M. D., Villanueva-Rodríguez, S. J., & Escalona-Buendía, H. B. (2023). Changes in the Sensory Odor Profile during Chorizo Maturation and Their Relationship with Volatile Compound Patterns by Partial Least Square Regression (PLS). *Foods*, *12*(5). doi: 10.3390/foods12050932. Article.

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SYSTEMS APPROACH FOR THE ADOPTION OF NEW TECHNOLOGIES IN ENTERPRISES

ABSTRACT. There is a great challenge in the business sector to adopt new technologies that boost companies to break into Industry 4.0, especially to obtain the capacity to adopt and develop complex systems based on: artificial intelligence, Big Data, Data Mining, and Cyber Physical Systems. However, efforts tend to be more of an empirical process, rather than a prior analysis, that allows companies to identify the complexity of the situation and trigger a viable implementation. For this reason, this research carried out a systematic review to identify and analyze, from the Systems Science approach, the proposed and most used models to face these organizational problems. In total, 42 of the 3800 documents were filtered for discussion using a systems approach. In addition, one of the models was tested by interviews with Mexican managers to understand how it promotes the abstraction of complexity necessary for a viable system change. The findings at the end of the work were to determine the lack of systemic properties in the current proposals, especially in the efforts to adopt artificial intelligence and the need to have a suitable model for the context of technology.

Ramírez-Gutiérrez, A. G., Solano García, P., Morales Matamoros, O., Moreno Escobar, J. J., & Tejeida-Padilla, R. (2023). Systems Approach for the Adoption of New Technologies in Enterprises. *Systems*, *11*(10). doi: 10.3390/systems11100494. Article.

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MAPS AND TERRITORIES IN SCIENTIFIC INVESTIGATION

ABSTRACT. Already in the 'classical' Greek culture a partition of the 'sciences' was recognized and established either by considering their different aim, or their different subject matter. This was the first appearance of 'territories' in science which, however, did not entail a differentiation in the cognitive approach. A new model of science was introduced in the age of Renaissance with the Galilean revolution based on the proposal to delimit the inquiry to the behavior of physical bodies and, moreover, by considering only a restricted amount of their properties (the measurable magnitudes). This delimitation of 'territory' was accompanied by a significant novelty in the admitted tools of inquiry, that were concentrated in the use of mathematical descriptions and the adoption of the experimental method. By means of these tools a display of mappings was developed during a couple of centuries, thanks to which the different 'sub-territories' of physics were investigated by using the methods originally proposed for mechanics. This was a reductionist program whose aim was that of overcoming the partition in territories and recover the unitary totality at least of the physical world. The failure of this program at the end of the 19th century was interpreted by certain philosophers as the evidence that science is unable to offer a reliable knowledge of reality. This pessimistic view can be avoided by recognizing that science is constituted by a rich variety of 'territories' (including also the broad display of the social sciences and humanities), that is, of really distinct disciplines each having its own domain of objects which is also its specific 'conceptual space'. Within this conceptual space several scientific theories are proposed offering different ways of mapping the territory. Both moments rely upon the presence of operational procedures that are essential for linking the maps with the territories and justify a realistic conception of science. © 2018, Springer International Publishing AG.

Agazzi, E. (2018). Maps and Territories in Scientific Investigation. In Wuppuluri, S., & Doria, F. A. (Eds.), *The Map and the Territory: Exploring the Foundations of Science, Thought and Reality* (pp. 3-14). Springer. doi: 01.1007/978-3-319-72478-2_1. Book Chapter.

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SLEEP AND PERCEIVED STRESS: AN EXPLORATORY MEDIATION ANALYSIS OF THE ROLE OF SELF-CONTROL AND RESILIENCE AMONG UNIVERSITY STUDENTS

ABSTRACT. Background: High levels of stress are frequent in university education, and a lack of sleep has been reported to make students more vulnerable to stress. The mechanisms through which sleep harms students have not been sufficiently clarified; therefore, this study aimed to explore the mediating role of self-control and resilience in the relationship between sleep quality and duration and perceived stress. Methods: Of 32 first-year college students, 21 (78%) were women, with a mean age of 18.47 (±0.84). They responded to a self-administered survey that included questions on stress, resilience, and sleep quality and recorded their daily sleep duration using a wristband for six days. Results: Perceived stress was significantly correlated with resilience (r = −0.63). self-control (r = −0.46). sleep duration (r = −0.35). and lower sleep quality (r = 0.57). Path analysis revealed that self-control and resilience were partially mediated by sleep quality (R2 = 0.62; p < 0.01) and completely mediated by sleep duration (R2 = 0.46; p < 0.01). In both models, self-control had a direct effect on resilience and had a good-fit index. Conclusion: Being resilient seems to play a mediating role in the relationship between sleep and perceived stress; this ability can be favored by self-control, which is directly influenced by sleep. © 2023 by the authors.

Tafoya, S. A., Aldrete-Cortez, V., Tafoya-Ramos, F., Fouilloux-Morales, C., & Díaz-Olavarrieta C. (2023). Sleep and Perceived Stress: An Exploratory Mediation Analysis of the Role of Self-Control and Resilience among University Students. *International Journal of Environmental Research and Public Health*, *20*(16). doi: 10.3390/ijerph20166560. Article.

VANIA ROCÍO ALDRETE CORTEZ

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THE CONTRIBUTION OF SELF-CONCEPT TO SLEEP QUALITY IN ADOLESCENTS: A CROSS-SECTIONAL STUDY

ABSTRACT. Self-concept has been associated with health-related behaviors and emotional self-regulation, which can improve sleep. However, its involvement in sleep quality in a healthy adolescent population has been little studied. This study evaluated the association between self-concept and sleep quality in adolescents adjusting for sleep/wake habits. The cross-sectional study included 1,751 adolescents, 54% females, with an age of M = 16.76 ± 1.04 years. The information was collected through an electronic survey that contained the Patient Health Questionnaire, Sleep Habits Questionnaire, Pittsburgh Sleep Quality Index, and Self-Concept Scale. A significant association between self-concept, adjustment for adolescents´ characteristics and sleep/wake habits was observed (R 2 = .17, F = 26.61, p < .001). That is, in addition to the adolescent habits, self-concept also contributed to the explanation of sleep/wake habits. These results reinforce the idea that the self-concept can be an essential factor that contributes to better sleep quality, despite the habits of adolescents. © 2022 Informa UK Limited, trading as Taylor & Francis Group.

Tafoya, S. A., Aldrete-Cortez, V., Fouilloux-Morales, M., & Fouilloux, C. (2022). The contribution of self-concept to sleep quality in adolescents: A cross-sectional study. *Psychology, Health and Medicine*, *28*(4), 938-945. doi: 10.1080/13548506.2022.2090583. Article.

VANIA ROCÍO ALDRETE CORTEZ

SNII Level I

THE EMOTIONAL EXPERIENCE OF MEXICAN WOMEN WITH SARS-COV-2 DURING PREGNANCY—A QUALITATIVE STUDY

ABSTRACT. Pregnant women have been considered a high-risk group for SARS-CoV-2 infection; the impact of the disease on the health of a mother and her child is still being studied. The emotional impact of the pandemic on pregnant women has been extensively studied. Emotional distress is proposed as a perspective to explain the emotional manifestations in women during this stage as something common rather than pathological. The objective of this study was to explore the emotional experience of women who tested positive for SARS-CoV-2 towards the end of their pregnancy, during the first and second waves of COVID-19 in Mexico. A qualitative study was carried out: 18 pregnant women with COVID-19 were interviewed. A thematic analysis of the data was performed, resulting in 3 main themes and 14 subthemes. The COVID-19-infected mothers-to-be experienced mild to moderate emotional distress. It was more intense for those with comorbidities. This distress

was aggravated during obstetrical complications and comorbidities, as well as during COVID-19 and postpartum. The emotional distress was appeased by both the perception of medical care and social support. The emotional distress of pregnant women with COVID-19 requires emotional support to reduce its impact. © 2023 by the authors.

Gómez-López, M. E., Aldrete-Cortez, V., González-Carpinteiro, A., Mendizábal-Espinosa, R., & Bobadilla, L. (2023). The Emotional Experience of Mexican Women with SARS-CoV-2 during Pregnancy—A Qualitative Study. *Healthcare*, *11*(20). doi: 10.3390/healthcare11202785. Article.

VÍCTOR MANUEL ARENAS LUNA

Research Professor

DESIDERIO SALOMÓN HERNÁNDEZ GUTIÉRREZ

SNII Level I

IN VITRO EVIDENCE OF DIFFERENTIAL IMMUNOREGULATORY RESPONSE BETWEEN MDA-MB-231 AND BT-474 BREAST CANCER CELLS INDUCED BY BONE MARROW-DERIVED MESENCHYMAL STROMAL CELLS CONDITIONED MEDIUM

ABSTRACT. Inside tumors, cancer cells display several mechanisms to create an immunosuppressive environment. On the other hand, by migration processes, mesenchymal stromal cells (MSCs) can be recruited by different cancer tumor types from tissues as distant as bone marrow and contribute to tumor pathogenesis. However, the impact of the immunoregulatory role of MSCs associated with the aggressiveness of breast cancer cells by soluble molecules has not been fully elucidated. Therefore, this in vitro work aimed to study the effect of the conditioned medium of human bone marrow-derived-MSCs (hBM-MSC-cm) on the immunoregulatory capability of MDA-MB-231 and BT-474 breast cancer cells. The hBM-MSC-cm on MDA-MB-231 cells induced the overexpression of TGF-β, IDO, and IL-10 genes. Additionally, immunoregulation assays of mononuclear cells (MNCs) in co-culture with MDA-MB-231 and hBM-MSC-cm decreased lymphocyte proliferation, and increased proteins IL-10, TGF-β, and IDO while also reducing TNF levels, shooting the proportion of regulatory T cells. Conversely, the hBM-MSC-cm did not affect the immunomodulatory capacity of BT-474 cells. Thus, a differential immunoregulatory effect was observed between both representative breast cancer cell lines from different origins. Thus, understanding the immune response in a broader tumor context could help to design therapeutic strategies based on the aggressive behavior of tumor cells. © 2022 by the authors.

Arenas-Luna, V. M., Montesinos, J. J., Cortés-Morales, V. A., Navarro-Betancourt, J. R., Peralta-Ildefonso, J., Cisneros, B., & Hernández-Gutiérrez, S. (2023). In Vitro Evidence of Differential Immunoregulatory Response between MDA-MB-231 and BT-474 Breast Cancer Cells Induced by Bone Marrow-Derived Mesenchymal Stromal Cells Conditioned Medium. *Current Issues in Molecular Biology*, *45*(1), 268-285. doi: 10.3390/cimb45010020. Article.

GERARDO ARRELLÍN ROSAS

Research Professor

AQUEOUS FRACTION FROM CUCUMIS SATIVUS AERIAL PARTS ATTENUATES ANGIOTENSIN II-INDUCED ENDOTHELIAL DYSFUNCTION IN VIVO BY ACTIVATING AKT

ABSTRACT. Background: Endothelial dysfunction (ED) is a marker of vascular damage and a precursor of cardiovascular diseases such as hypertension, which involve inflammation and organ damage. Nitric oxide (NO), produced by eNOS, which is induced by pAKT, plays a crucial role in the function of a healthy endothelium. Methods: A combination of subfractions SF1 and SF3 (C4) of the aqueous fraction from Cucumis sativus (Cs-Aq) was evaluated to control endothelial dysfunction in vivo and on HMEC-1 cells to assess the involvement of pAkt in vitro. C57BL/6J mice were injected daily with angiotensin II (Ang-II) for 10 weeks. Once hypertension was established, either Cs-AqC4 or losartan was orally administered along with Ang-II for a further 10 weeks. Blood pressure (BP) was measured at weeks 0, 5, 10, 15, and 20. In addition, serum creatinine, inflammatory status (in the kidney), tissue damage, and vascular remodeling (in the liver and aorta) were evaluated. Cs-AqC4 was also tested in vitro on HMEC-1 cells stimulated by Ang-II to assess the involvement of Akt phosphorylation. Results: Cs-AqC4 decreased systolic and diastolic BP, reversed vascular remodeling, decreased IL-1β and TGF-β, increased IL-10, and decreased kidney and liver damage. In HMEC-1 cells, AKT phosphorylation and NO production were increased. Conclusions: Cs-AqC4 controlled inflammation and vascular remodeling, alleviating hypertension; it also improved tissue damage associated with ED, probably via Akt activation. © 2023 by the authors.

Trejo-Moreno, C., Alvarado-Ojeda, Z. A., Méndez-Martínez, M., Cruz-Muñoz, M. E., Castro-Martínez, G., Arrellín-Rosas, G., Zamilpa, A., Jimenez-Ferrer, J. E., Baez Reyes, J. C., Fragoso, G., & Salgado G. R. (2023). Aqueous Fraction from Cucumis sativus Aerial Parts Attenuates Angiotensin II-Induced Endothelial Dysfunction In Vivo by Activating Akt. *Nutrients*, *15*(21). doi: 10.3390/nu15214680. Article.

VÍCTOR HUGO GÁLVEZ ZÚÑIGA

SNII Level I

COGNITIVE FOLLOW-UP IN ANTI-N-METHYL-D-ASPARTATE RECEPTOR ENCEPHALITIS: HOSPITAL DISCHARGE, 4, 8, AND 12 MONTHS

ABSTRACT. Cognitive dysfunction is a core symptom in patients with Anti-N-methyl-D-aspartate (NMDA) receptor encephalitis (ANMDARE). In stark contrast to the good functional (neurological) outcome observed in most ANMDARE patients (81%) after 18 months of hospital discharge, 80% of patients exhibit moderate or severe cognitive impairment even two years after the acute phase. Despite clinical features during the recovery phase having been widely characterized, our understanding of cognitive recovery during the first year remains incomplete since most reports have cross-sectional study designs or small sample sizes in which the administered neuropsychological tests and follow-up times (when available) are heterogeneous.

To sum up the main cognitive reports, neuropsychological cross-sectional studies have revealed deficits related to attention, language, visuospatial function, and episodic and working memory. Nevertheless, longitudinal and systematic neuropsychological assessments reveal a wider picture. According to a recent study of 43 ANMDARE patients, moderate or severe cognitive impairments persisted for an average 2.3 years after onset, mainly in memory and executive function domains. Significant improvements were observed in neuropsychological performance after 4.9 years, but 2/3 of patients still had moderate to severe deficits despite favorable neurological outcomes. However, this approach does not provide information on the evolution of cognitive functions until 2 years after the acute stage. Therefore, detailed cognitive outcomes during the first year are still lacking.

We aim to describe the cognitive outcomes in ANMDARE patients through a

comprehensive neuropsychological assessment at hospital discharge as well as after 4, 8, and 12 months.

Bayliss, L., Sandoval, A. M., Nava, A., Diaz-Victoria, A. R., Espinola-Nadurille, M., Ramírez-Bermúdez, J., & Galvez, V. (2023). Cognitive follow-up in anti-N-methyl-D-aspartate receptor encephalitis: Hospital discharge, 4, 8, and 12 months. *Clinical Neurology and Neurosurgery*, *228*. doi: 10.1016/j.clineuro.2023.107701. Article.

VÍCTOR HUGO GÁLVEZ ZÚÑIGA

SNII Level I

IS BRAIN PERFUSION CORRELATED TO SWITCHING MOOD STATES AND COGNITIVE IMPAIRMENT IN BIPOLAR DISORDER TYPE I? A LONGITUDINAL STUDY USING PERFUSION IMAGING APPROACH

ABSTRACT. Type I Bipolar disorder (BD-I) is a neuropsychiatric disorder characterized by manic or mixed-featured episodes, impaired cognitive functioning, and persistent work and social functioning impairment. This study aimed to investigate within-subject; (i) differences in brain perfusion using Single-photon emission computed tomography (SPECT) between manic and euthymic states in BD-I patients; (ii) explore potential associations between altered brain perfusion and cognitive status; and (iii) examine the relationship between cerebral perfusion and mania symptom ratings. Seventeen adult patients diagnosed with BD-I in a manic episode were recruited, and clinical assessments, cognitive tests, and brain perfusion studies were conducted at baseline (mania state) and a follow-up visit 6 months later. The results showed cognitive impairment during the manic episode, which persisted during the euthymic state at follow-up. However, no significant changes in brain perfusion were observed between the manic and euthymic states. During mania, trends toward decreased perfusion in the left cerebellum and right superior parietal lobule were noted. Additionally, trends indicated a higher perfusion imbalance in the left superior and middle frontal gyrus during mania and the right superior and middle frontal gyrus during euthymia. No significant correlations existed between brain perfusion, mania symptom ratings, and cognitive performance, indicating that symptomatology might represent more than neural hemodynamics. These findings suggest that cognitive impairment may persist in BD-I patients and highlight the need for therapeutic interventions targeting cognitive deficits. More extensive studies with extended follow-up periods are warranted further to investigate brain perfusion and cognitive functioning in BD-I patients. Copyright © 2023 Estudillo-Guerra, Linnman, Galvez, Chapa-Koloffon, Pacheco-Barrios, Morales-Quezada and Flores Ramos.

Estudillo-Guerra, M. A., Linnman, C., Galvez, V., Chapa-Koloffon, G., Pacheco-Barrios, K., Morales-Quezada, L., & Flores Ramos, M. (2023). Is brain perfusion correlated to switching mood states and cognitive impairment in bipolar disorder type I? A longitudinal study using perfusion imaging approach. *Frontiers in Psychiatry*, *14*. doi: 10.3389/fpsyt.2023.1244134. Article.

VÍCTOR HUGO GÁLVEZ ZÚÑIGA

SNII Level I

VALIDATING A BRIEF EMPATHY QUOTIENT TEST WITH ADOLESCENTS FROM MEXICO

ABSTRACT. Empathy is a skill that enables the identification with and interpretation of others' subjective experiences. The purpose of this study was to validate the Empathy Quotient (EQ) in adolescents in Mexico. A sample of 573 Mexican adolescent students (350 female and 223 male) with an age range of 12-19 years was employed (Mage= 14.8 years, SD= 1.96). An exploratory factor analysis (EFA) was carried out which identified two factors, one with 16 items associated with the affective dimension and one with 13 items related to the cognitive dimension (model fit indices: GFI= .984, RMSEA= .034, and RMSR= .072). To evaluate the resultant bifactor model, a confirmatory factor analysis (CFA) was performed, showing good fit indexes (RMSEA= .020, RMSR= .045, CFI= .998, GFI= .988). Regarding internal consistency, we found a McDonald's ω correlation coefficient of= .941 for the affective dimension and ω= .772 for the cognitive dimension, with p< .001. The validation of this empathy instrument will support its use as a clinical research assessment tool in Mexican adolescents. © 2023, Fundacion VECA. All rights reserved.

Ledesma-Amaya, L., Galindo-Aldana, G., Galvez, V., Salvador-Cruz, J., & Guzmán-Saldaña, R. (2023). Validating a Brief Empathy Quotient Test With Adolescents From Mexico. *Behavioral Psychology/Psicologia Conductual*, *31*(1), 59-76. doi: 10.51668/bp.8323104n. Article.

BLANCA ESTELA LÓPEZ HERNÁNDEZ

Research Professor

MARÍA JOSÉ GONZÁLEZ MIER

Research Professor

PROFESSIONAL DEVELOPMENT AND ACADEMIC SATISFACTION FROM A WOUND PROGRAMME IN LATIN AMERICA: 10 YEARS OF EXPERIENCE

ABSTRACT. Objective: Latin America had only one Spanish-speaking postgraduate academic programme on managing wounds and ostomies until 2021. Since then, two more programmes have been developed; one in Colombia and another in Mexico. Therefore, studying alumni outcomes becomes highly relevant. We aimed to describe the alumni's professional development and academic satisfaction from a Wound, Ostomy and Burn Therapy postgraduate programme in Mexico City, Mexico. Method: An electronic survey was sent to all alumni from January–July 2019 from the School of Nursing of Universidad Panamericana. Employability, academic development and satisfaction following completion of the academic programme were evaluated. Results: From 88 respondents, 77 of whom were nurses, 86 (97.7%) answered that they were working, and 86.4% were working in an area related to the studied programme. Regarding general satisfaction, 88% were totally satisfied/satisfied with the programme and 93.2% would recommend it. Conclusion: Alumni from the Wound, Ostomy and Burn Therapy postgraduate programme are satisfied with the academic curriculum and have good professional development, demonstrated by a high employment rate. Declaration of interest: The authors have no conflicts of interest. © 2023 MA Healthcare Ltd. All rights reserved.

Chico-Barba, G., Jiménez-Limas, K., López-Hernández, B., Murad-Robles, Y., González-Mier, M. J., Bonilla, A., Vila-Zepeda, A., & Rubilar, X. (2023). Professional development and academic satisfaction from a wound programme in Latin America: 10 years of experience. *Journal of Wound Care*, *32*(6). doi: 10.12968/jowc.2023.32.Sup6.S4. Article.

MARIO ISAAC LUMBRERAS MÁRQUEZ

SNII Level I

ABDOMINAL CIRCUMFERENCE GROWTH VELOCITY AS A PREDICTOR OF ADVERSE PERINATAL OUTCOMES IN SMALL-FOR-GESTATIONAL-AGE FETUSES

ABSTRACT. Objective: To assess the predictive value of abdominal circumference growth velocity (ACGV) between the second and third trimesters to predict adverse perinatal outcomes in a cohort of small-for-gestational-age fetuses without evidence of placental insufficiency (i.e. fetal growth restriction). Material and methods: This is a single-center retrospective cohort study of all singleton pregnancies with small-for-gestational-age fetuses diagnosed and delivered at a quaternary institution. Crude and adjusted odds ratios (ORs) and corresponding confidence intervals (CIs) were calculated via logistic regression models to assess the potential association between abnormal ACGV (i.e. ≤10th centile) and adverse perinatal outcomes defined as a composite outcome (i.e. umbilical artery pH <7.1, 5-min Apgar score <7, admission to the neonatal intensive care unit, hypoglycemia, intrapartum fetal distress requiring expedited delivery, and perinatal death). Furthermore, the area under the receiver-operating characteristic curve (AUC) of three logistic regression models based on estimated fetal weight and ACGV for predicting the composite outcome is also reported. Results: A total of 154 pregnancies were included for analysis. The median birthweight for the cohort was 2,437 g (interquartile range [IQR] 2280, 2635). Overall, the primary composite outcome was relatively common (29.2%). In addition, there was a significant association between abnormal ACGV and adverse perinatal outcomes (OR 3.37, 95% CI 1.60, 7.13; adjusted OR 4.30, 95% CI 1.77, 10.49). Likewise, the AUC for the ACGV was marginally higher (0.64) than the estimated fetal weight (0.54) and ACGV + estimated fetal weight (0.54). Still, no significant difference was detected between the curves (p = 0.297). Conclusions: Our results suggest that an ACGV below the 10th centile is a risk factor for adverse perinatal outcomes among small-for-gestational-age fetuses. © 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Rodríguez-Sibaja, M. J., Villa-Cueva, A., Ochoa-Padilla, M., Rodríguez-Montenegro, M. S., Lumbreras-Marquez, M. I., Acevedo-Gallegos, S., Gallardo-Gaona, J. M., & Copado-Mendoza, Y. (2023). Abdominal circumference growth velocity as a predictor of adverse perinatal outcomes in small-for-gestational-age fetuses. *Journal of Maternal-Fetal and Neonatal Medicine*, *36*(2). doi: 10.1080/14767058.2023.2262077. Article.

MARIO ISAAC LUMBRERAS MÁRQUEZ

SNII Level I

INTENDED DELIVERY MODE AND NEONATAL OUTCOMES IN PREGNANCIES WITH FETAL GROWTH RESTRICTION

ABSTRACT. Objective: To compare neonatal outcomes in pregnancies with fetal growth restriction (FGR) by intended delivery mode. Methods: This is a retrospective cohort study of singleton pregnancies with FGR that were delivered ≥34.0 weeks gestation. Neonatal outcomes were compared according to the intended delivery mode, which the attending obstetrician determined. Of note, none of the subjects had a contraindication to labor. Crude and adjusted odds ratios (ORs) and corresponding confidence intervals (CIs) were calculated via logistic regression models to assess the potential association between intended delivery mode and neonatal morbidity defined as a composite outcome (i.e. umbilical artery pH ≤7.1, 5-min Apgar score ≤7, admission to the neonatal intensive care unit, hypoglycemia, intrapartum fetal distress requiring expedited delivery, and perinatal death). A sensitivity analysis excluded intrapartum fetal distress requiring emergency cesarean delivery from the composite outcome since only patients with spontaneous labor or labor induction could meet this criterion. Potential confounders in the adjusted effects models included maternal age, body mass index, hypertensive disorders, diabetes, FGR type (i.e. early or late), and oligohydramnios. Results: Seventy-two (34%) patients had an elective cesarean delivery, 73 (34%) had spontaneous labor and were expected to deliver vaginally, and 67 (32%) underwent labor induction. The composite outcome was observed in 65.3%, 89%, and 88.1% of the groups mentioned above, respectively (p < 0.001). Among patients with spontaneous labor and those scheduled for labor induction, 63% and 47.8% required an emergency cesarean delivery for intrapartum fetal distress. Compared to elective cesarean delivery, spontaneous labor (OR 4.32 [95% CI 1.79, 10.42], p = 0.001; aOR 4.85 [95% CI 1.85, 12.66], p = 0.001), and labor induction (OR 3.92 [95% CI 1.62, 9.49] p = 0.002; aOR 5.29 [95% CI 2.01, 13.87], p = 0.001) had higher odds of adverse neonatal outcomes. Conclusion: In this cohort of FGR, delivering at ≥34 weeks of gestation, pregnancies with spontaneous labor, and those that underwent labor induction had higher odds of neonatal morbidity than elective cesarean delivery. © 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Rodríguez-Sibaja, M. J., Mendez-Piña, M. A., Lumbreras-Márquez, M. I., Acevedo-Gallegos, S., Velázquez-Torres, B., & Ramírez-Calvo, J. A. (2023). Intended delivery mode and neonatal outcomes in pregnancies with fetal growth restriction. *Journal of Maternal-Fetal and Neonatal Medicine*, *36*(2). doi: 10.1080/14767058.2023.2286433. Article.

CARLOS FEDERICO ORTÍZ HIDALGO

SNII Level II

POORLY DIFFERENTIATED SYNOVIAL SARCOMA OF THE CHEST WALL WITH RHABDOID FEATURES

[SARCOMA SINOVIAL POBREMENTE DIFERENCIADO DE PARED DEL TÓRAX CON CARACTERÍSTICAS RABDOIDES]

ABSTRACT. We report a rare case of a poorly differentiated synovial sarcoma (SS) with rhabdoid features. A 33-year-old woman was referred to our hospital with a chest wall tumor. MRI revealed a diffuse mass that invaded the pleura and extended into the esophagus, aorta, diaphragm and pancreas. Histopathological examination of the neoplasm showed it to be composed of sheets of small/medium cells with rhabdoid morphology, consisting of round, eccentrically localized nuclei, conspicuous nucleoli, and eosinophilic cytoplasm. Immunohistochemical studies demonstrated the tumor cells to be positive for TLE1, Bcl-2, EMA, CAM5.2, CD138 and CD56 and negative for desmin, smooth muscle actin or S100 protein. Fluorescent in-situ hybridization technique, performed on the paraffin section, showed SS18 gene rearrangement in the nuclei of the tumor cells. Poorly differentiated SS with "rhabdoid" features was diagnosed. This is only the 8 th case of a SS with "rhabdoid"

features reported to date. © 2022 Sociedad Española de Anatomía Patológica.

Canchola-Ibarra, A. O., & Ortiz-Hidalgo, C. (2022). Poorly differentiated synovial sarcoma of the chest wall with rhabdoid features [Sarcoma sinovial pobremente diferenciado de pared del tórax con características rabdoides]. *Revista Española de Patología*, *56*(3), 201-205. doi: 10.1016/j.patol.2022.07.001. Article.

CARLOS FEDERICO ORTÍZ HIDALGO

SNII Level II

PRIMARY CUTANEOUS ANAPLASTIC LARGE CELL LYMPHOMA—A REVIEW OF CLINICAL, MORPHOLOGICAL, IMMUNOHISTOCHEMICAL, AND MOLECULAR FEATURES

ABSTRACT. Primary cutaneous anaplastic large cell lymphoma (ALCL) is the second most common cutaneous T-cell lymphoma after mycosis fungoides and belongs to the spectrum of cutaneous CD30+ T-cell lymphoproliferative disorders. Although primary cutaneous ALCL usually presents as a localized nodule or papule with or without ulceration, multifocal lesions may occur in up to 20% of cases. Histologically, primary cutaneous ALCL consists of a diffuse dermal infiltrate of medium to large anaplastic/pleomorphic cells with abundant amphophilic-to-eosinophilic cytoplasm, horseshoe-shaped nuclei, strong and diffuse expression of CD30, and with focal or no epidermotropism. The neoplastic infiltrate may show angiocentric distribution and may extend to the subcutis. Patients with localized or multifocal disease have a similar prognosis with a 10-year overall survival rate of 90%. Approximately 30% of primary cutaneous ALCLs harbor a DUSP22 (6p25.3) gene rearrangement that results in decreased expression of this dual-specific phosphatase, decreased STAT3 activation, and decreased activity of immune and autoimmune-mediated mechanisms regulated by T-cells. © 2023 by the authors.

Ortíz-Hidalgo, C., & Pina-Oviedo, S. (2023). Primary Cutaneous Anaplastic Large Cell Lymphoma—A Review of Clinical, Morphological, Immunohistochemical, and Molecular Features. *Cancers*, *15*(16). doi: 10.3390/cancers15164098. Review.

DIANA PACHECO ÁLVAREZ

SNII Level I

KARLA LEYVA RÍOS

Research Professor

STRUCTURE-FUNCTION RELATIONSHIPS IN THE SODIUM CHLORIDE COTRANSPORTER

ABSTRACT. The thiazide sensitive Na+:Cl– cotransporter (NCC) is the principal via for salt reabsorption in the apical membrane of the distal convoluted tubule (DCT) in mammals and plays a fundamental role in managing blood pressure. The cotransporter is targeted by thiazide diuretics, a highly prescribed medication that is effective in treating arterial hypertension and edema. NCC was the first member of the electroneutral cation-coupled chloride cotransporter family to be identified at a molecular level. It was cloned from the urinary bladder of the Pseudopleuronectes americanus (winter flounder) 30 years ago. The structural topology, kinetic and pharmacology properties of NCC have been extensively studied, determining that the transmembrane domain (TM) coordinates ion and thiazide binding. Functional and mutational studies have discovered residues involved in the phosphorylation and glycosylation of NCC, particularly on the N-terminal domain, as well as the extracellular loop connected to TM7-8 (EL7-8). In the last decade, single-particle cryogenic electron microscopy (cryo-EM) has permitted the visualization of structures at high atomic resolution for six members of the SLC12 family (NCC, NKCC1, KCC1-KCC4). Cryo-EM insights of NCC confirm an inverted conformation of the TM1-5 and TM6-10 regions, a characteristic also found in the amino acid-polyamine-organocation (APC) superfamily, in which TM1 and TM6 clearly coordinate ion binding. The high-resolution structure also displays two glycosylation sites (N-406 and N-426) in EL7-8 that are essential for NCC expression and function. In this review, we briefly describe the studies related to the structure-function relationship of NCC, beginning with the first biochemical/functional studies up to the recent cryo-EM structure obtained, to acquire an overall view enriched with the structural and functional aspects of the cotransporter. Copyright © 2023 Moreno, Pacheco-Álvarez, Chávez-Canales, Elizalde, Leyva-Ríos and Gamba.

Moreno, E., Pacheco-Álvarez, D., Chávez-Canales, M., Elizalde, S., Leyva-Ríos, K., & Gamba G. (2023). Structure-function relationships in the sodium chloride cotransporter. *Frontiers in Psychology*, *14*. doi: 10.3389/fphys.2023.1118706. Review.

GREGORIO TOMÁS OBRADOR VERA

SNII Level III

MANAGEMENT OF ANEMIA IN NONDIALYSIS CHRONIC KIDNEY DISEASE: CURRENT RECOMMENDATIONS, REAL-WORLD PRACTICE, AND PATIENT PERSPECTIVES

ABSTRACT. In nondialysis CKD (ND-CKD), anemia is a multifactorial and complex condition in which several dysfunctions dynamically contribute to a reduction in circulating hemoglobin (Hb) levels in red blood cells. Anemia is common in CKD and represents an important and modifiable risk factor for poor clinical outcomes. Importantly, symptoms related to anemia, including reduced physical functioning and fatigue, have been identified as high priorities by patients with CKD. The current management of anemia in ND-CKD (i.e., parameters to initiate treatment, Hb and iron indexes targets, choice of therapies, and effect of treatment on clinical and patient-reported outcomes) remains controversial. In this review article, we explore the epidemiology of anemia in ND-CKD and revise current recommendations and controversies in its management. Exploring data from real-world clinical practices, particularly from the Chronic Kidney Disease Outcomes and Practice Patterns Study (CKDopps), we highlight the current challenges to translating current recommendations to clinical practice, providing patients' perspectives of anemia and how it affects their quality of life. Finally, we summarize recent advances in the field of anemia that may change the way this condition will be managed in the future. Copyright © 2020 by the American Society of Nephrology.

Guedes, M., Robinson, B. M., Obrador, G., Tong, A., Pisoni, R. L., & Pecoits-Filho, R. (2020). Management of Anemia in Nondialysis Chronic Kidney Disease: Current Recommendations, Real-World Practice, and Patient Perspectives. *Kidney360*, *1*(8), 855-862. doi: 10.34067/KID.0001442020. Conference Paper.

GREGORIO TOMÁS OBRADOR VERA

SNII Level III

NEPHROLOGY IN MEXICO

ABSTRACT. Nephrology in Mexico started in 1955 with the opening of the nephrology department at Mexico's National Heart Institute, where the first nephrology training program began in 1958. Pediatric nephrology

care was first offered at Mexico's Federico Gomez Children's Hospital in 1953, among the first pediatric nephrology programs in the world. Kidney transplantation began in 1963 at the IMSS General Hospital. The Sociedad Mexicana de Nefrologia, the first Mexican nephrology society, was established in 1967, followed by the publication of Nefrologia Mexicana, its official journal, in 1980. Chronic kidney disease has emerged as a public health problem in Mexico. However, the fragmentation of the health system has resulted in unequal access to renal replacement therapy. Seguro Popular, a public health-care insurance for the poor, does not cover renal replacement therapy. As a consequence, many uninsured patients refuse dialysis, eventually abandon their treatment, or lose their kidney grafts because sustaining dialysis or immunosuppression becomes unaffordable. The lack of a national dialysis registry results in a vacuum of information on the burden of treated end-stage renal disease and its outcomes. In addition to the high burden of traditional risk factors (i.e., diabetes mellitus), a number of "hotspots" of chronic kidney disease of unknown origin have been recently described in the country. Despite the increased burden of chronic kidney disease, strategies to prevent chronic kidney disease have not been part of the nation's noncommunicable disease health policies. Chronic kidney disease screening is not part of the National Health Surveys. Peritoneal dialysis continues to be the dialysis modality of choice, although a significant shift to hemodialysis has been observed over the last two decades. The number of nephrologists (9.1 per million population) is insufficient to match the demand imposed by the burden of chronic kidney disease. In conclusion, after 65 years of the beginning of nephrology in Mexico, kidney disease care remains unjust, unequal, and below the quality of international standards. The current infrastructure and resources are insufficient to satisfy the demand of renal care in our society. Therefore, it is important to consider it as a public health priority and to implement a comprehensive program for the prevention and control of this illness. The establishment of a national public policy for the prevention and treatment of chronic kidney disease is urgently needed.

García-García, G., Chavez-Iñiguez, J. S., Vazquez-Rangel, A., Cervantes-Sanchez, C. G., Paniagua, R., Valdez-Ortiz, R., Reyes-Acevedo, R., Medeiros, M., Aguilar-Kitsu, M.A., Muñoz-Arizpe, R., Obrador, G. T., & Rubilar-Araya, X. (2021). Nephrology in Mexico. In Moura-Neto, J. A., Divino-Filho, J. C., & Ronco, C. (Eds.), *Nephrology Worldwide* (pp. 157-172). Springer. doi: 10.1007/978-3-030-56890-0_14. Book Chapter.

GREGORIO TOMÁS OBRADOR VERA

SNII Level III

REGIONAL VARIATION OF ERYTHROPOIESIS-STIMULATING AGENT HYPORESPONSIVENESS IN THE GLOBAL DAPRODUSTAT DIALYSIS STUDY (ASCEND-D)

ABSTRACT. Introduction: Hyporesponsiveness to erythropoiesis-stimulating agents (ESAs) affects 10-15% of the chronic dialysis population. We explored baseline characteristics and predictors of ESA hyporesponsiveness in a global randomized cardiovascular outcomes study comparing an investigational hypoxia-inducible factor prolyl hydroxylase inhibitor (HIF-PHI), daprodustat, with conventional ESA treatment. Methods: ASCEND-D (NCT02879305) recruited 2,964 chronic dialysis patients receiving ESA treatment (standardized to weekly intravenous [IV] epoetin) who were iron replete at baseline. The primary ESA hyporesponsiveness definition was an ESA Resistance Index (ERI, ESA units/kg/week/hemoglobin g/L) ≥2 or IV standardized ESA dose ≥450 units/kg/week. Predictors of ESA hyporesponsiveness were determined using a multivariable regression model. Alternative hyporesponder definitions were explored. Results: Using the primary definition, 354 (12%) patients were ESA hyporesponsive. Geographic region, notably Latin America, lower baseline body mass index and transferrin saturation, younger age, lower albumin concentration, and a higher baseline IV iron dose were identified as strongly associated ($p < 0.001$) with ESA hyporesponsiveness. Additional predictors of ESA hyporesponsiveness included female sex ($p = 0.010$). history of heart failure ($p = 0.035$). longer dialysis vintage ($p = 0.077$). smoking status ($p = 0.247$). aspirin use ($p = 0.121$). and angiotensin-converting enzyme inhibitor/angiotensin receptor blocker use ($p = 0.214$). Conclusion: This is the first global HIF-PHI study to report prespecified definitions and predictors of ESA hyporesponsiveness. While most of the predictors identified in our study have been previously reported, geographic region stands out as an unexpected finding, meriting further investigation.

Macdougall, I. C., Meadowcroft, A. M., Blackorby, A., Cizman, B., Cobitz, A. R., Godoy, S., Jha, V., Johansen, K. L., McMahon, G., Obrador, G. T., Wong, M G., & Singh, A. K. (2023). Regional Variation of Erythropoiesis-Stimulating Agent Hyporesponsiveness in the Global Daprodustat Dialysis Study (ASCEND-D). *American Journal of Nephrology*, *54*(1-2), 1-13. doi: 10.1159/000528696. Article.

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THE ASCEND-NHQ RANDOMIZED TRIAL FOUND POSITIVE EFFECTS OF DAPRODUSTAT ON HEMOGLOBIN AND QUALITY OF LIFE IN PATIENTS WITH NON-DIALYSIS CHRONIC KIDNEY DISEASE

ABSTRACT. The ASCEND-NHQ trial evaluated the effects of daprodustat on hemoglobin and the Medical Outcomes Study 36-item Short Form Survey (SF-36) Vitality score (fatigue) in a multicenter, randomized, double-blind, placebo-controlled trial. Adults with chronic kidney disease (CKD) stages 3–5, hemoglobin 8.5–10.0 g/dl, transferrin saturation 15% or more, and ferritin 50 ng/ml or more without recent erythropoiesis-stimulating agent use were randomized (1:1) to oral daprodustat or placebo to achieve and maintain target hemoglobin of 11–12 g/dl over 28 weeks. The primary endpoint was the mean change in hemoglobin between baseline and the evaluation period (Weeks 24–28). Principal secondary endpoints were proportion of participants with a 1 g/dl or more increase in hemoglobin and mean change in the Vitality score between baseline and Week 28. Outcome superiority was tested (1-sided alpha level of 0.025). Overall, 614 participants with non-dialysis-dependent CKD were randomized. The adjusted mean change in hemoglobin from baseline to the evaluation period was greater with daprodustat (1.58 vs 0.19 g/dl). The adjusted mean treatment

difference (AMD) was significant at 1.40 g/dl (95% confidence interval 1.23, 1.56). A significantly greater proportion of participants receiving daprodustat showed a 1 g/dl or greater increase in hemoglobin from baseline (77% vs 18%). The mean SF-36 Vitality score increased by 7.3 and 1.9 points with daprodustat and placebo, respectively; a clinically and statistically significant 5.4 point Week 28 AMD increase. Adverse event rates were similar (69% vs 71%); relative risk 0.98, (95% confidence interval 0.88, 1.09). Thus, in participants with CKD stages 3–5, daprodustat resulted in a significant increase in hemoglobin and improvement in fatigue without an increase in the overall frequency of adverse events. © 2023 International Society of Nephrology.

Johansen, K. L., Cobitz, A. R., Singh, A. K., Macdougall, I. C., Lopes, R. D., Obrador, G. T., Kovesdy, C. P., Israni, R., Jha, V., Okoro, T., Sprys, M., Jolly, S., Lindsay, A. C., Bhatt, P., Camejo, R. R., Keeley, T., Cizman, B., & Wheeler, D. C. (2023). The ASCEND-NHQ randomized trial found positive effects of daprodustat on hemoglobin and quality of life in patients with non-dialysis chronic kidney disease. *Kidney International*, *103*(6), 1180-1192. doi: 10.1016/j.kint.2023.02.019. Article.

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[1] Collaboration in two articles in the School of Engineering, p. 89.

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MOBILE BANKING AFFORDANCES AND CONSTRAINTS BY THE ELDERLY

ABSTRACT. Purpose: The study explores the affordances and constraints perceived by older adults through their experiences using mobile banking apps. Design/methodology/approach: Twenty-five interviews via Skype were carried out with older adults aged 65 years and over between April and May 2021 (during the COVID-19 pandemic). Findings: Based on their usage experiences with mobile banking, older adults identified functional (saving time, avoiding physical risk and having control over their finances) and social affordances (supporting and bonding with family and friends), as well as non-technological (lack of useful information and patience from bank employees) and technological constraints (concerns about cybersecurity, data privacy and passwords). Originality/value: The study offers a novel approach to customer experience research in mobile banking by adopting a customer-centered perspective and applying the theoretical framework of affordances and constraints to analyze the experiences of older adults as active mobile banking users. © 2022, Emerald Publishing Limited.

Castillo-Villar, F. R., & Castillo-Villar, R. G. (2022). Mobile banking affordances and constraints by the elderly. *Marketing Intelligence & Planning*, *41*(1), 124-137. doi: 10.1108/MIP-01-2022-0045. Article.

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DIGITAL CONSUMER BEHAVIOR AND MEDICAL TOURISM: A REGIONAL ANALYSIS IN MEXICO

[COMPORTAMIENTO DEL CONSUMIDOR DIGITAL Y EL TURISMO MÉDICO: ANÁLISIS REGIONAL EN MÉXICO]

ABSTRACT. Medical tourism has increasingly become an important alternative to receive healthcare services given medical systems' limitations such as: treatment availability, access, and price. The industry has significantly grown with the availability of internet services and digital platforms which enable consumers to connect with service providers as well as other stakeholders around the world. And, considering medical tourism profiles related to travel frequency, expenditure, place, and degree of digital platform use, the question is how does digital platform use impact medical tourism consumer behavior related to the type of destination? Cluster analysis and georeferencing analytics were utilized to study the correlation between digital platform use and the preferred type of destination for medical tourism. The study shows a clear positive correlation between the variables compared. ©2019 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración.

Arrioja-Castrejón, E., López-Fernández, A. M., Ramírez-Pérez, H. X., & Dávila-Aragón, G. (2023). Digital consumer behavior and medical tourism: A regional analysis in Mexico [Comportamiento del consumidor digital y el turismo médico: análisis regional en México]. *Contaduría y Administración*, *68*(4), 241-260. doi: 10.22201/fca.24488410e.2023.4968. Article.

GRISELDA DÁVILA ARAGÓN

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MEDICAL TOURISM IN MEXICO. ANALYSIS OF THE ECONOMIC AND TECHNOLOGICAL MODEL IN THE COVID-19 PANDEMIC ERA

ABSTRACT. In the last decades, organizations have generated and exploited the data product of their operational activity using technological tools to support executives in decision-making, seeking to incorporate economic and social benefits. A key factor today to increase the competitiveness of service providers is taking advantage of the exponential increase in Internet purchases that has been further enhanced by the COVID-19 pandemic. The use of social networks as a means of reference and knowledge of recommendations based on the experience of other users, as well as the use of mobile applications, have contributed to exponentially exploding e-commerce and making it increasingly profitable for companies. This document analyzes the data obtained from various sources, in order to determine the behaviors and preferences related to medical tourism. The study seeks to determine which are the main factors that allow predicting consumption habits and leading the various options for socially responsible medical tourism through the use of advanced analytical and artificial intelligence tools, in order to identify the most attractive alternatives to benefit consumers in an adverse environment like the one the world is facing because of the global pandemic caused by COVID-19, which represents a significant challenge for most industries, but also generates new opportunities with significant benefits for those who know how to take advantage of them. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021.

Dávila-Aragón, G., & Arrioja-Castrejón, E. (2021). Medical Tourism in Mexico. Analysis of the Economic and Technological Model in the COVID-19 Pandemic Era. In Dávila-Aragón, G. & Rivas-Aceves, S. (Eds.), *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America* (pp. 131-147). Springer. doi: 10.1007/978-981-16-2613-5_7. Book Chapter.

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SURVIVAL LIKELIHOOD OF MICRO AND SMALL BUSINESSES FACING A CATASTROPHE

ABSTRACT. This chapter proposes a measurement methodology throughout a Bayesian Network to quantify the survival probability of micro and small enterprises (MSEs) facing a catastrophic event, and to assess if a Business Continuity Plan (BCP) is a unique alternative to prevent companies from bankruptcy. Empirical evidence for a developing country shows the majority of companies are MSEs and without enough knowledge about a BCP; therefore, the likelihood of businesses' survival will depend on BCP and several other elements that should be taken into account for owners when making decisions towards negative effects of catastrophic events. Results showed that for MSEs businesses with high face-to-face customer interaction, a BCP might be useful as well as the experience in crisis of the management team, but not as the only variable. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021.

Dávila-Aragón, G., Rivas-Aceves, S., & Ramírez-Pérez, H. X. (2021). Survival Likelihood of Micro

and Small Businesses Facing a Catastrophe. In Dávila-Aragón, G. & Rivas-Aceves, S. (Eds.), *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America* (pp. 17-36). Springer. doi: 10.1007/978-981-16-2613-5_2. Book Chapter.

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THE FUTURE OF COMPANIES IN THE FACE OF A NEW REALITY: IMPACT AND DEVELOPMENT IN LATIN AMERICA

ABSTRACT. This book analyzes the changes brought on to economic and business activities in Latin America due to the new scenarios, environments and social dynamics the world is facing as a result of the COVID-19 pandemic, at both micro- and macroeconomic levels.

Recent changes to working environments has brought discussions on work-life balance to the forefront, and creating support mechanisms to attract and retain the next generation of workers has become a primary focus for talent managers. At an industry level, there are expectations that once the crisis passes, there will be massive capital inflows toward ESG investments in emerging markets driving the transformation of companies. Consequently, ESG business models will have a cascading effect in the whole supply chain (upstream, midstream and downstream) and will generate greater value for all stakeholders. At the same time, technologies of the fourth industrial revolution, such as Blockchain and Artificial Intelligence, have gradually been adopted by companies leading the charge in ESG business models. The financial sector has taken the lead in these two technologies, but the challenge generated by the COVID-19 pandemic forced other sectors to innovate rapidly in order to remain afloat. Using empirical and theoretical frameworks, the contributors in this book identify the most attractive alternatives to benefit consumers in an adverse environment like the one the world is facing as a result of the COVID-19 pandemic, which while posing a significant challenge for most industries, has also created new opportunities for innovation and ingenuity, analyzing case studies from the coffee and medical tourism sectors in particular.

Dávila-Aragón, G., & Rivas-Aceves, S. (Eds.) (2021). *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America*. Springer. doi: 10.1007/978-981-16-2613-5. Book.

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THE POPULARITY OF BRANDS AND THEIR ECONOMIC VALUE IN THE FRAMEWORK OF CORPORATE FINANCE: A MACHINE LEARNING ANALYSIS

[LA POPULARIDAD DE LAS MARCAS Y SU VALOR ECONÓMICO EN EL MARCO DE LAS FINANZAS CORPORATIVAS: UN ANÁLISIS DE APRENDIZAJE MÁQUINA]

ABSTRACT. Over time, the brand has played a significant role in the business sphere, the perception of commercial image, and added value. This study is focused on exploring the components of brand value from a diagnosis and machine learning techniques to develop a series of models associated with the dimensions of perceived brand value from a more current concept of popularity. The machine learning methodology prioritizes prediction over inference. Unlike classical statistics, it does not impose a specification or a theory, where a model is required to be specified; this represents an alternative dynamic way to understand how one of the most critical resources of companies is present in the market, which undoubtedly has repercussions on the financial and risk management of the company. The results obtained through three different machine learning techniques show that the eleven variables proposed in the study positively influence brand popularity with different intensities.

González, V. M. M., Aragón, G. D., & Ortiz, F. (2023). The popularity of brands and their economic value in the framework of corporate finance: A machine learning analysis [La popularidad de las marcas y su valor económico en el marco de las finanzas corporativas: un análisis de aprendizaje máquina]. *Contaduría y Administración*, *68*(1), 289-323. doi: 10.22201/fca.24488410e.2023.4665. Article.

CARLOS VLADIMIRO GONZÁLEZ ZELAYA

Research Professor

DIFFERENTIALLY PRIVATE GRAPH PUBLISHING THROUGH NOISE-GRAPH ADDITION

ABSTRACT. Differential privacy is commonly used for graph analysis in the interactive setting, were a query of some graph statistic is answered with additional noise to avoid leaking private information. In such setting, only a statistic can be studied. However, in the non-interactive setting, the data may be protected with differential privacy and then published, allowing for all kinds of privacy preserving analyses. We present a noise-graph addition method to publish graphs with differential privacy guarantees. We show its relation to the probabilities in the randomized response matrix and prove that such probabilities can be chosen in such a way to preserve the sparseness of the original graph in the protected graph. Thus, better preserving the utility for different tasks, such as link prediction. Additionally, we show that the previous models of random perturbation and random sparsification are differentially private, and calculate the ϵ guarantees that they provide depending on their specifications.

Salas, J., González-Zelaya, V., Torra, V., & Megías, D. (2023). Differentially Private Graph Publishing Through Noise-Graph Addition. In Torra. V., & Narukawa, Y. (Eds.), *Modeling Decisions for Artificial Intelligence: 20th International Conference, MDAI 2023, Umeå, Sweden, June 19-22, 2023, Proceedings. Serie Lecture Notes in Computer Science (subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 13890 LNCS* (pp. 253-264). Springer. doi: 10.1007/978-3-031-33498-6_18. Conference Paper.

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PREPROCESSING MATTERS: AUTOMATED PIPELINE SELECTION FOR FAIR CLASSIFICATION

ABSTRACT. Improving fairness by manipulating the preprocessing stages of classification pipelines is an active area of research, closely related to AutoML. We propose a genetic optimisation algorithm, FairPipes, which optimises for user-defined combinations of fairness and accuracy and for multiple definitions of fairness, providing flexibility in the fairness-accuracy trade-off.

FairPipes heuristically searches through a large space of pipeline configurations, achieving near-optimality efficiently, presenting the user with an estimate of the solutions' Pareto front. We also observe that the optimal pipelines differ for different datasets, suggesting that no "universal best" pipeline exists and confirming that FairPipes fills a niche in the fairness-aware AutoML space.

González-Zelaya, V., Salas, J., Prangle, D., & Missier, P. (2023). Preprocessing Matters: Automated Pipeline Selection for Fair Classification. In Torra. V., & Narukawa, Y. (Eds.), *Modeling Decisions for Artificial Intelligence: 20th International Conference, MDAI 2023, Umeå, Sweden, June 19-22, 2023, Proceedings. Serie Lecture Notes in Computer Science (subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 13890 LNCS* (pp. 202-213). Springer. doi: 10.1007/978-3-031-33498-6_14. Conference Paper.

ANDREÉ MARIE LÓPEZ FERNÁNDEZ

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BUSINESS DISRUPTION ON TIKTOK: QUIET QUITTING CHALLENGING CORPORATE SOCIAL RESPONSIBILITY POLICIES

ABSTRACT. During the past three years, the world has borne witness to the most significant disruptor in decades: the COVID-19 pandemic. Collateral effects have been vast including significant changes in the way collaborators have decided to prioritize their wellbeing. In addition, workers around the world are increasingly less tolerant to organizations' performative actions, and both have led to mass resignation and quiet quitting. This conceptual study discusses a series of propositions and a conceptual framework and contributes to previous literature related to corporate social responsibility, collaborator management, as well as social media management. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

López-Fernández, A. M. (2023). Business Disruption on TikTok: Quiet Quitting Challenging Corporate Social Responsibility Policies. In Rajagopal, & Behl, R. (Eds.), *Paradigm Shift in Business. Critical Appraisal of Agile Management Practices* (pp. 419-439). Springer. doi: 10.1007/978-3-031-40439-9_20. Book Chapter.

ANDREÉ MARIE LÓPEZ FERNÁNDEZ

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CORPORATE SOCIAL RESPONSIBILITY INFORMING BUSINESS ANALYTICS: NEW STANDARDS FOR ENGAGEMENT AND PERFORMANCE

ABSTRACT. The main objective of the study is to assess current settings of business analytics around the world in relation to social responsibility. The specific objectives include to analyze the ethical ramifications and norms applicable to business analytics; and, to propose a model that puts forth standards of practice congruent with both business strategic objectives and corporate social responsibility, to ensure effective stakeholder engagement and firm performance. To do so, a series of propositions and a conceptual model to illustrate the proposed association of constructs and variables is presented, as well as a discussion on the managerial implications of such association. © The Editor(s) (if applicable) and The Author(s), under exclusive licence to Springer Nature Switzerland AG 2021.

López-Fernández, A. M. (2020). Corporate Social Responsibility Informing Business Analytics: New Standards for Engagement and Performance. In Rajagopal, & Behl, R. (Eds.), *Entrepreneurship and Regional Development. Analyzing Growth Models in Emerging Markets* (pp. 219-239). Springer. doi: 10.1007/978-3-030-45521-7_12. Book Chapter.

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STAKEHOLDER PERCEPTIONS AND WORD-OF-MOUTH ON CSR DYNAMICS: A BIG DATA ANALYSIS FROM TWITTER

ABSTRACT. Corporate social responsibility is a strategy by which firms address social issues whilst tending to their profit enhancing objectives. However, is a socially responsible firm fulfilling its objectives if current and potential stakeholders perceive it to be unethical, engaging in poor and questionable practices? The article analyzes Big Data retrieved from Twitter related to five firms that have stated to be socially responsible but have yet to obtain stakeholders' legitimacy granted by the engagement in corporate social responsibility. The article contributes to the understanding and effects of firm dynamics in corporate social responsibility or lack thereof, on social networking sites by means of Big Data analysis. © 2021, IGI Global.

López-Fernández, A. M., & Silva, Z. B. (2021). Stakeholder perceptions and word-of-mouth on CSR dynamics: A big data analysis from Twitter. In Information R Management Association (Ed.), *Research Anthology on Strategies for Using Social Media as a Service and Tool in Business* (pp. 1165-1179). IGI Global. doi: 10.4018/978-1-7998-9020-1.ch058. Book Chapter.

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TEQUILA ARETTE®

ABSTRACT. Research methodology: The case study is based on a series of in-depth interviews carried out with the owners and directors of the company. The data are complemented by documentary analysis, including descriptions of internal processes and industry information. For the teaching note, the authors opt for an exploratory study using the open-ended approach of grounded theory. Case overview/synopsis: Arette® is a Mexican family business dedicated to the production and sale of tequila, fusing the artisanal with the new in its production processes. Sales take place mostly in the European and American markets. The foreign market for tequila is very attractive but also very demanding both in terms of financial resources and time. Although the company has managed to enter this market through bars and restaurants, it has not yet managed to reach the final consumers (those who order margaritas in bars). Jaime, Eduardo and Lalo are wondering whether it might be time to invest more resources in ensuring that Arette® is not just a brand for fine cocktails. Until now, their main promotional tool has been word of mouth, and they are not sure what their next step should be – to focus on the international or the domestic market. Complexity academic level: The case study can be incorporated into undergraduate classes, where it could serve as part of an international marketing course, in particular, as an international sales strategy and implementation session. It can be used to

teach basic concepts and their application. Learning objectives: This case study focuses on the decision that many small companies have to make at some point in their business strategy, which is to focus either on the international or domestic market: The objectives are as follows: 1. To identify the variables that increase or modify the demand for Tequila. 2. Compare the advantages and disadvantages of focusing on a domestic Tequila market or focusing on an international market. 3. Identify the critical variables that a small company faces if it wants to go international such as. 4. Identify if there are forms of diversification for Tequila Arette such as new markets or new products, or both.

López-Hernández C., López F., González A.C. (2023). Tequila Arette®. *The CASE Journal*, *19*(5), 649-669. doi: 10.1108/TCJ-08-2022-0145. Article.

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ARTIFICIAL INTELLIGENCE AND ITS APPLICATION IN THE STUDY OF THE LEGAL COMPLEXITY OF THE VALUE ADDED TAX ACT IN MEXICO

ABSTRACT. The text is a raw material, researchers need to extract information and patterns of value. Through the use of AI tools in conjunction with the hard sciences, it is now possible to access significant sources of knowledge that previously remained hidden in the form of patterns of ideas and feelings stored in large volumes of text. The analysis of the raw text of the Law of Value-Added Tax (VAT) considered the three elements: structure, language, and interdependence. With these three elements, a legal complexity index was constructed, and the results of the model's parameters show the following: the value for the legal complexity variable was negative (-1.39). which means that when the legal complexity index per unit increases, tax collection will decrease 1.39%. It is helpful to remember that interdependence is the component that outweighs the rest within the legal complexity index. The GDP estimator showed a positive sign, and its magnitude was 4.51; this means that when this estimator increases 1%, VAT collection could increase a 4.5%.

Espinosa, J. M., & Álvarez, A. C. (2022). Artificial Intelligence and Its Application in the Study of the Legal Complexity of the Value Added Tax Act in Mexico. In Núñez Mora, J. A., & Mota Aragón, M. B. (Eds.), *Data Analytics Applications in Emerging Markets* (pp. 177-202). Springer. doi: 10.1007/978-981-19-4695-0_9. Book Chapter.

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EXTREME VALUE THEORY AND AUCTION MODELS

[TEORÍA DE VALORES EXTREMOS Y MODELOS DE SUBASTAS]

ABSTRACT. The objective of this article is to develop a parametric approach to estimating auctions with incomplete data using Extreme Value Theory (EVT). The methodology is mainly theoretical: we first review that, when only transaction prices can be observed, the distribution of private valuations is irregularly identified. The sample bias produced by nonparametric estimators will affect all functionals of practical interest. We provide simulations for a best-case scenario and a worst-case scenario. Our results show that, compared to nonparametric approaches, the approximation of such functionals developed using EVT produces more accurate results, is easy to compute, and does not require strong assumptions about the unobserved distribution of bidders' valuations. It is recommended that financial operators working with auctions use this parametric approach when facing incomplete datasets. Given the difficult nature of the analysis, this work does not provide large sample properties for the proposed estimators and recommends the use of bootstrapping. This article contributes originally to the literature of structural estimation of auction models providing a useful and robust parametric approximation.

Morganti, P. R. (2021). Extreme Value Theory and Auction Models [Teoría de valores extremos y modelos de subastas]. *Revista Mexicana de Economía y Finanzas*, Nueva Epoca, *16*(2). doi: 10.21919/remef.v16i2.596. Article.

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***Senior Researcher A**, Research Professor*

THE PERILS OF ASYMMETRICAL TECHNOLOGICAL CHANGES IN A KNOWLEDGE ECONOMY WITH COMPLETE MARKETS

ABSTRACT. How does the asymmetrical adoption of advanced communication technology affect economic and social sustainability? We examined the impact of Industry 4.0 on these two pillars of sustainability, focusing on the productivity divide arising from the asymmetric adoption of advanced technologies. We used a theoretical, general equilibrium model to describe a population within a knowledge economy with complete markets who gets exposed to a generally available advanced technology. Our main assumption was that only the more-knowledgeable individuals are able to adopt or fully benefit from the technology, leaving the unskilled ones behind. We demonstrate that this asymmetry prevents the property of positive sorting to apply, leading to a failure to sustain an equilibrium. The divide between knowledgeable and less-skilled individuals poses challenges for workers situated around the boundary, who face penalties in terms of employability and cost-effectiveness. Bridging this skill gap is crucial for inclusive growth. Policy recommendations include retraining programs, accessible education, and targeted policies promoting technology diffusion. As a possible extension, the model could be adapted to analyze collective bargaining agreements.

Morganti, P., & Valdes, R. C. (2023). The Perils of Asymmetrical Technological Changes in a Knowledge Economy with Complete Markets. *Sustainability*, *15*(17). doi: 10.3390/su151712867. Article.

CLAUDINE MOYA PONCE

Research Professor

BELIEFS THAT PROVIDE A FOUNDATION FOR HEURISTICS AND BIASES IN FINANCIAL DECISION-MAKING

[CREENCIAS QUE FUNDAMENTAN HEURÍSTICAS Y SESGOS EN LA TOMA DE DECISIONES FINANCIERAS]

ABSTRACT. Heuristics and biases are the result of intuitive thinking, which is shaped starting from intuitions, feelings, and impressions, which later emerge as beliefs once processed through analytical thinking. In this study, we examine beliefs that pro-

vide a foundation for heuristics and biases in financial decision-making through in-depth interviews with 31 upper-class Mexican emerging adults. We found feelings of mistrust that provide a foundation for foreign bias, non-herding behavior and reliance on professional advice, as well as lower-risk investing beliefs that then drive sustainable investing. We also found reflection that their money, in light of their narrative is either saved or invested regardless of its source and that lenders were framed as investors to avoid the shame they associate with borrowing. Implications for future research, educational interventions and providers of financial services are discussed.

Moya-Ponce, C., & Madrazo-Lemaroy, P. (2023). Beliefs that provide a foundation for heuristics and biases in financial decision-making [Creencias que fundamentan heurísticas y sesgos en la toma de decisiones financieras]. *Cuadernos de Gestión*, *23*(2), 69-80. doi: 10.5295/cdg.221703pm. Article.

ENRIQUE MARTÍN MURILLO OTHÓN

***Senior Researcher C**, SNII Level I*

A RESEARCH AGENDA FOR BRAND MANAGEMENT IN A NEW ERA OF CONSUMERISM

ABSTRACT. Elgar Research Agendas outline the future of research in a given area. Leading scholars are given the space to explore their subject in provocative ways, and map out the potential directions of travel. They are relevant but also visionary. Tracking the seismic shifts in consumerism over time, this cutting-edge Research Agenda provides a theoretical and methodological roadmap of brand management research in the third age of consumption. Leading experts and pioneers of key concepts in brand management give insights into the exponential growth of the field and identify promising directions for future investigation. Illustrating the significant depth and breadth of research in brand management, contributors explore both foundational topics and contemporary work in the field. They synthesise diverse approaches to provide a holistic and dynamic understanding of the major areas of brand management. Alongside this theoretical taxonomy of the field, this Research Agenda also examines the application of branding principles and best practices in common business contexts. Chapters analyse cutting-edge developments in brand management research including brand co-creation, conscientious brands, online brand communities, non-profit branding, and internal brand management. Providing a concise overview of key brand management topics and illustrating important areas for further research, this Research Agenda will be an invaluable resource for doctoral students and scholars in marketing, strategic management, and branding. © The Editors and Contributors Severally 2023. All rights reserved.

King, C., & Murillo, E. (Eds.) (2023). *A Research Agenda for Brand Management in a New Era of Consumerism*. Edward Elgar. doi: 10.4337/9781803925516. Book.

ENRIQUE MARTÍN MURILLO OTHÓN

***Senior Researcher C**, SNII Level I*

INTRODUCING A RESEARCH AGENDA FOR BRAND MANAGEMENT IN A NEW ERA OF CONSUMERISM

ABSTRACT. Tracking the seismic shifts in consumerism over time, this cutting-edge Research Agenda provides a theoretical and methodological roadmap of brand management research in the third age of consumption. Leading experts and pioneers of key concepts in brand management give insights into the exponential growth of the field and identify promising directions for future investigation.

Murillo, E., & King, C. (2023). Introducing a Research Agenda for Brand Management in a New Era of Consumerism. In King, C., & Murillo, E. (Eds.), *A Research Agenda for Brand Management in a New Era of Consumerism* (pp. 1-13). Edward Elgar. doi: 10.4337/9781803925516.00007. Book Chapter.

ENRIQUE MARTÍN MURILLO OTHÓN

***Senior Researcher C**, SNII Level I*

THE COMING OF AGE OF INTERNAL BRAND MANAGEMENT RESEARCH: LOOKING BACK TO LOOK FORWARD

ABSTRACT. The literature on internal brand management (IBM) has accumulated over 240 Scopus-indexed articles in the last two decades since the first seminal studies. This chapter undertakes a systematic literature review complemented with a bibliometric cluster analysis to highlight the studies with the most impact, the dominant themes, as well as the authors driving this emerging research phenomenon. The analysis provides a roadmap of the theories, methods and contexts that have been used in past studies and proposes a number of meaningful and relevant contemporary research avenues. As IBM research matures with increasingly repetitive studies, future investigations are encouraged to emphasize more actionable and meaningful research topics for academia and businesses, as well as to develop strong theoretical underpinnings and diverse research methods to break new ground.

King, C., Murillo, E., & Xiong, L. (2023). The coming of age of internal brand management research: Looking back to look forward. n King, C., & Murillo, E. (Eds.), *A Research Agenda for Brand Management in a New Era of Consumerism* (pp. 177-197). Edward Elgar. doi: 10.4337/9781803925516.00018. Book Chapter.

JUAN ENRIQUE NÚÑEZ RÍOS

***Senior Researcher B**, SNII Level I*

JACQUELINE YVETTE SÁNCHEZ GARCÍA

***Senior Researcher B**, SNII Level I*

CARLOS EDUARDO LÓPEZ HERNÁNDEZ

***Senior Researcher B**, SNII Level I*

ALEJANDRO RODRÍGUEZ MAGAÑA

***Senior Researcher A**, SNII Level I*

MODELING ORGANIZATIONAL RESILIENCE IN SMES: A SYSTEM DYNAMICS APPROACH

ABSTRACT. Resilience is challenging for small- and medium-sized enterprises (SMEs), as their structure hinders them from overcoming external disturbances. This article used control to model how these perspectives can lead SMEs to equilibrium. We adopted a systemic approach, which addresses organizational complexity via linear modeling. First, using social network analysis (SNA), we revised the understanding of organizational resilience in the SME literature, identified groups with similar components, and used this information to feed our model. Second, we developed a conceptual model via a causal loop diagram, and third, we simulated scenarios using system dynamics. Our results indicate that organizational resilience is associated with feedforward, buffering, and feedback controls as critical factors demanding contin-

uous coordination between core operations and management mechanisms. A limitation regarding system dynamics is that it models a system's behavior rather than predicting it statistically. Even though the focus of this work is on the organizational context and Mexican SMEs, the versatility of the systemic approach may allow for the application of these ideas in other sectors. Our results may help managers and academics rethink resilience by restructuring relationships in operational and strategic units, increasing their autonomy, strengthening strategic planning as well as feedback means. The revised studies used statistical modeling to evaluate factors that foster SMEs' organizational resilience. The present article contributes to this area by framing the problem in terms of system dynamics methodology and evaluating the adopted scenario.

Sánchez-García, J. Y., Núñez-Ríos, J. E., López-Hernández, C., & Rodríguez-Magaña, A. (2023). Modeling Organizational Resilience in SMEs: A System Dynamics Approach. *Global Journal of Flexible Systems Management*, *24*(1), 29-50. doi: 10.1007/s40171-022-00322-z. Article.

JUAN ENRIQUE NÚÑEZ RÍOS
***Senior Researcher B**, SNII Level I*
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JOSÉ FRANCISCO LÓPEZ TORRES
Research Professor

PRIORITIZING FACTORS FOR EFFECTIVE STRATEGY IMPLEMENTATION IN SMALL AND MEDIUM-SIZE ORGANIZATIONS

ABSTRACT. Purpose: Organizations depend on multiple factors to maintain competitiveness and continuously adapt to the environment. Managers must know how to implement strategies while motivating the commitment of those involved. This study aims to present a model for prioritizing factors to promote effective strategy implementation in small- and medium-sized companies. Design/methodology/approach: The authors adopted a systemic approach to articulate two instruments: social network analysis to identify the components that could affect strategy implementation, designing a conceptual model with this information, and analytical hierarchy process to validate the resulting construct. Findings: The factors for effectively implementing strategies relate to the need for reinforcement, commitment, organizational culture, managerial skills, clear communication and involvement to reduce inconsistencies between the expected and current organizational state without neglecting coordination and management mechanisms. Research limitations/implications: This work is limited to organizational matters. This study was conducted in collaboration with medium-sized Mexican companies with the participation of 94 managers with 10 years of experience. Although the results are mathematically rigorous, increasing the number of participants could enhance the approach to the problem. Practical implications: This study could encourage academics and practitioners to target resources more accurately and improve organizational relationships to bridge the gap between strategic planning and practical implementation. Originality/value: This study contrasts with previous research in proposing a systemic perspective that integrates participants' experiences, developing a construct to determine and prioritize the factors to be addressed in strategy implementation. Therefore, this work invites the adoption of the proposed method as a complementary path to enrich academic and professional exchange.

López-Torres, J. F., Sánchez-García, J. Y., Núñez-Ríos, J. E., & López-Hernández C. (2023). Prioritizing factors for effective strategy implementation in small and medium-size organizations. *European Business Review*, *35*(5). doi: 10.1108/EBR-11-2022-0230. Article.

JUAN ENRIQUE NÚÑEZ RÍOS
***Senior Researcher B**, SNII Level I*
JACQUELINE YVETTE SÁNCHEZ GARCÍA
***Senior Researcher B**, SNII Level I*

SUSTAINABLE PERFORMANCE IN TOURISM SMES: A SOFT MODELING APPROACH

ABSTRACT. Purpose: This paper aims to present a model to incentivize sustainable performance (SUP) in small- and medium-sized tourism by strengthening inner relations to adapt to a complex environment. Design/methodology/approach: The authors adopted the systemic approach complementing analytic, tourism, partial least squares path modeling (PLS-PM), social network analysis (SNA) and systemic approach tools as follows: frame the problem through the soft systems methodology and SNA and identify the conflicting relationships; apply PLS-PM to validate the model; and propose new interactions for small- and medium-sized enterprises conducive to SUP based on the viable system model. Findings: Considering the results, the authors pinpointed factors and relationships managers can address to foster SUP, highlighting the need to reinforce feedback loops and reduce inconsistencies between primary operations with coordination and management mechanisms. Research limitations/implications: This work is limited to the organizational domain. Although the results apply to the Mexican context, this could be overcome using methodological complementarity to extend the ideas to other organizations. Practical implications: This study invites discussing methods and viewpoints for rethinking SUP because of multiple factors. This requires adopting methodological complementarity to generate alternatives and reconfiguring inner organizational interactions. Originality/value: The model captures minimum but sufficient components advising leaders about SUP. This proposal differs from previous studies because it suggests exploiting methodological complementarity to capture the insights of key operative actors to conceive the model. Hence, the authors suggest new relations among organizational factors so managers can develop strategies for adaptability.

Núñez-Ríos, J. E., Sánchez-García, J. Y., & Ramírez-Nafarrate, A. (2022). Sustainable performance in tourism SMEs: a soft modeling approach. *Journal of Modelling in Management*, *18*(6). doi: 10.1108/JM2-06-2021-0136. Article.

FRANCISCO ORTIZ ARANGO
SNII Level II

A MODEL FOR MINIMIZING MAINTENANCE COSTS OF MEDICAL EQUIPMENT USING FUZZY LOGIC

[UN MODELO DE MINIMIZACIÓN DE COSTOS DE MANTENIMIENTO DE EQUIPO MÉDICO MEDIANTE LÓGICA DIFUSA]

ABSTRACT. This paper presents an algorithm based on fuzzy logic that models a Maintenance Management Plan of Medical Equip-

ment, this is developed in three stages: In the first one, a functional inventory is generated, following the protocols recommended by the WHO and information of each team. In the second, three priority attention protocols are attached, used to select the diffuse system membership functions. In the third, a family of scenarios is generated by Monte Carlo simulation, calculating the degree of fuzzy maintenance priority for the equipment. The results achieve that the equipment selection of the annual maintenance plan is carried out guaranteeing the availability of the priority equipment. In this article, the application of the Fennigkoh-Smith algorithms and the Wang-Levenson algorithm are improved by placing the ambiguity of the diffuse structure, making the selection of the medical equipment incorporate the range of possibilities that exist when selected in an arbitrary manner. An area of opportunity consists of incorporating a process of optimization of equipment maintenance costs with a budgetary restriction. It is concluded that the system shown is friendly and robust for the purposes proposed.

Cabrera-Llanos, A. I., Ortiz-Arango, F., & Cruz-Aranda, F. (2019). A model for minimizing maintenance costs of medical equipment using fuzzy logic [Un modelo de minimización de costos de mantenimiento de equipo médico mediante lógica difusa]. *Revista Mexicana de Economía y Finanzas*, Nueva Epoca, *14*(3), 379-396. doi: 10.21919/remef.v14i3.410. Article.

FRANCISCO ORTIZ ARANGO
SNII Level II

GRISELDA DÁVILA ARAGÓN
***Senior Researcher B**, SNII Level I*

CHARACTERIZATION OF THE PRODUCTIVITY OF A MEXICAN TECHNOLOGY DEVELOPMENT COMPANY THROUGH FUZZY CONTROL

[CARACTERIZACIÓN DE LA PRODUCTIVIDAD DE UNA EMPRESA MEXICANA DESARROLLADORA DE TECNOLOGÍA MEDIANTE CONTROL DIFUSO]

ABSTRACT. The development of a model that allows measuring the productivity of a technology-based company is presented, which is based on the interactions identified between the investment of the research department, computer fraud, and theft. These interactions are presented through a model of fuzzy variables in which the membership functions are developed for each of these. Likewise, the interaction rules are developed based on the conjunction of the fuzzy sets proposed for the Mamdani model. With these designs, it is possible to determine the degree of productivity, characterized by a fuzzy set. To test the model, Monte Carlo simulation was used with four scenarios. The simulations' series results show that the fuzzy sets described allow to measure company's productivity being analysed through the proposed fuzzy sets productivity ranges.

Agustín, I. C. L., Francisco, O. A., & Griselda, D. A. (2022). Characterization of the productivity of a Mexican technology development company through fuzzy control [Caracterización de la productividad de una empresa mexicana desarrolladora de tecnología mediante control difuso]. *Revista de Métodos Cuantitativos para la Economía y la Empresa*, *34*, 281-304. doi: 10.46661/revmetodoscuanteconempresa.5374. Article.

FRANCISCO ORTIZ ARANGO
SNII Level II

FEASIBILITY OF INTRODUCING NATURAL GAS DERIVATIVES CONTRACTS IN THE MEXICAN DERIVATIVES MARKET: A HUBBERT-GRAY APPROACH

[VIABILIDAD DE INTRODUCIR CONTRATOS DE DERIVADOS DE GAS NATURAL EN EL MERCADO MEXICANO DE DERIVADOS: UN ENFOQUE HUBBERT-GREY]

ABSTRACT. After the enactment of the 2013 energy reform in Mexico, the possibility of incorporating natural gas derivative contracts into the Mexican Derivatives Market (MexDer) was opened. The aim of this research is to examine the feasibility of introducing natural gas derivative contracts in the MexDer. For this, we use the Hubert model to calculate the projection of the natural gas supply, and the demand projection is obtained through a novel combination of the Gray and the Vasicek models. Subsequently, employing Monte Carlo simulation, we calculate the premiums of a futures contract and a contract of the European options over the price of natural gas, both were designed according to the regulations of the MexDer. The results obtained show that at the moment such contracts are not viable, mainly due to the reduced volume of production for possible contracts, compared to the growing demand, so it is recommended to promote investment in the productive and commercial platform so that the natural gas derivatives transaction is viable.

García-Pérez, L. E., Arango, F. O., & Aké, S. C. (2021). Feasibility of Introducing Natural Gas Derivatives Contracts in the Mexican Derivatives Market: A Hubbert-Gray Approach [Viabilidad de introducir contratos de derivados de gas natural en el Mercado Mexicano de Derivados: Un enfoque Hubbert-Grey]. *Revista Mexicana de Economía y Finanzas*, Nueva Epoca, *16*(1). doi: 10.21919/remef.v16i1.479. Article.

FRANCISCO ORTIZ ARANGO
SNII Level II

FUND TRANSFER PRICING IN BANKS OF MEXICO FROM FEBRUARY 2012 TO MAY 2021

[PRECIOS DE TRANSFERENCIA DE FONDOS EN BANCOS DE MÉXICO ENTRE FEBRERO DE 2012 Y MAYO DE 2021]

ABSTRACT. Objective: The submitted work estimates the Funds Transfer Prices (FTP) of seven banks in Mexico. Methodology: A bond is used that reproduces the bank's cash flows, which allows estimating the term structure. The bond is valued utilizing the Nelson-Siegel model. Then, the rates of your loan portfolio and deposits are estimated to calculate the FTP. Likewise, we calculate each bank's spread of the TIIE-28 and the CETE-28 rate to establish their patterns between February 2012 and May 2021. Results: The results obtained show a discrepancy of less than 0.0006. Recommendations: The FTP methodology improves by using the most available data. Limitations and implications: To get better results, more information is required from all the bank's lines of business, making it difficult and delaying the application of the model. Originality: It shows a positive relationship between the application of the FTP methodology and profitability. Conclusions: Using the FTP methodology is possible to create value by optimizing the bank's net interest margins. JEL Classification: C13, G12, G21.

Valencia-Serpel, K., Cruz-Aranda, F., & Ortiz-Arango, F. (2023). Fund Transfer Pricing in banks of Mexico from February 2012 to May 2021 [Precios de transferencia de fondos en bancos de México entre febrero de 2012 y mayo de 2021]. *Revista Mexicana de Economía y Finanzas*, Nueva Epoca, *18*(2). doi: 10.21919/remef.v18i2.736. Article.

SALVADOR RIVAS ACEVES

***Senior Researcher B**, SNII Level I*

CONTAGION ADVERSE DEGREE, INCOME INEQUALITY AND ECONOMIC GROWTH

ABSTRACT. By introducing the effects of the pandemic into an endogenous economic growth model, with a financial system, among human, physical and financial capitals, diminishing returns, constant scale effects and heterogenic agents, the impact by the contagion adverse degree in households is modelled. Results are: a) contagion adverse degree affects intertemporal marginal substitution rate of households and production process for industry; b) short and long run economic growth rate are also affected by the contagion adverse degree of households; c) human capital growth rate and distribution dynamics relies on contagion adverse degree as well; d) in the absent of a financial system, poor households will allocate less time to leisure if they want to consume more or increase human capital or both when the contagion adverse degree is low, and viceversa; e) physical and human capital ratio of the economy relies only in one sector when there is none financial system. Consequently, economic growth rate is lower since only one sector performs production activitieswhile having a contagion adverse degree low; f) rises in output or decreases in salary due to the contagion adverse degree lead to increases in inequality; g) inequality decreases when human capital goes up; h) physical capital generates small and positive changes in inequality; i) financial capital causes positive impacts on inequality; j) inequality decreases if total multifactorial productivity increases; k) macroeconomic equilibrium depends in negative ways because of contagion adverse degree. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021.

Rivas-Aceves, S. (2021). Contagion Adverse Degree, Income Inequality and Economic Growth. In Dávila-Aragón, G. & Rivas-Aceves, S. (Eds.), *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America* (pp. 63-78). Springer. doi: 10.1007/978-981-16-2613-5_4. Book Chapter.

ROMÁN RODRÍGUEZ AGUILAR

***Senior Researcher C**, SNII Level II*

CATASTROPHIC HEALTH SPENDING BY COVID-19 IN THE MEXICAN INSURANCE SECTOR

ABSTRACT. The COVID-19 pandemic that the world has been suffering for 3 years has generated major impacts worldwide, both in public health systems and in the private insurance industry. The high costs of care derived from cases with complications have likewise generated a great impact on the private insurance industry. In the case of Mexico, the mortality rates observed are among the first places, in addition to generating a great impact on private insurance. This work deals with the measurement of the impact of catastrophic expenses derived from COVID-19 in an insurance company; using a set of machine learning models, the key variables in the estimation of patients with potential catastrophic expenses were determined. The results show that the estimated classification model has a positive performance in addition to allowing the identification of the main risk factors of the insured as well as their potentially catastrophic impact on insurance companies. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Domínguez-Gutiérrez, U., & Rodríguez-Aguilar, R. (2024). Catastrophic Health Spending by COVID-19 in the Mexican Insurance Sector. In Marmolejo-Saucedo, J. A., Rodríguez-Aguilar, R., Vasant, P., Litvinchev, I., Retana-Blanco, B. N. (Eds.), *Computer Science and Engineering in Health Services: 6th EAI International Conference Proceedings, COMPSE 2022, Mexico City, July 28, 2022. Serie EAI/Springer Innovations in Communication and Computing EAISICC* (pp. 247-255). Springer. doi: 10.1007/978-3-031-34750-4_14. Conference Paper.

ROMÁN RODRÍGUEZ AGUILAR

***Senior Researcher C**, SNII Level II*

HEALTH 4.0, PREVENTION, AND HEALTH PROMOTION IN COMPANIES: A SYSTEMATIC LITERATURE REVIEW

ABSTRACT. Noncommunicable diseases are growing worldwide and their impact within organizations affects the productivity of companies. The accelerated pace of life, sedentary lifestyle, eating habits, and lack of self-regulation have deteriorated workers' health conditions. The Health 4.0 paradigm can help in health prevention and promotion thanks to the use of smart devices and digital tools adaptable to users and companies. Trials from 11 bibliographic databases were consulted and out of a total of 742 articles, 86 were selected that met the selection criteria. There is scientific evidence that supports the use of smart devices in companies focusing on weight control, physical activity, sleep control, and glycemic index to impact the treatment and prevention of noncommunicable diseases such as diabetes, overweight, work stress, cardiovascular diseases, and in lifestyle. Using wearables or smartphones, incentive programs or assistance with specialists have been considered by some researchers; elements such as privacy and information security are essential in the implementation, as well as methods that can maintain the use of these prevention and health promotion programs. More research is necessary regarding the use of smart devices such as the permanence of health initiatives in companies, cost-effectiveness, and real-time analysis, and focus on various pathological conditions for success in prevention and health promotion strategies. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Domínguez-Miranda, S. A., & Rodríguez-Aguilar, R. (2024). Health 4.0, Prevention, and Health Promotion in Companies: A Systematic Literature Review. In Marmolejo-Saucedo, J. A., Rodríguez-Aguilar, R., Vasant, P., Litvinchev, I., Retana-Blanco, B. N. (Eds.), *Computer Science and Engineering in Health Services: 6th EAI International Conference Proceedings, COMPSE 2022, Mexico City, July 28, 2022. Serie EAI/Springer Innovations in Communication and Computing EAISICC* (pp. 217-245). Springer. Conference Paper.

ROMÁN RODRÍGUEZ AGUILAR

***Senior Researcher C**, SNII Level II*

OUT OF POCKET AND CATASTROPHIC HEALTH SPENDING IN MEXICO IN THE FACE OF THE COVID-19 PANDEMIC

ABSTRACT. Introduction: The measurement of the financial coverage of a health system uses key indicators such as household out-of-pocket spending as well as catastrophic health spending. Said indicators depend on the financing structure of the health system as well as quality criteria and efficiency of the system in patient care. In the case of Mexico, in recent years there have been important changes in the structure of the health system in addition to suffering from the COVID-19 pandemic events that have significantly impacted the access to health of patients. Therefore, it is relevant to quantify the impact of these events on out-of-

pocket spending and catastrophic spending on health in Mexico and have a robust diagnosis of the financial coverage of the system public health in Mexico. Objectives: The main objective of this study is to quantify out-of-pocket spending and catastrophic spending on health in Mexican households for the year 2020. Comparing these estimates with previous years given the recent changes in the Mexican health system as well as the effect of the COVID-19 pandemic in these indicators. Methods: Based on the information available in the 2020 National Household Income and Expenditure Survey (ENIGH), out-of-pocket and catastrophic spending on health were estimated following the methodology proposed by the World Health Organization. A quantile regression was estimated to assess the effect of income distribution on out-of-pocket spending. Results: In Mexico in 2020, 67.7% (24.2 million) of households had an out-of-pocket health expenditure (OOHE) and 6% of these households had a catastrophic health expenditure (CHE), with respect to all households this percentage represents 4.04%. According to the classification stipulated by the World Health Organization, healthcare has six expenditure components: orthopedics, medicines, maternity, hospital, alternative medicines, and ambulatory expenses. The three main expenditure was attributable to drugs (39.9%), ambulatory (25.3%), and hospital costs (20.3%). Conclusion: The effect of recent modifications to the public health system in Mexico in addition to the COVID-19 pandemic has been reflected in an increase in the percentage of households with out-of-pocket spending in Mexico, as well as the percentage of households with catastrophic spending in health. The main expense item is made in medicines, ambulatory care follow-up and hospitalization. It is a priority to establish efficient financial protection schemes that allow reversing this situation in terms of efficient access to health in Mexico. © 2023 R. Rodríguez-Aguilar et al.

Rodríguez-Aguilar, R., Marmolejo-Saucedo, J. A., Zavala-Landin, A., Rodríguez-Aguilar, M., & Marmolejo-Saucedo L. (2023). Out of pocket and catastrophic health spending in Mexico in the face of the COVID-19 pandemic. *EAI Endorsed Transactions on Pervasive Health and Technology*, *9*(1), doi: 10.4108/eetpht.9.3583. Article.

ALEJANDRO RODRÍGUEZ MAGAÑA

***Senior Researcher A**, SNII Level I*

HUGO BRISEÑO RAMÍREZ

***Senior Researcher A**, SNII Level I*

NATIONAL PROGRAM THAT INCENTIVATES SAVINGS TO ACCESS PRIVATE HIGHER EDUCATION IN MEXICO

[PROGRAMA NACIONAL QUE INCENTIVE EL AHORRO PARA ACCEDER A LA EDUCACIÓN SUPERIOR PRIVADA EN MÉXICO]

ABSTRACT. Currently, Mexican families use educational credits to access private higher education because they do not have enough income to pay tuition and additional expenses, or if they do, since there is free public education, they consider it a luxury. The objective of this article is to look for an option that encourages savings and promotes the professionalization of young people without entering debt. For this, secondary information was collected and a regression model was developed in order to establish which variables are significant for Mexican families and thus be able to propose a savings proposal. Households with low economic resources can hardly access the economic warrants from a credit and can hardly save enough to have higher educational degrees, when they have basic necessities to fulfill. For this reason, a national educational savings program is proposed that allows families to plan long-Term capital raising for the professionalization of their children, allocating a fraction of their income since their children are small so that when they go to make their University studies do not require paying interest rates that reduce your purchasing power in the future. © Universidad de Ciencias Aplicadas y Ambientales U.D.C.A. All Rights Reserved.

Magaña, A. R., Moreno, J. R., & Ramírez, H. B. (2020). National program that incentivates savings to access private higher education in Mexico [Programa nacional que incentive el ahorro para acceder a la educación superior privada en México]. *Revista U.D.C.A Actualidad & Divulgación Científica*, *23*(1). doi: 10.31910/rudca.v23.n1.2020.1324. Article.

OMAR GUILLERMO ROJAS ALTAMIRANO

***Senior Researcher D**, SNII Level I*

TIME-VARYING CAUSALITY BETWEEN BOND AND OIL MARKETS OF THE UNITED STATES: EVIDENCE FROM OVER ONE AND HALF CENTURIES OF DATA

ABSTRACT. This study uses daily COVID-19 news series to determine their impact on financial market volatility. This paper assesses whether U.S. financial markets react differently to COVID-19 news than emerging markets and if such markets are impacted differently by country-specific and global news. To detect the spillover effects from news on market volatility, a time-varying DCC-GARCH model was applied. The results suggest that the U.S. and emerging markets are affected differently by pandemic news, global series have a stronger impact on emerging markets than country-specific ones, and misleading information plays a significant role in financial market volatility, especially for the U.S. © 2023 by the authors.

Coronado, S., Gupta, R., Nazlioglu, S., & Rojas, O. (2023). Time-varying causality between bond and oil markets of the United States: Evidence from over one and half centuries of data. *International Journal of Finance & Economics*, *28*(3), 2236-2274. doi: 10.1002/ijfe.2534. Article.

OMAR GUILLERMO ROJAS ALTAMIRANO

***Senior Researcher D**, SNII Level I*

TIME-VARYING GRANGER CAUSALITY OF COVID-19 NEWS ON EMERGING FINANCIAL MARKETS: THE LATIN AMERICAN CASE

ABSTRACT. This study uses daily COVID-19 news series to determine their impact on financial market volatility. This paper assesses whether U.S. financial markets react differently to COVID-19 news than emerging markets and if such markets are impacted differently by country-specific and global news. To detect the spillover effects from news on market volatility, a time-varying DCC-GARCH model was applied. The results suggest that the U.S. and emerging markets are affected differently by pandemic news, global series have a stronger impact on emerging markets than country-specific ones, and misleading information plays a significant role in financial market volatility, especially for the U.S. © 2023 by the authors.

Coronado, S., Martínez, J. N., Gualajara, V., Romero-Meza, R., & Rojas, O. (2023). Time-Varying Granger Causality of COVID-19 News on

Emerging Financial Markets: The Latin American Case. *Mathematics*, *11*(2). doi: 10.3390/math11020394. Article.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

A PERSONALIST APPROACH TO BUSINESS ETHICS: NEW PERSPECTIVES FOR VIRTUE ETHICS AND SERVANT LEADERSHIP

ABSTRACT. This article has a twofold purpose: first, it explores how Leonardo Polo's personalist anthropology enriches and enhances neo-Aristotelian virtue ethics and second, it highlights how this specific personalist approach brings new perspectives to servant leadership. The recently revived neo-Aristotelian virtue ethics tradition finds that MacIntyre's scholarship significantly contributes to virtue ethics in business—particularly his conception of practices, institutions, and internal/external goods. However, we argue that some of his latest insights about the virtues of acknowledged dependence and human vulnerability remain underdeveloped because of the underlying anthropology that neo-Aristotelian virtue ethics relies on. To overcome this limitation, we introduce Polo's transcendental anthropology as a possible foundation of a personalist approach that enriches virtue ethics. To do so, we address how transcendental anthropology can enrich two central aspects of virtue ethics, namely (1) the understanding of human beings and their flourishing and (2) the relationship of virtue to praxis and human work. Finally, to address the practical implications for business leadership and work that can derive from assuming transcendental anthropology, we address how servant leadership acquires a new perspective in light of this personalism and its logic of gift, highlighting interpersonal self-giving as a way of service. © 2022 The Authors. Business Ethics, the Environment & Responsibility published by John Wiley & Sons Ltd.

Scalzo, G., Akrivou, K., & Fernández González, M. J. (2022). A personalist approach to business ethics: New perspectives for virtue ethics and servant leadership. *Business Ethics, Environment & Responsibility*, *32*(52), 145-158. doi: 10.1111/beer.12435. Article.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

ANTONIA TERÁN BUSTAMANTE

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SNII Level I

BALANCING WORK, FAMILY, AND PERSONAL LIFE IN THE MEXICAN CONTEXT: THE FUTURE OFWORK FOR THE "COVID-19 GENERATION"

ABSTRACT. Intergenerational talent management-i.e., attracting and retaining employees across generations and with different motivations-is one of companies' greatest challenges. The expectations that recent generations bring with them have pushed culture in the direction of work-family balance, which is now seen as a key tool for human resources departments in charge of creating support mechanisms to attract and retain the next generation of workers. This trend has been reinforced by the changes brought about in light of the COVID-19 pandemic. Responding to this shift, and inspired by the challenges that our "new normal" posits, this chapter presents research results from a survey conducted in Mexico with respondents from generations Y and Z. The survey results offer important insight into how these generations perceive work-life balance, as well as the expectations that young Mexicans between the ages of 18 and 30 hold in terms of family and work. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021.

Scalzo, G., Terán-Bustamante, A., & Martínez-Velasco, A. (2021). Balancing Work, Family, and Personal Life in the Mexican Context: The Future ofWork for the "COVID-19 Generation". In Dávila-Aragón, G. & Rivas-Aceves, S. (Eds.), *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America* (pp. 109-129). Springer. doi: 10.1007/978-981-16-2613-5_6. Book Chapter.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

CSR AND VIRTUE ETHICS THE COMMON GOOD OF FIRMS, MARKETS, AND CIVIL SOCIETY

ABSTRACT. This chapter probes the social responsibility of firms using a virtue ethics approach and the concept of the common good. In particular, it highlights the contrasting assumptions of mainstream approaches and the common good of the firm approach to explaining how the latter—rooted in Aristotelian virtue ethics—provides an original conception of social responsibility. A common good approach to social justice understands social relationships essentially as duties to which one voluntarily adheres; when said justice and commitment to the common good flourishes, community ensues. Finally, a virtue ethics approach to corporate social responsibility establishes three forms of duty and social responsibility to stakeholders, including those who make up the firm, those who maintain a market-based relationship with it, and those who are related to the firm as part of society's civic sphere.

Scalzo, G., Pinto-Garay, J., & Akrivou, K. (2022). CSR and virtue ethics: The common good of firms, markets, and civil society. In Maak, T., Pless, N., Orlitzky, M., & Sandhu, S. (Eds.), *Routledge Companion to Corporate Social Responsibility* (pp. 78-87). Routledge. doi: 10.4324/9781003152651-9. Book Chapter.

GERMÁN ROBERTO SCALZO MOLINA

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EXPLORING THE VULNERABILITY OF PRACTICE-LIKE ACTIVITIES: AN ETHNOGRAPHIC PERSPECTIVE

ABSTRACT. Introduction: This paper explores the vulnerability of practice-like activities to institutional domination. Methods: This paper offers an ethnographic case study of a UK-based engineering company in the aftermath of its acquisition, focusing in particular on its R&D unit. Results: The Lab struggled to maintain its practice-based work in an institutional environment that emphasized the pursuit of external goods. Discussion: We use this case to develop two arguments. Firstly, we illustrate the concept of "practice-like" activities and explore their vulnerability to institutional domination. Secondly, in light of the style of management on display after the takeover, we offer further support to MacIntyre's critique of management. Finally, based on the empirical data we reflect on the importance of organizational culture, as well as friendship and the achievement of a common good in business organizations for these kinds of activities. Copyright © 2022 Bolade-Ogunfodun, Sinnicks, Akrivou and Scalzo.

Bolade-Ogunfodun, Y., Sinnicks, M., Akrivou, K., & Scalzo, G. (2022). Exploring the vulnerability of practice-like activities: An ethnographic perspective. *Frontiers in Sociology*, *7*. doi: 10.3389/fsoc.2022.1003741. Article.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

INNOVATION AS A PRACTICE: WHY AUTOMATION WILL NOT KILL INNOVATION

ABSTRACT. As a result of contemporary culture's focus on continuous innovation and "change before you have to," innovation has been identified with economic gains rather than with creating added value for society. At the same time, given current trends related to the automation of business models, workers seem all but destined to be replaced by machines in the labor market. In this context, we attempt to explore whether robots and Artificial Intelligence (AI) will be able to innovate, and the extent to which said activity is exclusively inherent to human nature. Following the need for a more anthropological view of innovation, we make use of MacIntyrean categories to present innovation as a domain-relative practice with creativity and practical wisdom as its corresponding virtues. We explain why innovation can only be understood within a tradition as it implies participating in inquiry about the principle and end of practical life. We conclude that machines and "intelligent" devices do not have the capacity to innovate and they never will. They may replicate the human capacity for creativity, but they squarely lack the necessary conditions to be a locus of virtue or engage with a tradition. Copyright © 2023 Redín, Cabaleiro-Cerviño, Rodríguez-Carreño and Scalzo.

Redín, D. M., Cabaleiro-Cerviño, G., Rodríguez-Carreño, I., & Scalzo, G. (2023). Innovation as a practice: Why automation will not kill innovation. *Frontiers in Psychology*, *13*. doi: 10.3389/fpsyg.2022.1045508. Article.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

POWER, AUTHORITY, AND LEADERSHIP: A PROPOSAL FOR ORGANIZATIONAL THEORY IN THE POST-BUREAUCRATIC ERA

ABSTRACT. Organizations are privileged structures in contemporary society given that they contain and manage a large part of individuals' activities. This is so much so that a company's success depends on an adequate organizational structure. As such, this chapter studies the depths of organizations' political dimension with a conceptual, philosophical-political, and historical investigation on the development of the relationship between power and authority within organizational theory. It does so with the aid of Spanish author Juan Antonio Pérez Lopez's organizational management framework. Starting from the crisis of the modern bureaucratic model, in which rationalization continually increases, and power is separated from authority, this chapter maintains, to the contrary, the hypothesis that, in the post-bureaucratic era, a new paradigm for organizational theory is needed for studying the relationship between power and authority. This paradigm has the advantage of reflecting a healthy way of governing organizations focused on human development. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2022. All rights reserved.

Ciardi, L., & Scalzo, G. (2022). Power, Authority, and Leadership: A Proposal for Organizational Theory in the Post-Bureaucratic Era. In Faldetta, G., Mollona, E., & Pellegrini, M. M. (Eds.), *Philosophy and Business Ethics: Organizations, CSR and Moral Practice* (pp. 569-596). Springer. doi: 10.1007/978-3-030-97106-9_22. Book Chapter.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

THE ROLE OF EMPATHY IN SHARED INTENTIONALITY: CONTRIBUTIONS FROM INTER-PROCESSUAL SELF THEORY

ABSTRACT. Research in psychology related to the conceptualization of empathy has been on the rise in the last decades. However, we argue that there is still space for further research to help capture the important notion of empathy and its theoretical and conceptual depth. Following a critical review of the current state of the research that conceptualizes and measures empathy, we focus on works that highlight the importance of a shared vision and its relevance in psychology and neuroscience. Considering the state of the art of current neuroscientific and psychological approaches to empathy, we argue for the relevance of shared intention and shared vision in empathy-related actions. Upon review of different models that emphasize a shared vision for informing research on empathy, we suggest that a newly developed theory of self, human growth and action–the so-called Inter-Processual Self theory (IPS)–can significantly and novelly inform the theorization on empathy beyond what the literature has stated to date. Then, we show how an understanding of integrity as a relational act that requires empathy is an essential mechanism for current key research on empathy and its related concepts and models. Ultimately, we aim to present IPS as a distinctive proposal to expand upon the conceptualization of empathy. Copyright © 2023 Luis, Martínez, Akrivou, Scalzo, Aoiz and Orón Semper.

Luis, E. O., Martínez, M., Akrivou, K., Scalzo, G., Aoiz, M., & Orón Semper, J. V. (2023). The role of empathy in shared intentionality: Contributions from Inter-Processual Self theory. *Frontiers in Psychology*, *14*. doi: 10.3389/fpsyg.2023.1079950. Article.

GERMÁN ROBERTO SCALZO MOLINA

***Senior Researcher D**, SNII Level I*

THREE RIVAL VERSIONS OF WORK AND TECHNOLOGY: SMITH, MARX, AND MACINTYRE IN DISCUSSION

ABSTRACT. The Fourth Industrial Revolution, characterized by the wide introduction of automation in industry, brought about many changes in work and in the possibility of replacing workers with machines that are threatening the future of work. This chapter delves into the conflictive relationship between modern work and technology. We will depart from two main paradigmatic representatives of the eighteenth-century economic approach to work, namely Adam Smith and Karl Marx, mostly considered intellectual antagonists. Besides their differences, we sustain that both failed to give a sustainable and realistic account of the meaning of work and its contribution to individual flourishing and the common good, mainly because of their reductionist anthropological assumptions. Hence, we will analyze their understandings of the work-technology relationship in light of the thought of MacIntyre, a prominent critic of both Marx and Smith. By rehabilitating the idea of a practice, MacIntyre offers a more realistic and robust approach to understanding the way technology might nega-

tively affect work, but also recognizes it as an opportunity for excellence in modern corporations.

Pinto-Garay, J., Scalzo, G., & Ferrero, I. (2022). Three rival versions of work and technology: Smith, marx, and macintyre in discussion. In Faldetta, G., Mollona, E., & Pellegrini, M. M. (Eds.), *Philosophy and Business Ethics: Organizations, CSR and Moral Practice* (pp. 275-299). Springer. doi: 10.1007/978-3-030-97106-9_11. Book Chapter.

GERMÁN ROBERTO SCALZO MOLINA

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VIRTUES, THE COMMON GOOD, AND BUSINESS LEGITIMACY

ABSTRACT. When it comes to contributing to the wider society's common good, organizations' considerable ethical failures have weakened overall trust in business firms. Mainstream legitimacy theory fails to address normative issues on the ethical responsibilities of management toward and the role of business in society. This chapter reviews the main approaches to business legitimacy linked with institutional theory in light of the virtue ethics tradition to show how a virtuous management paradigm can enable a better relationship between the firm and its stakeholders, promoting their well-being and contributing to the common good of society as a whole. To facilitate a richer and more nuanced understanding of virtue ethics' concerns, it applies key terms from Aristotelian virtue ethics to discussion of the role of management and ethical communication in the context of business legitimacy. © Springer Nature Switzerland AG 2020.

Scalzo, G., & Akrivou, K. (2020). Virtues, the Common Good, and Business Legitimacy. In Rendtorff, J. D. (Ed.), *Handbook of Business Legitimacy: Responsibility, Ethics and Society* (pp. 263-275). Springer. doi: 10.1007/978-3-030-14622-1_96. Book Chapter.

GERMÁN ROBERTO SCALZO MOLINA

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WHOSE WORK? WHICH MARKETS? RETHINKING WORK AND MARKETS IN LIGHT OF VIRTUE ETHICS

ABSTRACT. Neo-Aristotelian virtue ethics applied to work and business theory have received increasing attention due to Alasdair MacIntyre's philosophy. At the same time, this approach has been accused of being inapplicable, a romantic nostalgia for an ideal world far from the reality of today's markets. Moreover, the more this theory evolves, the bigger the gap seems to become, as if good work were at odds with its economic dimension. This paper aims to address this gap by explaining how MacIntyre's neo-Aristotelianism conceives of the economic dimension of good work. In particular, we claim that it is consistent with MacIntyre's philosophy that said economic dimension of work can be defined in terms of excellence and virtue, particularly in accordance with the virtues of justice and unity of life. However, for these virtues of good work to be practicable, a reconsideration of market practices performed under the logic of giving and receiving is needed. Hence, defining and sustaining an economic dimension of good work in MacIntyre also depend on the possibility of market practices being defined as excellent.

Pinto-Garay, J., Scalzo, G., & Schlag, M. (2022). Whose work? Which markets? Rethinking work and markets in light of virtue ethics. *Business Ethics, Environment & Responsibility*, *32*(S1), 4-14. doi: 10.1111/beer.12507. Article.

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COMPLEXITY REDUCTION IN ANALYZING INDEPENDENCE BETWEEN STATISTICAL RANDOMNESS TESTS USING MUTUAL INFORMATION

ABSTRACT. The advantages of using mutual information to evaluate the correlation between randomness tests have recently been demonstrated. However, it has been pointed out that the high complexity of this method limits its application in batteries with a greater number of tests. The main objective of this work is to reduce the complexity of the method based on mutual information for analyzing the independence between the statistical tests of randomness. The achieved complexity reduction is estimated theoretically and verified experimentally. A variant of the original method is proposed by modifying the step in which the significant values of the mutual information are determined. The correlation between the NIST battery tests was studied, and it was concluded that the modifications to the method do not significantly affect the ability to detect correlations. Due to the efficiency of the newly proposed method, its use is recommended to analyze other batteries of tests. © 2023 by the authors.

Karell-Albo, J. A., Legón-Pérez, C. M., Socorro-Llanes, R., Rojas, O., & Sosa-Gómez, G. (2023). Complexity Reduction in Analyzing Independence between Statistical Randomness Tests Using Mutual Information. *Entropy*, *25*(11). doi: 10.3390/e25111545. Article.

GUILLERMO SOSA GÓMEZ

***Senior Researcher C**, SNII Level I*

ON THE CRYPTANALYSIS OF A SIMPLIFIED AES USING A HYBRID BINARY GREY WOLF OPTIMIZATION

ABSTRACT. Cryptosystem cryptanalysis is regarded as an NP-Hard task in modern cryptography. Due to block ciphers that are part of a modern cipher and have nonlinearity and low autocorrelation in their structure, traditional techniques and brute-force attacks suffer from breaking the key presented in traditional techniques, and brute-force attacks against modern cipher S-AES (simplified-advanced encryption standard) are complex. Thus, developing robust and reliable optimization with high searching capability is essential. Motivated by this, this paper attempts to present a novel binary hybridization algorithm based on the mathematical procedures of the grey wolf optimizer (GWO) and particle swarm optimization (PSO), named BPSOGWO, to deal with the cryptanalysis of (S-AES). The proposed BPSOGWO employs a known plaintext attack that requires only one pair of plaintext–ciphertext pairs instead of other strategies that require more pairs (i.e., it reduces the number of messages needed in an attack, and secret information such as plaintext-ciphertext pairs cannot be obtained easily). The comprehensive and statistical results indicate that the BPSOGWO is more accurate and provides superior results compared to other peers, where it improved the cryptanalysis accurateness of S-AES by 82.5%, 84.79%, and 79.6% compared to PSO, GA, and ACO, respectively. Furthermore, the proposed BPSOGWO retrieves the optimal key with a significant reduction in search space compared to a brute-force attack.

Experiments show that combining the suggested fitness function with HPSOGWO resulted in a 109-fold reduction in the search space. In cryptanalysis, this is a significant factor. The results prove that BPSOGWO is a promising and effective alternative to attack the key employed in the S-AES cipher.

Rizk-Allah, R. M., Abdulkader, H., Elatif, S. S. A., Oliva, D., Sosa-Gómez, G., & Snásel, V. (2023). On the Cryptanalysis of a Simplified AES Using a Hybrid Binary Grey Wolf Optimization. *Mathematics*, *11*(18). doi: 10.3390/math11183982. Article.

GUILLERMO SOSA GÓMEZ
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ON THE FITNESS FUNCTIONS INVOLVED IN GENETIC ALGORITHMS AND THE CRYPTANALYSIS OF BLOCK CIPHERS

ABSTRACT. There are many algorithms used with different purposes in the area of cryptography. Amongst these, Genetic Algorithms have been used, particularly in the cryptanalysis of block ciphers. Interest in the use of and research on such algorithms has increased lately, with a special focus on the analysis and improvement of the properties and characteristics of these algorithms. In this way, the present work focuses on studying the fitness functions involved in Genetic Algorithms. First, a methodology was proposed to verify that the closeness to 1 of some fitness functions' values that use decimal distance implies decimal closeness to the key. On the other hand, the foundation of a theory is developed in order to characterize such fitness functions and determine, a priori, if one method is more effective than another in the attack to block ciphers using Genetic Algorithms. © 2023 by the authors.

Tito-Corrioso, O., Borges-Quintana, M., Borges-Trenard, M. A., Rojas, O., & Sosa-Gómez, G. (2023). On the Fitness Functions Involved in Genetic Algorithms and the Cryptanalysis of Block Ciphers. *Entropy*, *25*(2). doi: 10.3390/e25020261. Article.

MANUEL SOTO PÉREZ
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CARLOS EDUARDO LÓPEZ HERNÁNDEZ
***Senior Researcher B**, SNII Level I*
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ENHANCING LEARNING OF ACCOUNTING PRINCIPLES THROUGH EXPERIENTIAL LEARNING IN A BOARD GAME

ABSTRACT. This study presents an empirically validated serious game proposal to cope with the challenges of apathy and lack of security in freshmen studying accounting. A review of the literature on serious games in accounting education found a dearth of studies identifying the factors that promote their effectiveness. Therefore, this study first analyses the Accounting Marathon board game's effectiveness in reinforcing the learning of accounting principles in an introductory accounting course. Secondly, since the Accounting Marathon is based on experiential learning theory, self-efficacy and learning motivation are proposed as mediating variables in the relationship between experiential learning and self-perceived academic performance. The sample consisted of 119 students who participated in the intervention. In terms of results, students who played the Accounting Marathon significantly improved their actual academic performance. Also, self-efficacy and learning motivation were significant mediator variables between experiential learning and self-perceived academic performance. © 2022 Informa UK Limited, trading as Taylor & Francis Group.

López-Hernández, C., Lizarraga-Álvarez, G. I., & Soto-Pérez, M. (2022). Enhancing learning of accounting principles through experiential learning in a board game. *Accounting Education*, *32*(3), 300-331. doi: 10.1080/09639284.2022.2059770. Article.

ANTONIA TERÁN BUSTAMANTE
***Senior Researcher A**, SNII Level I*
ANTONIETA TEODORA MARTÍNEZ VELASCO
SNII Level I

COVID-19, SOCIAL IDENTITY, AND SOCIALLY RESPONSIBLE FOOD CONSUMPTION BETWEEN GENERATIONS

ABSTRACT. Introduction: The objective of the research was to analyze the effect of COVID-19 with the predictors of the health belief model (perceived severity, perceived benefits, and cue to action) on the social identity of the consumer and the social identity of the socially responsible food consumption among four generation groups of adults based on the stimulus-organism-response model. Methods: The study had a quantitative approach explanatory design and a cross-sectional temporal dimension. A total of 834 questionnaires were collected from adults in the metropolitan area of Mexico City, and the data were analyzed through partial least squares structural equation modeling. Results: The results indicated that perceived severity, perceived benefits, and cue to action positively and significantly influenced social identity, and this positively and significantly influenced socially responsible consumption. In addition, identity was found to be a variable that had a total mediation effect between perceived severity and socially responsible consumption, perceived benefits and socially responsible consumption, and cue to action and socially responsible consumption. While the perceived barriers only had a direct effect on socially responsible consumption. Likewise, a difference was found between generation X and Y, generation Z and X, and generation Y and X in the relationship between cue to action, belonging to a social network group, and social identity. Discussion: In this sense, these results allow us to consider that when environmental stimuli (predictors of the health belief model) affect the organism (social identity), it will respond with socially responsible food consumption. This type of consumption is explained through social identity and is modified according to the age of the consumers due to the effects of social networks. Copyright © 2023 Leyva-Hernández, Terán-Bustamante and Martínez-Velasco.

Leyva-Hernández, S. N., Terán-Bustamante, A., & Martínez-Velasco, A. (2023). COVID-19, social identity, and socially responsible food consumption between generations. *Frontiers in Psychology*, *14*. doi: 10.3389/fpsyg.2023.1080097. Article.

ANTONIA TERÁN BUSTAMANTE
***Senior Researcher A**, SNII Level I*

MORTGAGE CREDIT: A PREDICTIVE MODEL OF RISK DISCRIMINATION

[CRÉDITO HIPOTECARIO: UN MODELO PREDICTIVO DE DISCRIMINACIÓN DE RIESGO]

ABSTRACT. Several studies demonstrate the relationship between access to housing and overcoming poverty. However, there is a lag in access to decent housing in Mexico and the lack of credit history is a limiting factor for access to bank loans. The objective of this research is to analyze mortgage credit selection criteria and propose a risk management model that allows banks to finance a greater number of people in the acquisition or improvement of their homes. The methodological strategy is based on machine learning techniques supported by data science to create a predictive model of credit fulfillment based on individual characteristics. The results show a predictive model of risk discrimination with a reliability of 85% for housing loans, which allows expanding the potential base of people susceptible to access mortgage financing. The right to decent housing presents a significant backlog in the country and so far the banks, by proposing a predictive model of mortgage risk selection, provide an answer to the research question that refers to the actions that can be taken by the banks to solve the problem of lack of access to decent housing. Banks can establish their risk selection criteria supported by data science and analytics and the application of predictive machine learning models using their extensive database.

González-Rossano, C., De la Torre-Díaz, L., & Terán-Bustamante, A. (2023). Mortgage credit: a predictive model of risk discrimination [Crédito hipotecario: un modelo predictivo de discriminación de riesgo]. *Revista Venezolana de Gerencia*, *28*(104), 1566-1583. doi: 10.52080/rvgluz.28.104.12. Article.

ANTONIA TERÁN BUSTAMANTE
***Senior Researcher A**, SNII Level I*
ANTONIETA TEODORA MARTÍNEZ VELASCO
SNII Level I

RELIABILITY AND VALIDITY OF A HUMAN CAPITAL SELECTION INSTRUMENT [CONFIABILIDAD Y VALIDEZ DE UN INSTRUMENTO DE SELECCIÓN DE CAPITAL HUMANO]

ABSTRACT. The objective of this research is to analyze a test model of integrity and trust for the selection of human talent in organizations. To assess the reliability and validity of the test, two types of analysis were used. The first was done with classical theory models using the statistics Cronbach Alpha and Kuder-Richardson 2.0. The second is done using the Item Response Theory (IRT) through the Rasch model using the R software. The exam is done focusing on organizational psychopathy. The evidence shows reliability and validity in the analyzed, both for the questions and for the individuals examined. Rach model provides valuable information at the level of questions and subjects to have a better instrument. This research provides bidirectional knowledge i) in the personality tests applied in the organization and ii) by showing a methodology that can be used in any questionnaire to validate your answers.

Terán-Bustamante, A., Ramírez-Castillo, C. E., & Martínez-Velasco, A. (2020). Reliability and validity of a Human Capital selection instrument [Confiabilidad y validez de un instrumento de selección de capital humano]. *Revista Mexicana de Economía y Finanzas*, Nueva Epoca, *15*(3), 435-454. doi: 10.21919/remef.v15i3.516. Article.

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WHAT DRIVES PROFIT INCOME IN MEXICO'S MAIN BANKS? EVIDENCE USING MACHINE LEARNING

ABSTRACT. Historically, the banking system has been critical to the development of economies by addressing funds efficiently—from customer savings and investors to the productive activities of people and companies, financing consumer goods and current expenses, housing, infrastructure projects and providing liquidity to the market. However, it must be transformed to respond to emerging demands in society for better financial products and services with a positive impact on living conditions and well-being. To achieve this, banks must create economic value—that is to say, banks should create profits in a sustained manner—in order to also create social value and thus generate shared value. The purpose of this study was twofold. The first aim was to identify the main factors that contributed to the majority of Mexican banking profits in the period from 2003 to 2021; the second aim of the study was to provide an innovative metric of banking performance. Using supervised machine learning algorithms and Principal Component Analysis, two prediction models were tested, and two banking performance indices were defined. The findings show that Random Forest is a reliable profit prediction model with a lower mean absolute error between the predicted yearly profit and losses and the actual data. There are no significant ranking position differences between the two performance indices. The first performance index obtained is novel due to its simplicity, since it is built on the basis of five values associated with commercial banking activity. In Mexico, no similar studies have been published. The indicator most widely used by regulators worldwide is the CAMELS index, which is a weighted average of the capital adequacy level, asset quality, management capacity, profitability, liquidity, and sensitivity to market risk. Its scale of 1 to 5 is useful for identifying the robustness and solvency of a bank, but not necessarily its capacity to generate profits. This approach might encourage banks to remain aware of their potential to create shared value and to develop competitive strategies to increase benefits for stakeholders.

González-Rossano, C., Terán-Bustamante, A., Velázquez-Salazar, M., & Martínez-Velasco, A. (2023). What Drives Profit Income in Mexico's Main Banks? Evidence Using Machine Learning. *Sustainability*, *15*(7). doi: 10.3390/su15075696. Article.

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ROMÁN RODRÍGUEZ AGUILAR
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***Senior Researcher B**, SNII Level I*

THE IMPORTANCE OF HEALTH AND SOCIAL PROTECTION ASSETS IN THE ECONOMIC WELFARE OF HOUSEHOLDS IN MEXICO

[LA IMPORTANCIA DE LOS ACTIVOS DE SALUD Y PROTECCIÓN SOCIAL EN EL BIENESTAR ECONÓMICO DE LOS HOGARES EN MÉXICO]

ABSTRACT. This paper seeks determines how the possession of health and social protection assets affects the probability of a household belonging to a given quintile of a proposed asset ownership index. An ordered logistic regression model was constructed. As a dependent variable, the quintile of each household was used according to the index. This research is based on 48 explanatory variables from the 2020 National Income and Expenses Survey. It confirms that health and social protection assets are relevant in the location of households in a quintile according to its socioeconomic condition. Estimated marginal effects and predictions for every quintile, show that the effect of the assets varies according to the quintile. Ownership of specific assets increase the likelihood of belonging to the higher quintiles. The possession of a voluntary pension fund is the most relevant asset. The empirical results obtained may contribute to design more efficient inequality-reducing public policies by promoting its acquisition and thereby encouraging social mobility. Main limitations of this research are related with the small number of health and social-protection related variables in the survey.

De la Torre-Díaz, L., Rodríguez-Aguilar, R., & Rivas-Aceves, S. (2023). The Importance of Health and Social Protection Assets in the Economic Welfare of Households in Mexico [La importancia de los activos de salud y protección social en el bienestar económico de los hogares en México]. *Revista Mexicana de Economía y Finanzas*, Nueva Epoca, *18*(4). doi: 10.21919/remef.v18i4.843. Article.

EDGAR DEMETRIO TOVAR GARCÍA

***Senior Researcher D**, SNII Level II*

A NOTE ON INSTITUTIONAL TRUST AND POVERTY: EVIDENCE FROM LATIN AMERICA

ABSTRACT. This short paper argues that institutional trust should be considered as an additional factor in-fluencing poverty at the macroeconomic level. By examining a sample of Latin American countries and analyzing annual data from 1995 to 2019 using panel data techniques such as cointe-gration analysis and panel fully modified least squares, this study estimates the long-term rela-tionships between poverty, economic growth, inequality, and institutional trust. As hypothe-sized, the empirical evidence suggests that institutional trust also reduces poverty. These findings hold particular significance for Latin America, where inequality levels are relatively high, institutional trust is low, and poverty rates have only recently begun to decline. Therefore, to alleviate poverty, it is crucial to implement public policies that restore and enhance institutional trust.

Tovar-García, E. D. (2023). A note on institutional trust and poverty: Evidence from Latin America. *Economics and Business Letters*, *12*(4), 313-320. doi: 10.17811/ebl.12.4.2023.313-320. Article.

EDGAR DEMETRIO TOVAR GARCÍA

***Senior Researcher D**, SNII Level II*

HIGH-TECH TRADE AS DETERMINANT OF THE US BILATERAL TRADE BALANCE

ABSTRACT. The relevance of high-tech industries has increased in recent years, particularly because of their effects on productivity and economic growth. However, the analysis of their relationship with the external sector is scarce, being a potential determinant of external imbalances. We examine the role of the share of high-tech exports and imports in the performance of the bilateral trade of the United States (US), characterized by a persistent trade deficit. The study focuses on bilateral data between the US and its 20 major partners, including developed and emerging countries, over the years 1990–2019. Accordingly, we developed dynamic panel data models based on the DIF GMM estimator, examining the relationship between bilateral trade balance and traditional regressors (relative income and exchange rate) and new explanatory variables (the high-tech composition of exports and imports). We found that the US high-tech composition of exports and imports has been changing over the last three decades, with the share of high-tech imports increasing and their exports decreasing. Furthermore, the regression results suggest that imports composed of high-tech goods are significant in explaining the US trade deficit, while the bilateral real exchange rate remains as a robust explanatory variable.

Carrasco, C. A., & Tovar-García, E. D. (2021). High-tech trade as determinant of the US bilateral trade balance. *Economics of Innovation and New Technology*, *32*(5), 713-730. doi: 10.1080/10438599.2021.2018313. Article.

EDGAR DEMETRIO TOVAR GARCÍA

***Senior Researcher D**, SNII Level II*

INSTITUTIONAL TRUST AND ENTREPRENEURS' EXPORT BEHAVIOR: AN INTERNATIONAL ANALYSIS

[CONFIANZA INSTITUCIONAL Y COMPORTAMIENTO EXPORTADOR DE LOS EMPRESARIOS: UN ANÁLISIS INTERNACIONAL]

ABSTRACT. The main goal of this research is to test the association between trust in institutions—e.g., police, law courts, property rights, government regulations, and public and private organizations—and entrepreneurial internationalization. The longitudinal analysis uses data obtained from the Global Entrepreneurship Monitor (GEM), the Heritage Foundation Index of Economic Freedom (IEF), World Bank Worldwide Governance Indicators (WGI), and World Development Indicators (WDI) for a sample of 88 countries during 2013-2018. Using factor analysis and panel data techniques that control for potential endogeneity, institutional trust is found to be significantly correlated with internationalization; however, this result is only valid for small and medium-sized enterprises (SMEs) in developing countries. Therefore, entrepreneurs from developing economies have to overcome the lack of institutional trust to successfully carry out their internationalization process.

De Anda. F., Baker. J. C., & Tovar-García. E. D. (2023). Institutional trust and entrepreneurs' export behavior: An international analysis [Confianza institucional y comportamiento exportador de los empresarios: un análisis internacional]. *Tec Empresarial*, *17*(3), 33-45. doi: 10.18845/te.v17i3.6848. Article.

EDGAR DEMETRIO TOVAR GARCÍA

***Senior Researcher D**, SNII Level II*

THE IMPORTANCE OF TRUST FOR ENTREPRENEURIAL INTERNATIONALIZATION: EVIDENCE FROM MEXICO

[LA IMPORTANCIA DE LA CONFIANZA PARA LA INTERNACIONALIZACIÓN EMPRESARIAL: EVIDENCIA DESDE MÉXICO]

ABSTRACT. This article presents six case studies, based on unstructured in-depth

interviews with CEOs from small and medium-sized Mexican companies, to explain why and how trust is relevant for internationalization. These firms suffer from negative stereotypes about their culture and the country's legal system, which creates a lack of individual and institutional trust. Therefore, we argue that mistrust is an additional barrier to entrepreneurial internationalization in the case of Mexico, and likely in the case of other developing countries. Other implications and specific findings are discussed.

Baker, J. C., De Anda, F., & Tovar-García, E. D. (2023). The Importance of Trust for Entrepreneurial Internationalization: Evidence from Mexico [La importancia de la confianza para la internacionalización empresarial: Evidencia desde México A importância da confiança para a internacionalização empresarial: evidências do México]. *Journal Globalization, Competitiveness, and Governability*, *17*(3), 89-100. doi: 10.58416/GCG.2023.V17.N3.04. Article.

MARISOL VELÁZQUEZ SALAZAR

SNII Level I

SMALL COFFEE COMPANIES AND THE IMPACT OF GEOGRAPHICAL INDICATIONS AS PRODUCTIVE INNOVATION IN MEXICO IN THE NEW REALITY

ABSTRACT. This paper analyzes the Protected Designation ofOrigin (PDO) as a factor of innovation in the Coffee Pluma geographical region in Oaxaca, Mexico, a vital tool to solve the problem of the actual crisis in the chain and for the newcontext of business and markets in the post-COVID 19 era due to the need for new marketing methods. Two case studies are presented under the Global Value Chain (GVC) methodology proposed by Gereffi et al. (1994, 2005, 2018) with a contribution from the conceptual framework of Geographical Indications (GI) used by Belletti et al. (2017) to analyze the PDO as an innovation. The first are small-size producers and the second are medium-size producers, both considered as small companies by the number of people employed. Even on a small scale, the coffee sector, through the appellation of origin, has the potential to generate economic benefits in the place of origin by promoting the development of two other economic sectors such as tourism and retail marketing. Likewise, it gives a comprehensive answer considering the business economic field and incorporating, as required by the current reality, other capitals such as social, cultural and environmental. The aim of this chapter is to evaluate the benefits that coffee sector, will obtain and generate through this sectorial and territorial development tool, considering that the G.I. emerges as an option to improve production by acquiring the exclusivity of producing coffee within that region to achieve sustainable development faced with the new reality. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021.

Velázquez Salazar, M., & Pérez Akaki, P. (2021). Small Coffee Companies and the Impact of Geographical Indications as Productive Innovation in Mexico in the New Reality. In Dávila-Aragón, G. & Rivas-Aceves, S. (Eds.), *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America* (pp. 149-167). Springer. doi: 10.1007/978-981-16-2613-5_8. Book Chapter.

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[1] Collaboration in one article in the School of Engineering, p. 96.

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CLARA LUZ ÁLVAREZ GONZÁLEZ DE CASTILLA

***Senior Researcher D**, SNII Level III*

ANTITRUST AND TELECOMMUNICATIONS SPECIALIZED COURTS: WHY, FOR WHAT AND HOW

[TRIBUNALES ESPECIALIZADOS EN COMPETENCIA Y TELECOMUNICACIONES: POR QUÉ, PARA QUÉ Y CÓMO]

ABSTRACT. The increasing trend in the creation of specialized courts mandates the analysis of specific courts in light of the advantages and disadvantages of judicial specialization. The focus of this article are the Antitrust and Telecommunications Courts in the Mexican Republic created by an amendment to the Constitution, analyzing them based on the traditional virtues and reasons for judicial specialization (e.g. efficiency, quality, uniformity, endorsing an ideology). Therefore, the different positions and arguments in connection with the creation of specialized courts, the criteria that promotes specialization, the types and degrees of specialization, the issues as to whether specialized courts are an end in itself or whether they are a byproduct of another end, are hereby expounded. Also, the literature of the judges´ selection process, and how it has been done in the Antitrust and Telecommunications Courts is presented, providing ideas for its improvement.

Álvarez, C. L. (2021). Antitrust and telecommunications specialized courts: why, for what and how [Tribunales especializados en competencia y telecomunicaciones: por qué, para qué y cómo]. *Cuestiones Constitucionales. Revista Mexicana de Derecho Constitucional*, 45, 3-46. doi: 10.22201/iij.24484881e.2021.45.16656. Article.

CLARA LUZ ÁLVAREZ GONZÁLEZ DE CASTILLA

***Senior Researcher D**, SNII Level III*

CHILDREN VIEWERS IN FREE-TO-AIR TV

[AUDIENCIAS INFANTILES EN TELEVISIÓN ABIERTA]

ABSTRACT. Notwithstanding the existence of diverse technological platforms to access audiovisual contents, free-to-air television continues to be significant in households and is consumed daily by children. Children audiences in free-to-air television needs to be protected through schedules during which only suitable contents for children of different ages is allowed. The schedules must remain as long as there is no parental control for free-to-air television, and which is generally available to the people. Mexican judicial cases evidence the difficulty to assert the children's audience rights and to respect the principle of the child's best interest.

Álvarez, C. L. (2020). Children Viewers in Free-To-Air Tv [Audiencias infantiles en televisión abierta]. *Actualidad Jurídica Iberoamericana*, *13*, 78-101. Article.

CLARA LUZ ÁLVAREZ GONZÁLEZ DE CASTILLA

***Senior Researcher D**, SNII Level III*

JOSÉ MARÍA SOBERANES DÍEZ

***Senior Researcher B**, SNII Level II*

THE CONTENT OF THE RIGHT TO INTERNET ACCESS

ABSTRACT. [Purpose] Having internet access is essential for the full enjoyment of many human rights. Therefore, this Article aims to determine the minimum essential content of the right to the internet in order to both understand the extent to which it deserves protection and to verify compliance with the obligations it entails. We describe the evolving nature of internet and broadband access due to technological developments and social needs. We also present the different positions regarding internet access as a human right or not. as well as how this right is acknowledged in the Mexican Constitution. [Methodology/Approach Design] The methodology was the review and analysis of norms, case law. academic and public policy documents, as well as references to relevant statistical data. The scope of the paper is framed in the discussion of fundamental and human rights. [Findings] The right to internet access has both a negative dimension and a positive one. The negative dimension consists of a State obligation not to limit or restrict the right to internet access. The positive dimension must be determined using the economic, social. and cultural rights standard of the four As. namely, availability, accessibility, acceptability. and adaptability. Finally, we propose the minimum essential content of the right to internet access on those four characteristics. [Practical Implications] - This Article provides arguments and bases for the minimum essential content of the right to internet access and broadband which are relevant for policymakers, judicial decisions, and civil society. Also, the academic debate is and will be open on the subject matter of this paper insofar as the evolutionary nature of technology. demands a constant review and update of the minimum essential content of the right. [Originality/Value] There is currently no literature regarding what a right to internet access and broadband would include as obligations to States and other parties.

Álvarez, C. L., & Soberanes, J. M. (2023). The Content of the Right to Internet Access. *Revista de Direito, Estado e Telecomunicações*, *15*(1), 31-57. doi: 10.26512/lstr.v15i1.46859. Article.

FERNANDO BATISTA JIMÉNEZ

SNII Level I

CONSTITUTIONAL NOTES ON MEXICO'S TIME ZONE LAW

[APUNTES CONSTITUCIONALES SOBRE LA LEY DE LOS HUSOS HORARIOS EN LOS ESTADOS UNIDOS MEXICANOS]

ABSTRACT. The enactment of the Mexican Time Zone Law established a substantial change in the subject. Its regulation introduces legally transcendental aspects from an organic and institutional point of view and for the study of human rights. This paper analyzes, from a constitutional and jurisprudential perspective, the relevance of the law for the Mexican legal system.

Batista Jiménez, F., & Hernández Bernal, G. (2023). Constitutional Notes on Mexico's Time Zone Law [Apuntes constitucionales sobre la Ley de los Husos Horarios en los Estados Unidos Mexicanos]. *Cuestiones Constitucionales. Revista Mexicana de Derecho Constitucional*, (48), 487-495. doi: 10.22201/iij.24484881e.2023.48.18054. Article.

GABRIELA GARCÍA ESCOBAR

Research Professor

HUMAN RIGHTS PLURALISTIC UNIVERSALITY: A BRIDGE BETWEEN GLOBAL NORMS AND CULTURAL DIVERSITY

ABSTRACT. International law in general and human rights norms specifically are experiencing a wave of criticism from various

fronts. One aspect of this is seen in the continuous debate on human rights universality and cultural diversity: there is growing discontent around tensions between global standards and local particularities. This article proposes to rediscover the pluralistic universality envisaged by the drafters of the Universal Declaration of Human Rights of 1948 as an interpretative tool that can provide guidance for this dilemma. The declaration's drafters understood universality as a set of commonly shared values that are essential for the respect of human dignity, but the content of which is open-ended and flexible enough to entertain a variety of notions of human flourishment. The drafters determined which concepts enjoyed universal acceptability and which did not by looking at a horizontal cross-cultural agreement, intercultural dialogue, and accepting reasonable disagreement on controversial subjects. The article proposes that their concept of universality and method for determining global standards could be used to address the tensions between the international and national spheres and enhance the legitimacy of the human rights system.

García Escobar, G. (2023). Human Rights Pluralistic Universality: A Bridge Between Global Norms and Cultural Diversity. *Nordic Journal of Human Rights*, *41*(2), 171-188. doi: 10.1080/18918131.2023.2216088. Article.

GABRIELA GARCÍA ESCOBAR

Research Professor

NORMS VERSUS INTERPRETATIONS: HUMAN RIGHTS UNIVERSALITY REVISITED

ABSTRACT. Debates on human rights universality frame universality according to an anthropological view called Western universalism and consider that "cultural relativism"is equivalent to any other framework. Thus, the discussion on this topic has been reduced to who is the rights-holder and the concept of human rights itself. There is a third approach to universality that must be addressed: the universality of interpretations. Most critics of human rights universality do not contest internationally agreed human rights norms (as established in treaties). Rather, they react against interpretations or standards as have been developed by human rights mechanisms. Accordingly, this paper explores three positions that have been developed around this notion: flexible Westerns, dialogical perspectives, and bottom-up approaches.

García Escobar, G. (2023). Norms versus Interpretations: Human Rights Universality Revisited. *Global Jurist*, *23*(2). doi: 10.1515/gj-2023-0001. Article.

JOSÉ MANUEL MAGAÑA RUFINO

***Senior Researcher B**, SNII Level II*

THE LEGAL REGIME AND CONCESSION OF VEGETABLE TITLE DEEDS

[EL RÉGIMEN JURÍDICO Y LA CONCESIÓN DE LOS TÍTULOS DE OBTENTOR EN MÉXICO]

ABSTRACT. This article analyses the implementation of the Legal Regime of protection of plant varieties in Mexico and the procedure of concession of title deeds. The star-ting point is the description of the Mexican agriculture offering a dichotomous panorama; traditional agriculture on one hand, and on the other, the commercial agriculture. It is followed by the study of the implementation of the plant variety system as part of the economy changes of the decade 1980 and 1990, period in which the Mexican State stops participating in the agricultural activity and un-dertakes a commercial discharge. Following with the study of one of the key elements of this change, the international trades that obligate Mexico to protect the plant varieties and The International Agreement for the Protection of the Plant Breeders. Briefly, the agreements in which the industrial property is limited is examined as well as its constitutional regulations and its interpretation that allows to balance the interests of all the involved parties. Following with a review of the Legal Regime the Federal Law of Plan Varieties and its Regulation. The limits of the Plant Breeders rights is emphasized, as well as the protection of the biodiver-sity. The administrative structure involved in the procedure of concession of plant breeders' deeds and, the whole process, from the application to the obtention of the plant breeders' deeds is studied.

Hernández, C. E. A., Magaña, J. M. (2022). The Legal Regime and Concession of Vegetable Title Deeds [El régimen jurídico y la concesión de los títulos de obtentor en México]. *Revista Iberoamericana de la Propiedad Intelectual*, (16), 7-58. doi: 10.26422/RIPI.2022.1600.arc. Article.

EDGARDO MUÑOZ LÓPEZ

SNII Level II

ELEMENTS, STANDARD AND CALCULATION OF PUNITIVE DAMAGE IN MEXICAN LAW

[OTORGAMIENTO Y CUANTIFICACIÓN DE LOS DAÑOS PUNITIVOS EN MÉXICO. UNA PROPUESTA A LA LUZ DEL DERECHO COMPARADO]

ABSTRACT. In this article, the authors undertake a solid comparative analysis about the elements of Mexican punitive damages, the negligence and unlawfulness threshold necessary for its award, and provide a method for its quantification. Despite the great efforts made by Mexico's Supreme Court of Justice to incorporate this type of damage in Mexican law, there was still no clarity regarding the elements to be considered for its award, the threshold that must be reached in each one of them or the formula to quantify them. This article attempts to fill in these gaps by using the functional method of comparative law; which makes it an invaluable contribution to the scholarly on the subject.

Muñoz, E., & Cabello, R. V. (2021). Elements, Standard And Calculation Of Punitive Damage In Mexican Law [Otorgamiento y cuantificación de los daños punitivos en México. Una propuesta a la luz del derecho comparado]. *Boletín Mexicano de Derecho Comparado*, *1*(162). doi: 10.22201/iij.24484873e.2021.162.17074. Article.

JAIME OLAIZ GONZÁLEZ

SNII Level I

ALBERT, RICHARD, CONSTITUTIONAL AMENDMENTS: MAKING, BREAKING, AND CHANGING CONSTITUTIONS, NUEVA YORK, OXFORD UNIVERSITY PRESS, 2019, 338 PP.

ABSTRACT. Durante los últimos treinta años, el estudio del cambio constitucional ha ocupado un lugar preponderante en la articulación de la teoría constitucio-nal contemporánea. Desdeel primer volumen de We the People publicado en 1991 (Ackerman, B., 1991) hasta The Cycles of Constitutional Time de 2020 (Balkin, J., 2020). podemos encontrar una doctrina muy vasta so-bre el cambio constitucional y sus efectos dentro del derecho y la política constitucionales.

Constitutional Amendments: Making, Breaking, and Changing Constitutions se inscribe en esta dilatada tradición doctrinal de la teoría constitucional, con un carácter ori-

ginal, profundo, provocador y revelador que merecen especial atención y reconocimiento.

Richard Albert nos propone una taxonomía de la enmienda constitucional con una profundidad y detalle tales, que su libro es en realidad un tratado sobre la teoría general de las enmiendas constitucionales y al mismo tiempo, un extenso estudio de constitucionalismo comparado sobre reformas constitucionales.

Olaiz González, J. (2021). Albert, Richard, Constitutional Amendments: Making, Breaking, and Changing Constitutions, Nueva York, Oxford University Press, 2019, 338 pp. *Cuestiones Constitucionales. Revista Mexicana de Derecho Constitucional*, *1*(45), 521-528. doi: 10.22201/iij.24484881e.2021.45.16675. Review.

JAIME OLAIZ GONZÁLEZ

SNII Level I

MEXICAN SUPREME COURT AT CROSSROADS: THREE ACTS OF CONSTITUTIONAL POLITICS

ABSTRACT. Since 2018, Mexico's Supreme Court is facing a critical juncture. The new distribution of political power and the distinctive platform of the governing coalition endowed with massive popular support has forced the Court to redefine its role as a constitutional tribunal within unprecedented dynamics of constitutional politics. Such juncture can be summarized as being at crossroads, between desirable affirmation, strategic accommodation and concerning subordination. © 2020 Walter de Gruyter GmbH, Berlin/Boston.

Olaiz-González, J. (2020). Mexican Supreme Court at Crossroads: Three Acts of Constitutional Politics. *ICL Journal*, *14*(4), 447-471. doi: 10.1515/icl-2020-0022. Article.

JAIME OLAIZ GONZÁLEZ

SNII Level I

REGRESSION THROUGH TRANSFORMATION: CONSTITUTIONAL CHANGE IN TIMES OF THE SO CALLED "FOURTH TRANSFORMATION"

[REGRESIÓN POR TRANSFORMACIÓN: CAMBIO CONSTITUCIONAL EN TIEMPOS DE LA DENOMINADA "CUARTA TRANSFORMACIÓN"]

ABSTRACT. Since 2018, Mexico is passing through a radical process of political transformation. This article explores how the new power elite has predicated its particular perspectives on constitutional change. Through the focal lenses of Bruce Ackerman's influential theory on contemporary paths to constitutionalism, it examines the new cycle of political and constitutional transformation promoted by the new government and is put into test to ascertain if its narrative resembles the patterns of revolutionary constitutionalism or, to the contrary, is more in tune with preservationist strategies for constitutional change that the article portrays as regression through transformation. © 2021 Universidad Nacional Autonoma de Mexico. All rights reserved.

Olaiz González, J. (2021). Regression Through Transformation: Constitutional Change in Times of the so Called "Fourth Transformation" [Regresión por Transformación: cambio constitucional en tiempos de la denominada "Cuarta Transformación"]. *Cuestiones Constitucionales. Revista Mexicana de Derecho Constitucional*, (45), 237-278. doi: 10.22201/iij.24484881e.2021.45.16663. Article.

HUGO SAÚL RAMÍREZ GARCÍA

SNII Level III

JUAN FRANCISCO DÍEZ SPELZ

***Assistant Researcher**, Research Professor*

WHEN CORPORATE SOCIAL RESPONSIBILITY MEETS HUMAN RIGHTS. BUSINESS PLANNING BASED ON MORAL ABSOLUTES

ABSTRACT. What happens when Corporate Social Responsibility (CSR) and Human Rights meet? This article argues that although CSR is a worthy attempt to propose social-aimed better practices for managerial decisions, a human rights perspective substantially enriches this vision. It also suggests that the ancient principle of res extra commercium can provide the rationale crucial to join CSR with human rights as a source of moral absolutes. Essentially, based on the res extra commercium rationale, businesses should start by identifying areas of economic activity that are off limits because they may violate human dignity. © 2022 Universitat Ramon Llull. All rights reserved.

Díez-Spelz, J. F., & Ramírez-García, H. S. (2022). When Corporate Social Responsibility Meets Human Rights. Business Planning Based on Moral Absolutes. Ramon Llull Journal of Applied *Ethics*, *13*(13), 77-98. doi: 10.34810/rljaev1n13id398680. Article.

JOSÉ MARÍA SOBERANES DÍEZ

***Senior Researcher B**, SNII Level II*

DISCRIMINATION IN JOB OFFERS

[LA DISCRIMINACIÓN EN LAS CONVOCATORIAS LABORALES]

ABSTRACT. The purpose of this paper is to analyze how the prohibition to discriminate in job offers occurs, to verify if it is a limit to the contractual freedom of a private subject and, where appropriate, how equality should operate because it is an offer of holding a legal act between individuals. © 2022 Universidad Nacional Autonoma de Mexico, Instituto de Astronomia. All rights reserved.

Soberanes Díez, J. M. (2022). Discrimination in Job Offers [La discriminación en las convocatorias laborales]. *Revista Latinoamericana de Derecho Social*, *1*(35), 271-296. doi: 10.22201/iij.24487899e.2022.35.17279. Article.

JOSÉ MARÍA SOBERANES DÍEZ

***Senior Researcher B**, SNII Level II*

JUDICIAL PRECEDENTS IN THE MEXICAN JUDICIAL REFORM OF 2021

[LA JURISPRUDENCIA EN LA REFORMA JUDICIAL MEXICANA DE 2021]

ABSTRACT. In this paper, the changes in the jurisprudential regime in the 2021 reform are analyzed, regarding the way of expressing the precedents and the rules so that a judicial criterion is mandatory. © 2023 Universidad Nacional Autonoma de Mexico. All rights reserved.

Soberanes Díez, J. M. (2023). Judicial Precedents in the Mexican Judicial Reform of 2021 [La jurisprudencia en la reforma judicial mexicana de 2021]. *Cuestiones Constitucionales. Revista Mexicana de Derecho Constitucional*, *49*, 391-422. doi: 10.22201/iij.24484881e.2023.49.18589. Article.

JOSÉ MARÍA SOBERANES DÍEZ

***Senior Researcher B**, SNII Level II*

THE RESTITUTION OF EQUALITY IN LAW

[LA RESTITUCIÓN DE LA IGUALDAD EN LA LEY]

ABSTRACT. In this paper, the possibilities of the constitutional jurisdiction to restore equality when it has been violated by the legislator are addressed, analyzing in abstract the demands that reparation entails and contrasting it with the powers that judges have to be able to make this principle effective. © 2021 Universidad Nacional Autonoma de Mexico. All rights reserved.

Soberanes Díez, J. M. (2021). The restitution of equality in law [La restitución de la igualdad en la ley]. *Cuestiones Constitucionales. Revista Mexicana de Derecho Constitucional*, *1*(45), 369-394. doi: 10.22201/iij.24484881e.2021.45.16667. Article.

GUILLERMO TEJEDA BECERRA

Research Professor

MANUEL ANDREU GÁLVEZ Y LEONARDO BROWN GONZÁLEZ, COORDS. "LOS RIESGOS DEL PENSAMIENTO". INTRODUCCIÓN AL MUNDO DE LAS IDEOLOGÍAS CONTEMPORÁNEAS. PAMPLONA: EUNSA, 2022. 295 PP.

ABSTRACT. La obra materia que se reseña en el presente escrito fue publicada en el año 2022 bajo la coordinación de los profesores el Dr. Manuel Andreu Gálvez y el Lic. Leonardo Brown González, ambos profesores a nivel Licenciatura de la Universidad Panamericana, campus México. La obra que se somete a reseña en el presente documento representa un trabajo arduo de exigencia metodológica y académica por parte de una serie de autores y profesores especialistas a nivel Iberoamérica en temas de Derecho, Filosofía e Historia. Desde diversos contextos académicos, se plantean estudiar los efectos en el entendimiento de la verdad que las ideologías han impuesto a nuestra sociedad y en muchas ocasiones como estos efectos han sido perniciosos no solo para la consecución de la verdad (actividad fundamental de la vida universitaria) sino también para otros valores como la paz, el orden y la armonía social. ©2022 Caceres Theological Institute, Universidad Francisco de Vitoria, Universidad de Extremadura.

Becerra, G. T. (2022). Manuel Andreu Gálvez y Leonardo Brown González, coords. "Los riesgos del pensamiento". Introducción al mundo de las ideologías contemporáneas. Pamplona: EUNSA, 2022. 295 pp. *Anuario de la Facultad de Derecho. Universidad de Extremadura*, (38), 905-907. Review.

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THE CONTROL OF CONSTITUTIONAL AMENDMENTS AND THE CHECKS AND BALANCES SYSTEM: A PROPOSAL IN THE LIGHT OF CONSTITUTIONAL ENGINEERING IN WHICH THE CONSTITUTIONAL MAGISTRACY IS LEGITIMIZED BY NOT HAVING THE LAST WORD

[EL CONTROL DE REFORMAS CONSTITUCIONALES Y EL SISTEMA DE «CHECKS AND BALANCES»: UNA PROPUESTA A LA LUZ DE LA INGENIERÍA CONSTITUCIONAL EN LA QUE LA MAGISTRATURA CONSTITUCIONAL SE LEGITIME AL NO TENER LA ÚLTIMA PALABRA]

ABSTRACT. Genuine constitutionalism lies upon a basic premise: «political power is limited by the law». Nonetheless, there are a couple of institutions and procedures that operate at the margin of the Constitution, and somehow, are beyond its control: On the one hand, the «Constituted Constituent Power»and'its'correlativeprocessofconstitutionalamendment; and on the other -and within those jurisdictions in which the latter is subject to judicial review- an equally reckoning and emerging power: Constitutional Courts empowered to review the unconstitutionality of constitutional amendments. This essay contends some fundamental notions that may enable the implementation of a distinctive procedure to govern constitutional amendments by fostering the necessary debate around their content and design, from the vantage point of the so-called «Constitutional Engineering», that may ultimately pave the way for consistent judicial review -accorded to constitutional courts- and for more effective political and social controls -accorded to the legislature and the People-, and by introducing at the same time, a series of checks and balances as expected in any constitutional democracy.

Gómez Bisogno, F. V. (2022). The control of constitutional amendments and the checks and balances system: a proposal in the light of constitutional engineering in which the constitutional magistracy is legitimized by not having the last word [El control de reformas constitucionales y el sistema de «checks and balances»: una propuesta a la luz de la ingeniería constitucional en la que la magistratura constitucional se legitime al no tener la última palabra]. *Revista de Investigações Constitucionais*, *9*(3), 543-577. doi: 10.5380/rinc.v9i3.85578. Article.

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PRAXIS, FREEDOM AND AFFECTIONS: ON THE "SUPRA-NATURE" OF THE WILL IN DUNS SCOTUS

[PRAXIS, LIBERTAD Y AFECCIONES: SOBRE LA "SUPRA-NATURALEZA" DE LA VOLUNTAD EN DUNS ESCOTO]

ABSTRACT. In dealing with the will, Scotus and Aristotle are not so far that Scotus himself denies their continuity, nor so close that he avoids reinterpreting the Aristotelian notion of prohaíresis in light of the Christian philosophy of freedom. His reinterpretaion consists in conceiving the will as a rational power, that is to say, free, and the intellect as a natural power. In this paper we will insist on this continuity and discontinuity in the following order: 1) we will show to what extent Scotus's will goes beyond intellection and, in that sense, "nature", focusing on the cases of incontinence and negligent omissions; 2) we will trace the structure of the Scotist will, following and answering Barnwell; 3) we will later study the freedom of the will, as Scotus understands it, mainly in his commentary on Metaphysics IX and, finally, 4) we will return to the influence of passions and the habits on the will for determining what is good. Our purpose is to show that Scotus takes up Aristotelian formulations to show how the will is a properly rational appetite, i.e. pace Aristotle, not properly an appetite.

Ginocchio, D. G., & Lecón, M. (2022). Praxis, Freedom and Affections: On the "supra-nature" of the Will in Duns Scotus [Praxis, libertad y afecciones: sobre la "supra-naturaleza" de la voluntad en Duns Escoto]. *Scripta Mediaevalia*, *15*(1), 173-214. doi: 10.48162/rev.35.014. Article.

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CONTEXTUALIZING PREMODERN PHILOSOPHY: EXPLORATIONS OF THE GREEK, HEBREW, ARABIC, AND LATIN TRADITIONS

ABSTRACT. This volume brings together contributions from distinguished scholars in the history of philosophy, focusing on points of interaction between discrete historical contexts, religions, and cultures found within the premodern period. The contributions connect thinkers from antiquity through the Middle Ages and include philosophers from the three major monotheistic faiths—Judaism, Islam, and Christianity. By emphasizing premodern philosophy's shared textual roots in antiquity, particularly the writings of Plato and Aristotle, the volume highlights points of cross-pollination between different schools, cultures, and moments in premodern thought. Approaching the complex history of the premodern world in an accessible way, the editors organize the volume so as to underscore the difficulties the premodern period poses for scholars, while accentuating the fascinating interplay between the Greek, Hebrew, Arabic, and Latin philosophical traditions. The contributors cover many topics ranging from the aims of Aristotle's cosmos, the adoption of Aristotle's Organon by al-Fārābī, and the origins of the Plotiniana Arabica to the role of Ibn Gabirol's Fons vitae in the Latin West, the ways in which Islamic philosophy shaped thirteenth-century Latin conceptions of light, Roger Bacon's adaptation of Avicenna for use in his moral philosophy, and beyond. The volume's focus on "source-based contextualism" demonstrates an appreciation for the rich diversity of thought found in the premodern period, while revealing methodological challenges raised by the historical study of premodern philosophy. Contextualizing Premodern Philosophy: Explorations of the Greek, Hebrew, Arabic, and Latin Traditions is a stimulating resource for scholars and advanced students working in the history of premodern philosophy.

Krause, K., López-Farjeat, L. X., & Oschman, N. A. (Eds.) (2023). *Contextualizing Premodern Philosophy: Explorations of the Greek, Hebrew, Arabic, and Latin Traditions*. Routledge. doi: 10.4324/9781003309895. Book.

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DEMOCRATIC CONFEDERALISM: AN ALTERNATIVE FOR FACING TENSIONS BETWEEN GLOBAL CITIZENSHIP AND LOCALIST CITIZENSHIP

[CONFEDERALISMO DEMOCRÁTICO: UNA ALTERNATIVA PARA AFRONTAR LAS TENSIONES ENTRE LAS CIUDADANÍAS GLOBAL Y LOCAL]

ABSTRACT. This article explores the tensions between different conceptions of "citizenship." On the one hand, we point out the virtues and limitations of cosmopolitan citizenship in the terms in which Seyla Benhabib understands it in The Right of Others...; on the other hand, we delve into another notion of citizenship, namely, the localist, in a version that could be at odds with some cosmopolitan values, that is, localism as understood by some Mexican autonomous communities, particularly the Zapatistas. Although Benhabib's cosmopolitan federalism is inclusive in spirit, it is conceived within a preponderantly global perspective and ends up being asymmetrical. While her proposal has some positive aspects, it faces some difficulties in the case of Mexican autonomous communities. In this article, we shall introduce the notion of democratic confederalism as a form of sociopolitical organization that seeks to strengthen the self-organization of social actors and to recognize the practice of citizenship in the terms in which autonomous communities exercise it. We propose that democratic confederalism could be an alternative for decreasing tensions between global citizenship and the idea of citizenship within autonomous communities.

López-Farjeat, L. X., & Lozano Ortega, T. (2023). Democratic Confederalism: An Alternative for Facing Tensions Between Global Citizenship and Localist Citizenship [Confederalismo democrático: una alternativa para afrontar las tensiones entre las ciudadanías global y local]. *Problema. Anuario de Filosofía y Teoría del Derecho*, *1*(17), 50-69. doi: 10.22201/iij.24487937e.2023.17.18207. Review.

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JANOS, D. (2020). AVICENNA ON THE ONTOLOGY OF PURE QUIDDITY. DE GRUYTER. 762 PP.

ABSTRACT. Avicena (m. 1037) es el filósofo más representativo de la tradición islámica clásica. Sus contribuciones a la lógica, la física, la metafísica, la psicología racional y la medicina son invaluables. Su importancia es tal, que varios historiadores de la filosofía han distinguido entre un periodo pre-aviceniano y uno post-aviceniano. En el primer periodo destacan sobre todo al-Kindī (m. *circa* 870). el primer filósofo de los árabes, y al-Fārābī (m. 950). conocido como el "segundo maestro" (el primero era

Aristóteles). A pesar de la fuerte influencia de este último en la filosofía de Avicena, es cierto que a partir de esta hay un parteaguas: las ideas de Avicena impactan notablemente en el ambiente intelectual islámico. Por ello, el lugar de este filósofo en la historia de la filosofía islámica es tal vez equiparable al de Kant o al de Hegel en la filosofía europea. Avicena adaptó y transformó varias nociones filosóficas provenientes de la filosofía aristotélica y del neoplatonismo, integrándolas al pensamiento islámico. De este modo, se volvió un punto de referencia entre los pensadores musulmanes que le sucedieron.

Avicena escribió varias obras y tratados en donde elabora planteamientos filosóficos sumamente complejos y originales, entre los que destaca su modo de entender la metafísica como una ontoteología. Su obra más conocida, *La curación* (*al-Shifāʾ*), es un trabajo monumental divido en tres grandes secciones, la primera destinada a la lógica, la segunda a la filosofía teorética y la última a la filosofía práctica. Divide la filosofía teorética, a su vez, en tres apartados, el primero dedicado a la física, el segundo a las matemáticas y el último a la metafísica (*ilāhiyyāt*) o filosofía primera. Es en este último apartado en donde se encuentra su ontoteología: si bien Avicena enfatiza que el objeto propio de la metafísica es el estudio del ser en cuanto ser, no por ello deja de lado el tema de la existencia de Dios. En la *Metafísica de la Shifāʾ* encontramos una serie de conceptos fundamentales en el desarrollo de la metafísica: "cosa" (*shayʾ*), "esencia" o *quiddidad* (*māhiyya*), "existencia" (*wuyūd*), "ser necesario" (*wāyib al-wuyūd*), "seres posibles" (*mumkinal-wuyūd*), entre otros. No es extraño encontrar la misma terminología en filósofos europeos tanto medievales como modernos.

López-Farjeat, L. X. (2022). Janos, D. (2020). Avicenna on the Ontology of Pure Quiddity. De Gruyter. 762 pp. *Tópicos*, (64), 487-493. doi: 10.21555/top.v640.2617. Review.

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Research Professor

RELIGION AND TERRITORY IN AL-FĀRĀBĪ'S POLITICAL PHILOSOPHY

[RELIGIÓN Y TERRITORIO EN LA FILOSOFÍA POLÍTICA DE AL-FĀRĀBĪ]

ABSTRACT. This article explores the use of the terminological pair dār al-islām/dār al-harb, first, from the Islamic juridical perspective. Then, the discussion is focused on the relationship between religion (milla), nation (umma), and territory (maskan), in al-Fārābī's political philosophy. It is highlighted that, in al-Fārābī's approach, the dichotomy dār al-islam/dār al-harb does not appear. The absence of that distinction suggests that for the philosopher religious identity is not a pre-requisite for a political community and its geographical demarcation. Therefore, it is argued that al-Fārābī's philosophical approach rules out the division of nations based on their religious identity. Beyond the differences between legal science and philosophy, the article examines the conceptualization of al-Fārābī's territory and its consequences for political philosophy.

López-Farjeat, L. X., & Ganem Gutiérrez, J. A. (2023). Religion and Territory in al-Fārābī's Political Philosophy [Religión y territorio en la filosofía política de al-Fārābī]. *Estudios de Asia y Africa*, *58*(2), 315-342. doi: 10.24201/EAA.V58I2.2834. Article.

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THE TRANSFORMATIONS OF THE ARISTOTELIAN DOCTRINE OF THE INTELLECT: ALEXANDER OF APHRODISIAS AND THE ARAB-ISLAMIC PHILOSOPHERS

[LAS TRANSFORMACIONES DE LA DOCTRINA ARISTOTÉLICA DEL INTELECTO: ALEJANDRO DE AFRODISIA Y LOS FILÓSOFOS ÁRABE-ISLÁMICOS]

ABSTRACT. This paper explains, firstly, the way in which Alexander of Aphrodisias interpreted the Aristotelian doctrine of the intellect in two of his most relevant treatises in this regard, namely the De Intellectu and the De anima. Secondly, it explores the presence of late antique commentators in the treatises on the intellect by al-Kindī and, mainly, by al-Fārābī, the first two philosophers to formulate doctrines of the intellect within the Arab-Islamic context. Thirdly, it shows the way in which al-Fārābī interprets the Aristotelian doctrine of the intellect influenced by Alexander of Aphrodisias. Finally, as a conclusion, it discusses the interpretative challenges of al-Fārābī's doctrine of the intellect, while briefly referring to Avempace's defense of the Farabian conception of the intellect.

López-Farjeat, L. X. (2022). The Transformations of the Aristotelian Doctrine of the Intellect: Alexander of Aphrodisias and the Arab-Islamic Philosophers [Las transformaciones de la doctrina aristotélica del intelecto: Alejandro de Afrodisia y los filósofos árabe-islámicos]. *Scripta Mediaevalia*, *15*(1), 31-65. doi: 10.48162/rev.35.010. Article.

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THE POLITICIAN AS A CHARACTER THERAPIST. AN ARISTOTELIAN ESSAY

[EL POLÍTICO COMO TERAPEUTA DEL CARÁCTER. UN ENSAYO ARISTOTÉLICO]

ABSTRACT. For Plato and Aristotle, ethics is a kind of knowledge that is intrinsically practical. Just as the physician worries about taking care of the sick, the professor of ethics worries about teaching virtue. But, unlike medicine, ethics is a knowledge that involves community. The politician, according to Plato and Aristotle, must care about how virtue is taught to citizens.

Arreguín, H. Z. (2022). The Politician as a Character Therapist. An Aristotelian Essay [El político como terapeuta del carácter. Un ensayo aristotélico]. *Open Insight*, *13*(29), 11-30. doi: 10.23924/oi.v13i29.442. Article.

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[1] Collaboration in four articles in the School of Economic And Business Sciences, pp. 54, 57-58.

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A DC-DC MULTILEVEL BOOST CONVERTER WITH REDUCED INDUCTOR-CURRENT

ABSTRACT. This article proposes a PWM-controlled dc-dc converter, similar to the traditional multilevel boost converter, which can achieve a high output voltage with low voltage devices, and their input current is non-pulsating. Compared to the multilevel boost converter and to other similar single-inductor single-transistor topologies, the inductor in the proposed converter drains a reduced amount of current compared to the input current (while maintaining a continuous input current), which results in reduced stored energy in the inductor for the same operating conditions and power rating. Theoretical analysis, simulation, and experimental results demonstrate the benefits of the proposed converter. © IET Conference Proceedings. All right reserved.

Alejo-Reyes, A., Mayo-Maldonado, J. C., Valdez-Resendiz, J. E., Rosas-Caro, J. C., & Rodríguez, A. (2022). A DC-DC multilevel boost converter with reduced inductor-current. *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 493-498). IET. doi: 10.1049/icp.2022.1099. Conference Paper.

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A MODIFIED SIMULATED ANNEALING (MSA) ALGORITHM TO SOLVE THE SUPPLIER SELECTION AND ORDER QUANTITY ALLOCATION PROBLEM WITH NON-LINEAR FREIGHT RATES

ABSTRACT. Economic Order Quantity (EOQ) is an important optimization problem for inventory management with an impact on various industries; however, their mathematical models may be complex with non-convex, non-linear, and non-differentiable objective functions. Metaheuristic algorithms have emerged as powerful tools for solving complex optimization problems (including EOQ). They are iterative search techniques that can efficiently explore large solution spaces and obtain near-optimal solutions. Simulated Annealing (SA) is a widely used metaheuristic method able to avoid local suboptimal solutions. The traditional SA algorithm is based on a single agent, which may result in a low convergence rate for complex problems. This article proposes a modified multiple-agent (population-based) adaptive SA algorithm; the adaptive algorithm imposes a slight attraction of all agents to the current best solution. As a proof of concept, the proposed algorithm was tested on a particular EOQ problem (recently studied in the literature and interesting by itself) in which the objective function is non-linear, non-convex, and non-differentiable. With these new mechanisms, the algorithm allows for the exploration of different regions of the solution space and determines the global optimum in a faster manner. The analysis showed that the proposed algorithm performed well in finding good solutions in a reasonably short amount of time. © 2023 by the authors.

González-Ayala, P., Alejo-Reyes, A., Cuevas, E., & Mendoza, A. (2023). A Modified Simulated Annealing (MSA) Algorithm to Solve the Supplier Selection and Order Quantity Allocation Problem with Non-Linear Freight Rates. *Axioms*, *12*(5), 459 doi: 10.3390/axioms12050459. Article.

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OPTIMAL EVALUATION OF RE-OPENING POLICIES FOR COVID-19 THROUGH THE USE OF METAHEURISTIC SCHEMES

ABSTRACT. A new contagious disease or unidentified COVID-19 variants could provoke a new collapse in the global economy. Under such conditions, companies, factories, and organizations must adopt reopening policies that allow their operations to reduce economic effects. Effective reopening policies should be designed using mathematical models that emulate infection chains through individual interactions. In contrast to other modeling approaches, agent-based schemes represent a computational paradigm used to characterize the person-to-person interactions of individuals inside a system, providing accurate simulation results. To evaluate the optimal conditions for a reopening policy, authorities and decision-makers need to conduct an extensive number of simulations manually, with a high possibility of losing information and important details. For this reason, the integration of optimization and simulation of reopening policies could automatically find the realistic scenario under which the lowest risk of infection was attained. In this paper, the metaheuristic technique of the Whale Optimization Algorithm is used to find the solution with the minimal transmission risk produced by an agent-based model that emulates a hypothetical re-opening context. Our scheme finds the optimal results of different generical activation scenarios. The experimental results indicate that our approach delivers practical knowledge and essential estimations for identifying optimal re-opening strategies with the lowest transmission risk. © 2023.

Cuevas, E., Rodríguez, A., Pérez, M., Murillo-Olmos, J., Morales-Castañeda, B., Alejo-Reyes, A., & Sarkar, R. (2023). Optimal evaluation of re-opening policies for COVID-19 through the use of metaheuristic schemes. *Applied Mathematical Modelling*, *121*, 506-523. doi: 10.1016/j.apm.2023.05.012. Article.

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QUADRATIC IMPROVED SUPER-BOOST (ISB) CONVERTER WITH LOW STORED ENERGY IN COMPONENTS

ABSTRACT. This article proposes a quadratic boost converter that requires small components compared to the traditional quadratic boost converter. The proposed converter is based on the recently proposed Improved Super-Boost (ISB) converter, and it is driven with a particular pulse width modulation technique (PWM). This allows producing a small switching ripple (input current and output voltage) with a relatively small value of inductors and capacitors. One of the main advantages of the proposed converter is the significant voltage gain, which is equal to the traditional quadratic boost converter; the other advantage is the small size of the components. The proposed converter contains more passive components, but their size is smaller. A comparative evaluation focused on the stored energy was performed; it is demonstrated that the proposed converter requires 50% of the stored energy in inductors and 14% of the stored energy in capac-

itors for a particular conversion with design specifications. © IET Conference Proceedings. All right reserved.

Mayo-Maldonado, J. C., Valdez-Resendiz, J. E., Alejo-Reyes, A., Rosas-Caro, J. C., & Valderrabano-González, A. (2022). Quadratic improved super-boost (ISB) converter with low stored energy in components. *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 505-511). IET. doi: 10.1049/icp.2022.1101. Conference Paper.

CLAUDIA YOHANA ARIAS PORTELA

Research Professor

MINIMIZATION OF ERGONOMIC RISK IN AUTOVEND: CASE STUDY-BREAD COMPANY

ABSTRACT. This chapter applies a mapping process and occupational ergonomic analysis to detect the ergonomic interventions required in a distribution process for automatic vending machines. Data collection was achieved by direct measurements such as physical effort, heart and metabolic rate, and observational measurements as OWAS postural risks. These variables were interrelated to observe the correlation between the level of discomfort and cardiovascular effort, and between posture and heart rate. The methodology is developed with data collected from two distribution centers. The results suggest that most work-related accidents occur due to a lack of standardization, process documentation, and good practices. Detected problems regarding occupational profiles, physical and metabolic load above the permissible limits, and postural risks allowed to propose interventions in the distribution system, which directly improve the employee's life quality. © Springer Nature Switzerland AG 2021. All rights reserved.

Arias-Portela, C. Y., & Wellens, A. G. (2021). Minimization of Ergonomic Risk in Autovend: Case Study-Bread Company. In Realyvásquez Vargas, A., García-Alcaraz, J. L., & Z-Flores, E. (Eds.), *New Perspectives on Applied Industrial Ergonomics* (pp. 203-234). Springer. doi: 10.1007/978-3-030-73468-8_10. Book Chapter.

PIA BERGER

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CLAUDIA NALLELY SÁNCHEZ GÓMEZ

***Senior Researcher B**, SNII Candidate Level*

SUSTAINABILITY OF URBAN PARKS: APPLICABLE METHODOLOGICAL FRAMEWORK FOR A SIMPLE ASSESSMENT

ABSTRACT. Urban parks are central to advancing urban sustainability and improving overall quality of life by providing green spaces that promote physical and mental well-being, mitigate environmental issues, and foster community cohesion. However, there is a lack of methodologies that measure these benefits and provide a sustainability rating. In this study, we propose a valuable tool for measuring the sustainability level of urban parks: low (0–50%), medium (51–79%), and high (80–100%). It employs effective and affordable measures for the daily management of urban parks. It is rooted in the three pillars of sustainability: environmental, social, and economic. We have defined 19 indicators (e.g., renewable energy and energy efficiency, environmental impact on society) and 50 criteria (e.g., clean energy generation, water workshops). A multi-criteria analysis facilitated the selection process for these indicators and criteria. This methodology is developed by characterizing and systematically documenting the park's day-to-day operations. We present a case study of Cárcamos Park in Guanajuato, Mexico. Through this real-life scenario, we demonstrate our methodology's high applicability and effectiveness. The sustainability assessment of Cárcamos Park reveals a level of 57%, with the environmental pillar at 47.7%, the economic pillar at 49%, and the social pillar at 75%. The adaptability of our methodology during the design phase of new parks plays a crucial role in shaping sustainable park layouts. Park managers can apply our procedure to any park, evaluate their sustainability status, and detect areas of opportunity.

González, T., Berger, P., Sánchez, C. N., & Mahichi, F. (2023). Sustainability of Urban Parks: Applicable Methodological Framework for a Simple Assessment. *Sustainability*, *15*(21). doi: 10.3390/su152115262. Article.

JORGE EDUARDO BRIEVA RICO

***Senior Researcher D**, SNII Level I*

DATAMINING AND ITS APPLICATIONS

ABSTRACT. Artificial intelligence and machine learning are widely applied in all domain applications today, including noncontact vital sign monitoring, datamining and denoising, data analysis, and application as traffic simulation and green finance. We briefly introduce the noncontact vital sign monitoring using video data and the solutions to this problem supplied by Artificial intelligence and machine learning. Then, we present the five papers selected in the related areas for this journal issue. © The Author(s) 2022.

Brieva, J. (2022). Datamining and its applications. *Journal of Artificial Intelligence and Technology*, *2*(3), 77-79. doi: 10.37965/jait.2022.0125. Article.

JORGE EDUARDO BRIEVA RICO

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ERNESTO MOYA ALBOR

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HIRAM EREDÍN PONCE ESPINOSA

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NON-CONTACT BREATHING RATE ESTIMATION USING MACHINE LEARNING WITH AN OPTIMIZED ARCHITECTURE

ABSTRACT. The breathing rate monitoring is an important measure in medical applications and daily physical activities. The contact sensors have shown their effectiveness for breathing monitoring and have been mostly used as a standard reference, but with some disadvantages for example in burns patients with vulnerable skins. Contactless monitoring systems are then gaining attention for respiratory frequency detection. We propose a new non-contact technique to estimate the breathing rate based on the motion video magnification method by means of the Hermite transform and an Artificial Hydrocarbon Network (AHN). The chest movements are tracked by the system without the use of an ROI in the image video. The machine learning system classifies the frames as inhalation or exhalation using a Bayesian-optimized AHN. The method was compared using an optimized Convolutional Neural Network (CNN). This proposal has been tested on a Data-Set containing ten healthy subjects in four positions. The percentage error and the Bland–Altman analysis is used to compare the performance of the strategies estimating the breathing rate. Besides, the Bland–Altman analysis is used to search for the agreement of the estimation to the reference. The percentage error for the AHN method is (Formula presented.) with and agreement with respect of the reference of ≈99%. © 2023 by the authors.

Brieva, J., Ponce, H., & Moya-Albor, E. (2023). Non-Contact Breathing Rate Estimation Using Machine Learning with an Optimized Architecture. *Mathematics*, *11*(3). doi: 10.3390/math11030645. Article.

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PORTABLE DEVICE FOR MONITORING THE RESPIRATORY RATE IN HOME CONDITIONS

ABSTRACT. During the last decades, technological advances have escalated at astronomical levels. One of the fields where technology has proven to be the most beneficial is in medicine. The vital signs monitoring is one of the medical areas with greater advances. Despite this technological advance in monitoring vital signs, heart rate and oxygen saturation are the ones that continue to be most used in diagnosis to the detriment of respiratory rate (RR) in medical and non medical environments. In this work we propose a preliminary contact device easy to use in non medical environments for monitoring, measuring and recording the RR. We test our device in controlled conditions in five healthy subjects. Accuracy will be computed through comparison of a visible estimation of the RR and the acquired data. The obtained mean PE% is less than 6% in normal conditions of utilisation for the experiments. Overall, our device has proven a reliable tool for RR measurement in this preliminary version. © 2023 IEEE.

Flores, S. A. A., Castillo, C. C. F. D., Carreon, D. S. S., Barreiro, S. Z., Brieva, J., Ponce, H., & Moya-Albor, E. (2023). Portable Device for Monitoring the Respiratory Rate in Home Conditions. *2023 IEEE 15th International Symposium on Autonomous Decentralized System (ISADS)*, Mexico City, Mexico, 2023 (pp. 1-5). IEEE. doi: 10.1109/ISADS56919.2023.10092089. Conference Paper.

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SNII Level I

THE CUMULATIVE CAPACITATED VEHICLE ROUTING PROBLEM INCLUDING PRIORITY INDEXES

ABSTRACT. This chapter studies the Cumulative Capacitated Vehicle Routing Problem including Priority Indexes, a variant of the classical Capacitated Vehicle Routing Problem, which serves the customers according to a certain level of preference. This problem can be effectively implemented in commercial and public environments where green concerns are incorporated, (like the reduction of CO2 emission and energy consumption), and waste collection systems. For this problem, we aim to minimize two objectives: the total latency and the total tardiness of the system. A Mixed-Integer formulation is developed and solved using the AUGMECON approach to obtain true efficient Pareto fronts. However, as expected, the use of commercial software was able to solve only small instances, up to 15 customers. Therefore two metaheuristics were developed to solve the problem, one based on the Non-dominated Sorting Genetic Algorithm (NSGA) and the other based on Particle Swarm Optimization (PSO). These algorithms were used to solve the small instances where True Efficient Fronts were available. Both algorithms provided good solutions, although the NSGA algorithm obtained a better and denser Pareto front. Later, both algorithms were used to solve larger instances with 20- 100 customers. The results were mixed in terms of quality, but the PSO algorithm performed faster. The instances solved were modified from benchmarks available in the literature. However, we are convinced that the model and algorithms proposed can be useful to solve a wide variety of situations where economic, environmental, and social concerns are involved. © Springer Nature Switzerland AG 2020.

Corona-Gutiérrez, K., Cruz, M. L., Nucamendi-Guillén, S., & Olivares-Benitez, E. (2020). The Cumulative Capacitated Vehicle Routing Problem Including Priority Indexes. In Derbel, H., Jarboui, B. & Siarry, P. (Eds.), *Green Transportation and New Advances in Vehicle Routing Problems* (pp. 91-129). Springer. doi: 10.1007/978-3-030-45312-1_4. Book Chapter.

FABIOLA CORTÉS CHÁVEZ
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IMPROVING PEDIATRIC MEDICAL PRESCRIPTION TO PROMOTE FIRST-TIME PARENT'S COMPREHENSION THROUGH AN INFORMATION DESIGN APPROACH

ABSTRACT. Studies indicate that parents consider pediatric medical encounters as stressful. One of the things they feel stressful is the uncertainty that revolves around the information in the medical prescription provided by the pediatrician since the information presented is not clear, confusing, and ambiguous. However, this feeling is more pronounced in new parents, since they do not have previous experience handling this type of health issue, it can be a significant trigger to face this type of situation and, above all, information. Based on this, a graphic restructuring was carried out from the perspective of the information design of the said medical document, that is, based on multi-scenarios and the cognitive, informational, and emotional needs of the users who interact with this design object. It was considered, in addition to the information that by law must appear in said documents, the ailment or symptom solves the medicine prescribed by the pediatrician, in such a way that, in addition to making these documents more understandable, it was sought to alleviate the stress and uncertainty that the user could feel. To validate the fact that the pediatric medical prescription was understandable and generated less stress, a questionnaire was applied to this user, the A/B Test and PSSUQ Questionnaire tool. © 2023, The Author(s), under exclusive license to Springer Nature Switzerland AG.

García-Hernández, M., Chavez-Cortes, F., & Rossa-Sierra, A. (2023). Improving Pediatric Medical Prescription to Promote First-Time Parent's Comprehension Through an Information Design Approach. In Soares. M. M., Rosenzweig, E., & Marcus, A. (Eds.), *Design, User Experience, and Usability: Design for Contemporary Technological Environments. 10th International Conference, DUXU 2021, Held as Part of the 23rd HCI International Conference, HCII 2021, Virtual Event, July 24–29, 2021, Proceedings, Part III. Series Lecture Notes in Computer Science (Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 14034 LNCS* (pp. 279-288). Springer. doi: 10.1007/978-3-031-35705-3_21. Conference Paper.

MARÍA LUISA CRUZ LÓPEZ
SNII Level I

MULTI-VIEW COMPUTER-GENERATED HOLOGRAM FOR DISPLAY PROJECTION USING FOURIER AND SPATIAL DOMAIN SEGMENTATION

ABSTRACT. We propose a method that includes spatial and Fourier segmentation to generate a multi-view computer-generated hologram with noise reduction. © 2022 The Author(s).

Cruz, M. L. (2022). Multi-view computer-generated hologram for display projection using Fourier and spatial domain segmentation. In *Frontiers in Optics + Laser Science 2022 (FIO, LS)*. Optica Publishing Group. doi: 10.1364/FIO.2022.JTu5A.75. Conference Paper.

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ANALYSIS OF BEEF QUALITY ACCORDING TO COLOR CHANGES USING COMPUTER VISION AND WHITE-BOX MACHINE LEARNING TECHNIQUES

ABSTRACT. The quality of beef products relies on the presence of a cherry red color, as any deviation toward brownish tones indicates a loss in quality. Existing studies typically analyze individual color channels separately, establishing acceptable ranges. In contrast, our proposed approach involves conducting a multivariate analysis of beef color changes using white-box machine learning techniques. Our proposal encompasses three phases. (1) We employed a Computer Vision System (CVS) to capture the color of beef pieces, implementing a color correction pre-processing step within a specially designed cabin. (2) We examined the differences among three color spaces (RGB, HSV, and CIELab*) (3) We evaluated the performance of three white-box classifiers (decision tree, logistic regression, and multivariate normal distributions) for predicting color in both fresh and non-fresh beef. These models demonstrated high accuracy and enabled a comprehensive understanding of the prediction process. Our results affirm that conducting a multivariate analysis yields superior beef color prediction outcomes compared to the conventional practice of analyzing each channel independently.

Sánchez-Gómez, C. N., Orvañanos-Guerrero, M. T., Domínguez-Soberanes, J., & Álvarez-Cisneros, Y. M. (2023). Analysis of beef quality according to color changes using computer vision and white-box machine learning techniques. *Heliyon*, *9*(7). doi: 10.1016/j.heliyon.2023.e17976. Article.

JULIETA DOMÍNGUEZ SOBERANES
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LINDA CAROLINA HERNÁNDEZ LOZANO
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ANTONIO ESTEVEZ RIOJA
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MARKET ORIENTATION AND CUISINE INNOVATION AS A DRIVEN SENSORY METHODOLOGY TO DEVELOP A SWEET POTATO SNACK AS AN ADDED-VALUE FOOD PRODUCT

ABSTRACT. Nowadays, there is an increasing interest in developing novel products that include ingredients that nourish and contribute to health. These food products need to possess unique sensory features that can differentiate them from existing ones, moreover considering that culinary creativity becomes an important part of the process of food product development. In this study, sweet potato (SP) was used as the main functional ingredient. This product is rich in bioactive compounds. However, this new product should be based on what consumers are looking for. For this purpose, a survey of 15 questions was conducted on 276 people in a local market from Aguascalientes, Mexico. The objective was to understand the use of SP and the expectations of new products with this ingredient. Results revealed that 26.45% of the surveyed people had never consumed SP and 54.71% of them like to consume stewed SP. Interestingly, 30.43% of the consumers would like to consume SP as a snack. As a result, cuisine professionals and innovators from Universidad Panamericana, Mexico, developed SP chips prepared with SP flour (36.86%), rice puree (40.86%), grasshopper powder (18%), salt (1.43%), sodium bicarbonate (1.88%) and sugar (0.94%). The process consisted of mixing, dehydrating, and insufflating stages. When the product was obtained, a sensory questionnaire was applied to consumers (n = 100). which consisted of an acceptability, a JAR, and a CATA test. The acceptability of the chip was 7.45 ± 2.25 on a 10-point basis. The consumers (82%) of them had never tried a value-added product made out of SP. The attributes considered significant by JAR are low in sweetness, sweet potato flavor and bread flavor; but high in salt, mouthfeel and flavor. In the CATA questionnaire, a list of 10 attributes was applied to individuals that were asked to endorse any relevant term which characterized the sample; from which, the ones that are relevant ($\alpha \leq 0.05$) are: spicy flavor, mouthfeel, sweet potato present, and mouth sensation. It was shown that the process of incorporating SP, rice and grasshoppers in a snack value-added product was promising. © 2023.

Licea-Dominguez, S., Estevez-Rioja, A., Hernández-Lozano, L. C., Alvarado-Ponce, G. E., Asemota, H., González-Cordova, A. F., González-Aguilar, G. A., & Domínguez-Soberanes, J. (2023). Market orientation and cuisine innovation as a driven sensory methodology to develop a sweet potato snack as an added-value food product. *International Journal of Gastronomy and Food Science*, *32*. doi: 10.1016/j.ijgfs.2023.100750. Article.

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RECOMMENDATION SYSTEM FOR A DELIVERY FOOD APPLICATION BASED ON NUMBER OF ORDERS

ABSTRACT. With the recent growth in food-delivery applications, creating new recommendation systems tailored to this platform is essential. State-of-the-art restaurant recommendation systems are based on users' ratings or reviews, with data that are obtained from questionnaires or online platforms such as TripAdvisor, Zomato, Foursquare, or Yield. However, not all users give ratings or reviews after their purchase. This document proposes a recommendation system whose input is the number of orders stored by a real food-delivery application. These data are always available for all food-delivery applications and are stored all the time. Our proposal is based on the nearest-neighbor technique that calculates the client's preferred restaurants and analyzes other clients with similar buying patterns. In addition, we propose a performance metric that can be used for this specific recommendation system that is based on real restaurant sales. We use a real dataset (available online) to validate our proposal. Based on our experiments, the recommendation system successfully gives only an average of 7.7 options from 187 that are available. We compared our proposal with other state-of-the-art recommendation techniques and obtained a better performance. Our results indicate that it is possible to generate recommendations based on the number of orders,

making the use of a restaurant-recommendation system feasible in a real food-delivery application. © 2023 by the authors.

Sánchez, C. N., Domínguez-Soberanes, J., Arreola. A., & Graff, M. (2023). Recommendation System for a Delivery Food Application Based on Number of Orders. *Applied Sciences*, *13*(4). doi: 10.3390/app13042299. Article.

JULIETA DOMÍNGUEZ SOBERANES
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MAYELI PERALTA CONTRERAS
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SENSORY CHARACTERIZATION OF FUNCTIONAL GUAVA SYMBIOTIC PETIT CHEESE PRODUCT

ABSTRACT. The consumption of functional dairy products continues to rise due to consumer needs. This study aimed to develop a dairy guava functional symbiotic petit cheese product that included probiotics (Bifidobacterium animalis subsp. lactis BB-12, Chr. Hansen, Denmark) and prebiotics (inulin), which had adequate organoleptic characteristics. Moreover, adequate physicochemical, microbiological, and sensory characteristics during its shelf life were expected. A pasteurized skim milk curd flavored with a guava pulp was stabilized with gelatin to formulate this product. As sweeteners, iso maltol, erythritol, and Luo Han Guo extract from monk fruit (Siraitia Grosvenorii) were added. The prebiotic used was inulin, and the probiotic (Bifidobacterium animalis subsp. lactis BB-12, Chr. Hansen, Denmark). The product was kept refrigerated (4 °C) during the shelf life of 28 days. For the organoleptic analysis (100 consumers), the evaluations performed were: (1) overall liking (OL), (2) CATA (Check all that apply) testing 19 attributes, and (3) purchase intention was evaluated. Results were analyzed with FIZZ Software Biosystèmes. During shelf life, (1) physicochemical, microbiological, and sensory tests were performed. The product was evaluated as "liked much" (7.16 out of 9); it was described as a creamy (71 %) natural product (73 %) with a fruity odor (57 %). It could be suitable for marketing because 82 % of the consumers would buy it. The product's probiotic character (over 1 × 106) was established through a microbiological count. On day one, the CFU was found to be 4.15 × 108, and after 28 days, 1.98 × 108 CFU of viable Bifidobacterium animalis subsp. lactis BB-12, leading us to establish its probiotic characteristics. The shelf life was estimated at 21 days. © 2023 The Authors.

Morales-Cortés, V. I., Domínguez-Soberanes, J., Hernández-Lozano, L. C., Licon, C. C., Estevez-Rioja, A., & Peralta-Contreras, M. (2023). Sensory characterization of functional guava symbiotic petit cheese product. *Heliyon*, *9*(11). doi: 10.1016/j.heliyon.2023.e21747. Article.

JULIETA DOMÍNGUEZ SOBERANES
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TECHNOLOGIES FOR THE USE AND CONSUMPTION OF SWEET POTATO LEAVES AND THEIR BIOACTIVE COMPOUNDS

ABSTRACT. Sweet potato (Ipomoea batatas L.) is native American; nevertheless, Asia and Africa are the leading producers and consumers of this product. Mainly, sweet potato is cultivated for its tubers, since they are a rich source of carbohydrates, minerals, and vitamins. On the other hand, sweet potato leaves (SPL) are also consumed in Taiwan and China, and are prepared in various ways (boiled, fried, baked, dehydrated, and fermented). This document shows a compendium of research related to the identification and quantification of the bioactive compounds in SPL, and how cooking processes and extraction technologies allow their use. Finally, the benefits of the bioactive compounds in SPL for human health are also reviewed. Lastly, promoting SPL consumption in Central America is necessary because it can be an alternative to reducing health problems caused by poor eating habits. © 2023 American Chemical Society.

López-Martínez, L. X., López-Pérez, A. A., González-Córdova, A. F., González-Aguilar, G. A., Colin Chávez, C., Beltrán-Barrientos, L. M., Domínguez-Soberanes, J., & Vargas-Ortiz, M. (2022). Technologies for the Use and Consumption of Sweet Potato Leaves and Their Bioactive Compounds. *ACS Food Science and Technology*, *3*(3), 379-393. doi: 10.1021/acsfoodscitech.2c00405. Article.

ALEJANDRO DORANTES ALDAMA
Research Professor

A POINT-PICKING GAME

ABSTRACT. In this article we study a version of the point-picking game defined by Berner and Juhász. Given a space X, the closed game CG(X) on X between Player O and Player P is played as follows: Player O chooses a nonempty open set U1⊂X, then Player P chooses a point x1∈U1, then Player O chooses a non-empty open set U2⊂X, then Player P chooses a point x2∈U2, and so on. An infinite sequence w=(U1,x1,U2,x2,...) such that Un is a nonempty open set and xn∈Un for every n∈N is called a play in CG(X). We will say that Player P wins w if {xn:n∈N} is closed in X, otherwise, Player O wins w. We prove that if Player O does not have a Markov winning strategy in CG(X) then X is selectively closed. We show that if X is the σ-product {f∈{0,1} ω1:f−1(1) is finite }, then Player O has a winning strategy in CG(X), yet X is selectively closed and selectively discrete. We also construct a selectively discrete space with a stationary winning strategy for Player O in CG(X). © 2023 Elsevier B.V.

Dorantes-Aldama, A. (2024). A point-picking game. *Topology and its Applications*, *341*. doi: 10.1016/j.topol.2023.108753. Article.

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***Research Associate**, Research Professor*

THE LANGUAGE OF NATURE AND ARTIFICIAL INTELLIGENCE IN PATIENT CARE

ABSTRACT. Given the development of artificial intelligence (AI) and the conditions of vulnerability of large sectors of the population, the question emerges: what are the ethical limits of technologies in patient care? This paper examines this question in the light of the "language of nature" and of Aristotelian causal analysis, in particular the concept of means and ends. Thus, it is possible to point out the root of the distinction between the identity of the person and the entity of any technology. Nature indicates that the person is always an end in itself. Technology, on the contrary, should only be a means to serve the person. The diversity of their respective natures also explains why their respective agencies enjoy diverse scopes. Technological operations (artificial agency, artificial intelligence) find their meaning in the results obtained through them (poiesis). Moreover, the person is capable of actions whose purpose is precisely the action itself (praxis), in which per-

sonal agency and, ultimately, the person themselves, is irreplaceable. Forgetting the distinction between what, by nature, is an end and what can only be a means is equivalent to losing sight of the instrumental nature of AI and, therefore, its specific meaning: the greatest good of the patient. It is concluded that the language of nature serves as a filter that supports the effective subordination of the use of AI to its specific purpose, the human good. The greatest contribution of this work is to draw attention to the nature of the person and technology, and about their respective agencies. In other words: listening to the language of nature, and attending to the diverse nature of the person and technology, personal agency, and artificial agency.

Enríquez, T., Alonso-Stuyck, P., & Martínez-Villaseñor, L. (2023). The Language of Nature and Artificial Intelligence in Patient Care. *International Journal of Environmental Research and Public Health*, *20*(15). doi: 10.3390/ijerph20156499. Article.

DAVID ESCOBAR CASTILLEJOS

SNII Level I

POLICY DESIGN FOR ELECTRICITY EFFICIENCY: A CASE STUDY OF BOTTOM-UP ENERGY MODELING IN THE RESIDENTIAL SECTOR AND BUILDINGS

ABSTRACT. Energy models play a crucial role in the domain of energy policy by serving as essential instruments for decision-making. However, a significant limitation of numerous bottom-up energy models (BUEMs) is their empirical design, which hinders their ability to effectively inform policy design. This study presents a structured framework that can be used to improve the effectiveness of behavior, understanding, and engagement measures in the development of BUEMs for enhancing energy end-use efficiency. The model selected for this case study was provided by the Mexican Commission for the Efficient Use of Energy (CONUEE), and it examines the impact of regulatory instruments on the residential sector and residential buildings. The benefits of the proposed framework were successfully demonstrated through a quantitative comparison of real energy models, using and without using the said framework, revealing the advantages of its use. The framework significantly decreases the time required for model generation in various aspects by 59.43%. The obtained results highlight the effectiveness of the framework, and it could enhance the existing knowledge in the sector.

Sanchez-Escobar, M. O., Noguez, J., Molina-Espinosa, J. M., Escobar-Castillejos, D., & Ruiz-Loza, S. (2023). Policy Design for Electricity Efficiency: A Case Study of Bottom-Up Energy Modeling in the Residential Sector and Buildings. *Energies*, *16*(19). doi: 10.3390/en16196765. Article.

RICARDO ABEL ESPINOSA LOERA

Research Professor

MULTI-SCALE STRUCTURAL-AWARE EXPOSURE CORRECTION FOR ENDOSCOPIC IMAGING

ABSTRACT. Endoscopy is the most widely imaging technique used for the diagnosis of cancerous lesions in hollow organs. However, endoscopic images are often affected by illumination artefacts: image parts may be over- or underexposed according to the light source pose and the tissue orientation. These artifacts have a strong negative impact on the performance of computer vision or artificial intelligence based diagnosis tools. Although endoscopic image enhancement methods are greatly required, little effort has been devoted to over- and underexposure enhancement in real-time. This contribution presents an extension to the objective function of LMSPEC, a method originally introduced to enhance images from natural scenes. It is used here for the exposure correction in endoscopic imaging and the preservation of structural information. To the best of our knowledge, this contribution is the first one that addresses the enhancement of both types of endoscopic artefacts (under- and over-exposure) using deep learning methods. Tested on the Endo4IE dataset, the proposed implementation has yielded a significant improvement over LMSPEC reaching a SSIM increase of 4.40% and 4.21% for over- and underexposed images, respectively.

García-Vega, A., Espinosa, R., Ramírez-Guzmán, L., Bazin T., Falcon-Morales, L., Ochoa-Ruiz, G., Lamarque, D., & Daul, C. (2023). Multi-Scale Structural-aware Exposure Correction for Endoscopic Imaging. In *2023 IEEE 20th International Symposium on Biomedical Imaging (ISBI)* (pp. 1-5). IEEE. doi: 10.1109/ISBI53787.2023.10230724. Conference Paper.

HÉCTOR EDUARDO GILARDI VELÁZQUEZ

***Senior Researcher B**, SNII Level I*

BIDIMENSIONAL DETERMINISTIC MODEL FOR DIFFUSION AND SETTLING OF PARTICLES

ABSTRACT. In this paper, we present a study of the diffusion properties of a deterministic model for settling particles in two displacement dimensions. The particularities of the novel deterministic model include the generation of Brownian motion and a two-dimensional displacement model without stochastic processes, which are governed by a set of six differential equations. This model is a piecewise system consisting of subsystems governed by jerk equations. With this model, we can consider different conditions of diffusion in both the dimensions and size of the space where the particles are dispersed. The settling time versus the dispersion medium and its size, as well as the average settling time and its probability distributions, are analyzed. Furthermore, the probability distributions for the settling location are presented for the changes in the diffusion parameters and space size. Finally, the basins of attraction for the settling positions are shown as a function of each dimensional diffusion parameter and for the medium size.

Velázquez Pérez, S. E., Campos-Cantón, E., Huerta Cuellar, G., Gilardi Velázquez, H. E. (2023). Bidimensional Deterministic Model for Diffusion and Settling of Particles. *Axioms*, *12*(2). doi: 10.3390/axioms12020191. Article.

HÉCTOR EDUARDO GILARDI VELÁZQUEZ

***Senior Researcher B**, SNII Level I*

GENERATION OF SELF-EXCITED, HIDDEN AND NON-SELF-EXCITED ATTRACTORS IN PIECEWISE LINEAR SYSTEMS: SOME RECENT APPROACHES

ABSTRACT. What kind of dynamics is a piecewise linear system able to display? How may they generate heteroclinic chaos? How can the coexistence of attractors be designed and characterized? Is it necessary to have equilibrium points to generate chaotic behavior? Chaos theory and complex systems are interesting and evolving topics whose investigation from a theoretical and practical point of view constantly leads to arising questions. Interesting behaviors can be observed in self-excited attractors, hidden attractors and non-self-excited attractors. This book presents some funda-

mentals of linear system theory and recent approaches to design the three classes of chaotic attractors in piecewise linear systems. Each chapter presents a brief description and basic concepts to provide an overview of linear systems theory; chaos and multistability in integer linear systems; hidden and non-self-excited attractors; and fractional approaches. They also provide example systems to illustrate the concepts and design methods introduced. Some current topics under investigation are addressed from an integer order perspective to make the connection with the fractional order counterpart. This textbook provides a comprehensive introduction, methodologies, and analysis tools to study chaotic piecewise linear systems and will be suitable for undergraduate or graduate students interested in the field of chaos and complex dynamics.

Campos Cantón, E., Escalante González, R. D. J., & Gilardi Velázquez, H. E. (2023). *Generation Of Self-Excited, Hidden and NON-SElf-Excited Attractors in Piecewise Linear Systems: Some Recent Approaches*. World Scientific. doi: 10.1142/13347. Book.

HÉCTOR EDUARDO GILARDI VELÁZQUEZ

***Senior Researcher B**, SNII Level I*

MULTISTABILITY ANALYSIS OF A PIECEWISE MAP VIA BIFURCATIONS

ABSTRACT. In this paper, we investigate the dynamical behavior of a one-dimensional piecewise map based on the logistic map, where generalized multistability can be observed. The proposed system has the unique property that the function is symmetric with respect to the origin but not its behavior, furthermore this system can display three types of multistability, and chaos for both, monostable and bistable behaviors. The stability analysis of the proposed system is presented. We describe the structure of bistable regions in the bifurcation diagram. Particular attention is paid to the chaotic regions. Corresponding to coexisting attractors, three scenarios of coexisting attractors, namely fixed points, periodic orbits, and chaotic attractors, can be found, which are unreported behaviors in discrete chaotic systems. The mechanism that leads to multistability phenomenon including pitchfork bifurcation, period-halving bifurcations, and the coexisting invariant sets is demonstrated. Furthermore, the Lyapunov exponent is analyzed with the type of multistability distinguished for a given set of parameters. © World Scientific Publishing Company.

Cassal-Quiroga, B. B., Gilardi-Velázquez, H. E., & Campos-Cantón, E. (2022). Multistability Analysis of a Piecewise Map via Bifurcations. *International Journal of Bifurcation and Chaos*, *32*(16). doi: 10.1142/S0218127422502418. Article.

JESÚS ALBERTO GÓMEZ ROMERO BÓRQUEZ

Research Professor

CAROLINA DEL VALLE SOTO

***Senior Researcher D**, SNII Level I*

JOSÉ ALBERTO DEL PUERTO FLORES

SNII Level I

MAPPING EEG ALPHA ACTIVITY: ASSESSING CONCENTRATION LEVELS DURING PLAYER EXPERIENCE IN VIRTUAL REALITY VIDEO GAMES

ABSTRACT. This work presents a study in which the cognitive concentration levels of participants were evaluated using electroencephalogram (EEG) measures while they were playing three different categories of virtual reality (VR) video games: Challenging Puzzlers, Casual Games, and Exergames. Thirty-one voluntary participants between the ages of 17 and 35 were recruited. EEG data were processed to analyze the brain's electrical activity in the alpha band. The values of power spectral density (PSD) and individual alpha frequency (IAF) of each participant were compared to detect changes that could indicate a state of concentration. Additionally, frontal alpha asymmetry (FAA) between the left and right hemispheres of the brain was compared. The results showed that the Exergame category of video games elicited higher average cognitive concentration in players, as indicated by the IAF and FAA values. These findings contribute to understanding the cognitive effects of VR video games and their implications for designing and developing VR experiences to enhance cognitive abilities. © 2023 by the authors.

GomezRomero-Borquez, J., Del Puerto-Flores, J. A., & Del-Valle-Soto, C. (2023). Mapping EEG Alpha Activity: Assessing Concentration Levels during Player Experience in Virtual Reality Video Games. *Future Internet, 15*(8). doi: 10.3390/fi15080264. Article.

ROBERTO GONZÁLEZ OJEDA

Research Professor

DISSOLUTION OF THE SECOND PHASES AND TRANSFORMATION FROM MG2SI TO Q-AL5CU2MG8SI6 IN SOLUTION HEAT TREATED QUATERNARY AL-ALLOYS

ABSTRACT. This work studies the formation of second phases and their dissolution for two alloys Al-6Si-7Cu-xMg (x = 5 and 7 wt%), focusing on Al5Cu2Mg8Si6 (Q-phase), which has been barely studied. The alloys were solution heat treated at 490 °C during times ranging from 1 to 24 h, and quenched in hot water. As-cast and solubilized alloys were characterized using Optical Microscopy (OM), X-Ray Diffraction (XRD), and Scanning Electron Microscopy (SEM). Results showed that second phases were eutectic Si, Al2Cu, Mg2Si, and Q, with total percentages of ~18% and 22% for the alloys with 5% and 7% Mg, respectively. Al2Cu and Q-phase were the predominant second phases in each individual case. The solution heat treatments led to the dissolution of the second phases following conventional and well-reported mechanisms. Nevertheless, Mg2Si did not present these mechanisms because both Chinese script and primary Mg2Si transformed into Q-phase, keeping the original morphology of Mg2Si. The presence of Q with a Chinese script morphology has not been reported before in literature, which is discussed here. This transformation led to an unusual increase in the Q-phase percentage after the solution heat treatment. © 2023 Elsevier B.V.

Casas, B. Y., Figueroa, I. A., González, G., González-Ojeda, R., & Alfonso I. (2023). Dissolution of the second phases and transformation from Mg2Si to Q-Al5Cu2Mg8Si6 in solution heat treated quaternary Al-alloys. *Journal of Alloys and Compounds*, *955*. doi: 10.1016/j.jallcom.2023.170003. Article.

ROBERTO GONZÁLEZ OJEDA

Research Professor

OCTAVIO LOZADA FLORES

SNII Level I

EFFECT OF MO ON HIGH ENTROPY TI-NB-ZR-TA ALLOY: PHASE EQUILIBRIA, MICROSTRUCTURE AND MECHANICAL PROPERTIES

ABSTRACT. Thermal and mechanical properties of Ti-Nb-Ta-Zr high entropy alloys are often influenced by element content and manufacturing routes, producing significant differences between mechanical properties

and microstructure. This work presents a Ti-Nb-Ta-Zr alloy in which Mo is added by adjusting the composition with phase equilibria simulation, improving the mechanical properties based on a mixture of two chemically different solid solutions (BCC1 and BCC2). The materials were produced by arc-melting suction casting. Characterization of the dendritic and interdendritic zones was carried out by means of X-ray spectroscopy, indicating the segregation of Ta and Nb in BCC1 and Zr and Ti in BCC2 phases. The dislocation density increased preferentially in the interdendritic Zr-Ti rich zones. The mechanical properties results were related to the chemical differences between the BCC1 and BCC2 lattice parameters induced by the Mo addition. With Mo segregating between both BCC cells, the resulting microstructure increased the yield strength, being confirmed with the kernel average maps, which showed that, after compression tests, the interdendritic zone accumulated a high density of dislocations, resulting in the segregation of Ti and Zr, affecting the mechanical response of Mo containing alloy. © 2023 Elsevier B.V.

Aranda, V. A., Figueroa, I. A., Amigó, V., González-Ojeda, R., Lozada, O., Vidilli, A. L., Otani, L. B., & González, G. (2023). Effect of Mo on high entropy Ti-Nb-Zr-Ta alloy: Phase equilibria, microstructure and mechanical properties. *Journal of Alloys and Compounds*, *960*. doi: 10.1016/j.jallcom.2023.170758. Article.

JUAN CARLOS LÓPEZ PIMENTEL

***Senior Researcher B**, SNII Level I*

CAROLINA DEL VALLE SOTO

***Senior Researcher D**, SNII Level I*

NFT-VEHICLE: A BLOCKCHAIN-BASED TOKENIZATION ARCHITECTURE TO REGISTER TRANSACTIONS OVER A VEHICLE'S LIFE CYCLE

ABSTRACT. The sale of second-hand vehicles is a popular trade worldwide, and vehicle fraud is currently a common issue, mainly because buyers can lack a complete view of the historical transactions related to their new acquisition. This work presents a distributed architecture for stakeholders to register transactions over a vehicle's life cycle in a blockchain network. The architecture involves a non-fungible token (NFT) linked to a physical motorized vehicle after a tokenization process, which denote as the NFT-Vehicle. The NFT-Vehicle is a hierarchical smart contract designed using an object-oriented paradigm and a modified version of the ERC721 standard. Every stakeholder engages with the NFT-Vehicle through distinct methods embedded within a smart contract. These methods represent internal protocols meticulously formulated and validated based on a finite-state machine (FSM) model. We implemented our design as a proof of concept using a platform based on Ethereum and a smart contract in the Solidity programming language. We carried out two types of proof: (a) validations, following the FSM model to ensure that the smart contract remained in a consistent state, and (b) proofs, to achieve certainty regarding the amount of ETH that could be spent in the life cycle of a vehicle. The results of the tests showed that the total transaction cost for each car throughout its life cycle did not represent an excessive cost considering the advantages that the system could offer to prevent fraud. © 2023 by the authors.

López-Pimentel, J. C., Morales-Rosales, L. A., Algredo-Badillo, I., & Del-Valle-Soto, C. (2023). NFT-Vehicle: A Blockchain-Based Tokenization Architecture to Register Transactions over a Vehicle's Life Cycle. *Mathematics*, *11*(13). doi: 10.3390/math11132801. Article.

OCTAVIO LOZADA FLORES

SNII Level I

INFLUENCE OF THE POLYMERIC MATRIX ON THE OPTICAL AND ELECTRICAL PROPERTIES OF COPPER PORPHINE-BASED SEMICONDUCTOR HYBRID FILMS

ABSTRACT. In this study, we assessed the electrical and optical behavior of semiconductor hybrid films fabricated from octaethyl-21H,23H-porphine copper (CuP), embedded in polymethylmethacrylate (PMMA), and polystyrene (PS). The hybrid films were characterized structurally and morphologically using infrared spectroscopy (IR), atomic force microscopy (AFM), scanning electron microscopy (SEM), and X-ray diffraction (XRD). Subsequently, the PMMA:CuP and PS:CuP hybrid films were evaluated optically by UV–vis spectroscopy, as well as electrically, with the four-point collinear method. Hybrid films present a homogeneous and low roughness morphology. In addition, the PS matrix allows the crystallization of the porphin, while PMMA promotes the amorphous structure in CuP. The polymeric matrix also affects the optical behavior of the films, since the smallest optical gap (2.16 eV) and onset gap (1.89 eV), and the highest transparency are obtained in the film with a PMMA matrix. Finally, the electrical behavior in hybrid films is also affected by the matrix: the largest amount of current carried is approximately 0.01 A for the PS:CuP film, and 0.0015 A for the PMMA:CuP film. Thanks to the above properties, hybrid films are promising candidates for use in optoelectronic devices. © 2023 by the authors.

Sánchez Vergara, M. E., Hernández Méndez, J. A., González Verdugo, D., Giammattei Funes, I. M., & Lozada Flores, O. (2023). Influence of the Polymeric Matrix on the Optical and Electrical Properties of Copper Porphine-Based Semiconductor Hybrid Films. *Polymers*, *15*(14). doi: 10.3390/polym15143125. Article.

OCTAVIO LOZADA FLORES

SNII Level I

PREPARATION OF HYBRID FILMS BASED IN ALUMINUM 8-HYDROXYQUINOLINE AS ORGANIC SEMICONDUCTOR FOR PHOTOCONDUCTOR APPLICATIONS

ABSTRACT. In the present work, we have investigated an organic semiconductor based on tris(8-hydroxyquinoline) aluminum (AlQ3) doped with tetracyanoquinodimethane (TCNQ), which can be used as an organic photoconductor. DFT calculations were carried out to optimize the structure of semiconductor species and to obtain related constants in order to compare experimental and theoretical results. Subsequently, AlQ3-TCNQ films with polypyrrole (Ppy) matrix were fabricated, and they were morphologically and mechanically characterized by Scanning Electron Microscopy, X-ray diffraction and Atomic Force Microscopy techniques. The maximum stress for the film is 8.66 MPa, and the Knoop hardness is 0.0311. The optical behavior of the film was also analyzed, and the optical properties were found to exhibit two indirect transitions at 2.58 and 3.06 eV. Additionally, photoluminescence measurements were carried out and the film showed an intense visible emission in the visible region. Finally, a photoconductor was fabricated and electrically characterized. Applying a cubic spline approximation to fit cubic polynomials to the J-V curves, the ohmic to SCLC transition voltage (Formula presented.) and the trap-filled-limit voltage (Formula presented.) for

the device were obtained. Then, the free carrier density and trap density for the device were approximated to (Formula presented.) and (Formula presented.), respectively. © 2023 by the authors.

Sánchez Vergara, M. E., Cantera Cantera, L. A., Rios, C., Salcedo, R., Lozada Flores, O., & Dutt, A. (2023). Preparation of Hybrid Films Based in Aluminum 8-Hydroxyquinoline as Organic Semiconductor for Photoconductor Applications. *Sensors*, *23*(18). doi: 10.3390/s23187708. Article.

FÉLIX ORLANDO MARTÍNEZ RÍOS

***Senior Researcher C**, SNII Level I*

COMPLEX NETWORKS ANALYSES OF ANTIBIOFILM PEPTIDES: AN EMERGING TOOL FOR NEXT-GENERATION ANTIMICROBIALS' DISCOVERY

ABSTRACT. Microbial biofilms cause several environmental and industrial issues, even affecting human health. Although they have long represented a threat due to their resistance to antibiotics, there are currently no approved antibiofilm agents for clinical treatments. The multi-functionality of antimicrobial peptides (AMPs), including their antibiofilm activity and their potential to target multiple microbes, has motivated the synthesis of AMPs and their relatives for developing antibiofilm agents for clinical purposes. Antibiofilm peptides (ABFPs) have been organized in databases that have allowed the building of prediction tools which have assisted in the discovery/design of new antibiofilm agents. However, the complex network approach has not yet been explored as an assistant tool for this aim. Herein, a kind of similarity network called the half-space proximal network (HSPN) is applied to represent/analyze the chemical space of ABFPs, aiming to identify privileged scaffolds for the development of next-generation antimicrobials that are able to target both planktonic and biofilm microbial forms. Such analyses also considered the metadata associated with the ABFPs, such as origin, other activities, targets, etc., in which the relationships were projected by multilayer networks called metadata networks (METNs). From the complex networks' mining, a reduced but informative set of 66 ABFPs was extracted, representing the original antibiofilm space. This subset contained the most central to atypical ABFPs, some of them having the desired properties for developing next-generation antimicrobials. Therefore, this subset is advisable for assisting the search for/design of both new antibiofilms and antimicrobial agents. The provided ABFP motifs list, discovered within the HSPN communities, is also useful for the same purpose. © 2023 by the authors.

Agüero-Chapin, G., Antunes, A., Mora, J. R., Pérez, N., Contreras-Torres, E., Valdes-Martini, J. R., Martínez-Rios, F., Zambrano, C. H., & Marrero-Ponce, Y. (2023). Complex Networks Analyses of Antibiofilm Peptides: An Emerging Tool for Next-Generation Antimicrobials' Discovery. *Antibiotics*, *12*(4). doi: 10.3390/antibiotics12040747. Article.

FÉLIX ORLANDO MARTÍNEZ RÍOS

***Senior Researcher C**, SNII Level I*

STARPEP TOOLBOX: AN OPEN-SOURCE SOFTWARE TO ASSIST CHEMICAL SPACE ANALYSIS OF BIOACTIVE PEPTIDES AND THEIR FUNCTIONS USING COMPLEX NETWORKS

ABSTRACT. Motivation: Antimicrobial peptides (AMPs) are promising molecules to treat infectious diseases caused by multidrug resistance pathogens, some types of cancer, and other conditions. Computer-aided strategies are efficient tools for the high-throughput screening of AMPs. Results: This report highlights StarPep Toolbox, an open-source and user-friendly software to study the bioactive chemical space of AMPs using complex network-based representations, clustering, and similarity-searching models. The novelty of this research lies in the combination of network science and similarity-searching techniques, distinguishing it from conventional methods based on machine learning and other computational approaches. The network-based representation of the AMP chemical space presents promising opportunities for peptide drug repurposing, development, and optimization. This approach could serve as a baseline for the discovery of a new generation of therapeutics peptides. © 2023 The Author(s). Published by Oxford University Press.

Aguilera-Mendoza, L., Ayala-Ruano, S., Martínez-Ríos, F., Chávez, E., García-Jacas, C. R., Brizuela, C. A., & Marrero-Ponce, Y. (2023). StarPep Toolbox: an open-source software to assist chemical space analysis of bioactive peptides and their functions using complex networks. *Bioinformatics*, *39*(8). doi: 10.1093/bioinformatics/btad506. Article.

ANTONIETA TEODORA MARTÍNEZ VELASCO

SNII Level I

ANTONIA TERÁN BUSTAMANTE

***Senior Researcher A**, SNII Level I*

DECISION MAKING FOR KNOWLEDGE MANAGEMENT IN THE TEQUILA SECTOR: A FUZZY LOGIC MODEL

ABSTRACT. Knowledge management creates value for organizations, allowing them to be more innovative, productive, and competitive if that knowledge is used appropriately. Through this management, vital information is created and disseminated systematically and efficiently, and at the same time, knowledge learning is adopted, transformed, shared, and applied. This research analyzes decision-making for knowledge management in a mature low-tech sector, such as Tequila in Mexico. At the same time, it generates a predictive model of knowledge management that allows innovation in this sector by combining knowledge of modern technologies and ancestral knowledge in manufacturing the product, along with providing support to public policymakers and decision-makers to support small producers and rural communities. The methodological strategy used is an expert system through fuzzy logic, starting from a data set based on the patterns found in a Bayes network. The results show that the most relevant variables in decision-making for knowledge management in the Tequila sector are modern technologies, ancestral knowledge, and the Denomination of Origin. Under the above, it could be inferred that the ancestral knowledge variable is the most influential in achieving high values in managing knowledge management -the output variable preserving the value of a product with a designation of origin. © the authors, 2023. All Rights Reserved.

Martínez-Velasco, A., & Terán-Bustamante, A. (2023). Decision Making for Knowledge Management in the Tequila Sector: A Fuzzy Logic Model. In Matos, F. & Rosa, A. (Eds.), *Proceedings of the 24th European Conference on Knowledge Management ECKM* (pp. 881-892). ECKM. doi: 10.34190/eckm.24.1.1276. Conference Paper.

ANTONIETA TEODORA MARTÍNEZ VELASCO
SNII Level I
ANTONIA TERÁN BUSTAMANTE
***Senior Researcher A**, SNII Level I*

ENTREPRENEURSHIP: ANALYSIS BY COUNTRY THROUGH MACHINE LEARNING TECHNIQUES

ABSTRACT. This research aims to analyze entrepreneurship worldwide through the dimensions and pillars of the entrepreneurship ecosystem of each country, identifying the contribution and patterns of behavior and correlation within the entrepreneurship ecosystem. This analysis intends to show the main actions that countries have carried out in support of entrepreneurship and entrepreneurs. The tool used to analyze is machine learning, where various algorithms are applied. The evidence shows that the most relevant pillars in the entrepreneurial ecosystem are I. Opportunity Startup, II. Technology Absorption, III. Risk Acceptance, IV. Risk Capital and V. Process Innovation. The pillars that best correlate are I. Competition and Opportunity Startup, II. Opportunity Startup, and Risk Acceptance, III. Opportunity Startup and Technology Absorption, IV. Cultural Support and Opportunity Startup, and V. Opportunity Startup and Risk Capital. The present work aims to provide knowledge to decision-makers in both the public and private sectors to channel public policies that support entrepreneurs in this time of crisis and promote the generation and strengthening of entrepreneurial activity. Although there are still no reliable GEI data for the years 2020 to 2022, the economic crisis generated by the stagnation in the development of the countries has reduced support for entrepreneurs, which in many cases can be a key factor for the rescue of the most disadvantaged countries.

Martínez-Velasco A., & Terán-Bustamante A. (2022). Entrepreneurship: Analysis by Country Through Machine Learning Techniques. In Sklias, P., & Apostolopoulos, N. (Eds.), *Vol. 17 No. 1 (2022): Proceedings of the 17th European Conference on Innovation and Entrepreneurship* (pp. 340-350). ECIE. doi: 10.34190/ecie.17.1.475. Conference Paper.

ABRAHAM MENDOZA ANDRADE
***Senior Researcher D**, SNII Level I*
AVELINA ALEJO REYES
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MIGUEL ALCARAZ RIVERA
Research Professor

A MATHEMATICAL MODEL FOR AN INVENTORY MANAGEMENT AND ORDER QUANTITY ALLOCATION PROBLEM WITH NONLINEAR QUANTITY DISCOUNTS AND NONLINEAR PRICE-DEPENDENT DEMAND

ABSTRACT. This article focuses on solving the order quantity allocation problem for retailers. It considers factors such as quality constraints, nonlinear quantity discounts, and price-dependent demand. By formulating it as a nonlinear maximization problem, the article aims to find the best combination of suppliers and order quantity out of infinite solutions to maximize the retailer's profit. The main contribution of this research is a new mathematical model that can solve the problem of quality constraint and demand in a single step. This problem is complex due to the number of equations, their nonlinear nature, and the various trade-offs given by the market. Additionally, this research considers demand as output and includes price-dependent demand, which is more realistic for retailers. The proposed model was tested using an example from the recent literature and showed better results than the previously published best solution regarding profit maximization.

Alejo-Reyes, A., Mendoza, A., Cuevas, E., & Alcaraz-Rivera, M. (2023). A Mathematical Model for an Inventory Management and Order Quantity Allocation Problem with Nonlinear Quantity Discounts and Nonlinear Price-Dependent Demand. *Axioms*, *12*(6). doi: 10.3390/axioms12060547. Article.

ABRAHAM MENDOZA ANDRADE
***Senior Researcher D**, SNII Level I*

COMPARATIVE ANALYSIS OF THE BIBLIOGRAPHIC DATA SOURCES DIMENSIONS AND SCOPUS: AN APPROACH AT THE COUNTRY AND INSTITUTIONAL LEVELS

ABSTRACT. This paper presents a large-scale document-level comparison of two major bibliographic data sources: Scopus and Dimensions. The focus is on the differences in their coverage of documents at two levels of aggregation: by country and by institution. The main goal is to analyze whether Dimensions offers as good new opportunities for bibliometric analysis at the country and institutional levels as it does at the global level. Differences in the completeness and accuracy of citation links are also studied. The results allow a profile of Dimensions to be drawn in terms of its coverage by country and institution. Dimensions' coverage is more than 25% greater than Scopus which is consistent with previous studies. However, the main finding of this study is the lack of affiliation data in a large fraction of Dimensions documents. We found that close to half of all documents in Dimensions are not associated with any country of affiliation while the proportion of documents without this data in Scopus is much lower. This situation mainly affects the possibilities that Dimensions can offer as instruments for carrying out bibliometric analyses at the country and institutional level. Both of these aspects are highly pragmatic considerations for information retrieval and the design of policies for the use of scientific databases in research evaluation.

Guerrero-Bote, V. P., Chinchilla-Rodríguez, Z., Mendoza, A., & De Moya-Anegón, F. (2020). Comparative Analysis of the Bibliographic Data Sources Dimensions and Scopus: An Approach at the Country and Institutional Levels. *Frontiers in Research Metrics and Analytics*, *5*. doi: 10.3389/frma.2020.593494. Article

ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
HIRAM EREDÍN PONCE ESPINOSA
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Research Professor

A COMPUTER VISION APPROACH TO TERMINUS MOVEMENT ANALYSIS OF VIEDMA GLACIER

ABSTRACT. In this paper, an automatic segmentation approach of the Viedma glacier terminus is proposed. The method uses multi-spectral images from the Landsat-5 satellite to determine the area of the glacier through computer vision techniques. The area of the glacier is estimated, and a linear model is fitted, obtaining a correlation of 0.968 between the measured area and a fit linear regression model. On the other hand, a bio-inspired optical flow estimation approach is used to calculate and visualize the displacement of the glacier through time. In addition, an analysis is per-

formed between the temperature variation in the Southern Cone and the decrease of the glacier in the function of time. A linear trend (r2=0.95) shows that the analyzed area of the glacier has decreased by about 1.9% annually in the observation season. It reveals an inverse relationship between the change in the size of the glacier and global warming, showing that if the same conditions remain, the glacier's zone analyzed in this work would be close to its disappearance in around 70 years, the time lapse in which a global temperature increase of 1.24 °C would be reached.

Moya-Albor, E., Schwartzman, A., Brieva, J., Pardo, M., Ponce, H., & Chavez-Dominguez, R. (2023). A Computer Vision Approach to Terminus Movement Analysis of Viedma Glacier. In *2023 IEEE 15th International Symposium on Autonomous Decentralized System (ISADS)* (pp. 1-8). IEEE. doi: 10.1109/ISADS56919.2023.10092045. Conference Paper.

ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
JORGE EDUARDO BRIEVA RICO
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A ROBUST AND SECURE WATERMARKING APPROACH BASED ON HERMITE TRANSFORM AND SVD-DCT

ABSTRACT. Currently, algorithms to embed watermarks into digital images are increasing exponentially, for example in image copyright protection. However, when a watermarking algorithm is applied, the preservation of the image's quality is of utmost importance, for example in medical images, where improper embedding of the watermark could change the patient's diagnosis. On the other hand, in digital images distributed over the Internet, the owner of the images must also be protected. In this work, an imperceptible, robust, secure, and hybrid watermarking algorithm is presented for copyright protection. It is based on the Hermite Transform (HT) and the Discrete Cosine Transform (DCT) as a spatial–frequency representation of a grayscale image. Besides, it uses a block-based strategy and a perfectibility analysis of the best embedding regions inspired by the Human Vision System (HVS), giving the imperceptibility of the watermark, and a Singular-Value Decomposition (SVD) approach improved robustness against attacks. In addition, the proposed method can embed two watermarks, a digital binary image (LOGO) and information about the owner and the technical data of the original image in text format (MetaData). To secure both watermarks, the proposed method uses the Jigsaw Transform (JST) and the Elementary Cellular Automaton (ECA) to encrypt the image LOGO and a random sequence generator and the XOR operation to encrypt the image MetaData. On the other hand, the proposed method was tested using a public dataset of 49 grayscale images to assess the effectiveness of the watermark embedding and extraction procedures. Furthermore, the proposed watermarking algorithm was evaluated under several processing and geometric algorithms to demonstrate its robustness to the majority, intentional or unintentional, attacks, and a comparison was made with several state-of-the-art techniques. The proposed method obtained average values of PSNR = 40.2051 dB, NCC = 0.9987, SSIM = 0.9999, and MSSIM = 0.9994 for the watermarked image. In the case of the extraction of the LOGO, the proposal gave MSE = 0, PSNR ≫ 60 dB, NCC = 1, SSIM = 1, and MSSIM = 1, whereas, for the image MetaData extracted, it gave BER = 0% and (Formula presented.). Finally, the proposed encryption method presented a large key space (Formula presented.) for the LOGO image. © 2023 by the authors.

Gomez-Coronel, S. L., Moya-Albor, E., Brieva, J., & Romero-Arellano, A. (2023). A Robust and Secure Watermarking Approach Based on Hermite Transform and SVD-DCT. *Applied Sciences*, *13*(14). doi: 10.3390/app13148430. Article.

ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
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AUTHENTICATION OF MEDICAL IMAGES THROUGH A HYBRID WATERMARKING METHOD BASED ON HERMITE-JIGSAW-SVD

ABSTRACT. This work presents a watermarking algorithm applied to medical images by using the Steered Hermite Transform (SHT), the Singular Value Decomposition (SVD), and the Jigsaw transform (JS). The principal objective is to protect the patient's information using imperceptible watermarking and preserve its diagnosis. Thus, the watermark imperceptibility is achieved using the high-order Steered Hermite coefficients, whereas the SVD decomposition and the JS ensure the watermark against attacks. We use the medicine symbol Caduceus as a watermark. The metrics employed to evaluate the algorithm's performance are the Peak Signal-to-Noise Ratio (PSNR), the Mean Structural Similarity Index (MSSIM), and the Normalized Cross-Correlation (NCC). The evaluation metrics over the watermarked image show that it does not suffer quantitative and qualitative changes, and the extracted watermark was recovered successfully with high PSNR values. In addition, several watermark extraction tests were performed against geometric and common processing attacks. These tests show that the proposed algorithm is robust under critical conditions of attacks, for example, against nonlinear smoothing (median filter), high noise addition (Gaussian and Salt & Pepper noise), high compression rates (JPEG compression), rotation between 0 to 180 degree, and translations up to 100 pixels. © 2023 SPIE.

Gomez-Coronel, S. L., Moya-Albor, E., Pérez-Daniel, K. R., Brieva, J., Cruz-Aceves, I., Hernández-Aguirre, A., & Soto-Álvarez, J. A. (2023). Authentication of Medical Images through a Hybrid Watermarking Method based on Hermite-Jigsaw-SVD. In Brieva, J., Guevara, P., Lepore, N., Linguraru, M. G., Rittner, L. & Romero Castro, E. (Eds.), *Proceedings Volume 12567, 18th International Symposium on Medical Information Processing and Analysis: 125671G (6 March 2023)*. SPEI. doi: 10.1117/12.2669724. Conference Paper.

ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
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COLOR IMAGE ENCRYPTION ALGORITHM BASED ON A CHAOTIC MODEL USING THE MODULAR DISCRETE DERIVATIVE AND LANGTON'S ANT

ABSTRACT. In this work, a color image encryption and decryption algorithm for digital images is presented. It is based on the modular discrete derivative (MDD), a novel technique to encrypt images and efficiently hide visual information. In addition, Langton's ant, which is a two-dimensional universal Turing machine with a high key space, is used. Moreover, a deterministic noise technique that adds security to the MDD is utilized. The proposed hybrid scheme exploits the advantages of MDD and Langton's ant, generating a very secure and reliable encryption algorithm. In this proposal, if the key is known, the original image

is recovered without loss. The method has demonstrated high performance through various tests, including statistical analysis (histograms and correlation distributions), entropy, texture analysis, encryption quality, key space assessment, key sensitivity analysis, and robustness to differential attack. The proposed method highlights obtaining chi-square values between (Formula presented.) and (Formula presented.), entropy values between (Formula presented.) and (Formula presented.), PSNR values (in the original and encrypted images) between (Formula presented.) and (Formula presented.), the number of pixel change rate (NPCR) values between (Formula presented.) and (Formula presented.), unified average changing intensity (UACI) values between (Formula presented.) and (Formula presented.), and a vast range of possible keys (Formula presented.). On the other hand, an analysis of the sensitivity of the key shows that slight changes to the key do not generate any additional information to decrypt the image. In addition, the proposed method shows a competitive performance against recent works found in the literature. © 2023 by the authors.

Moya-Albor, E., Romero-Arellano, A., Brieva, J., & Gomez-Coronel, S. L. (2023). Color Image Encryption Algorithm Based on a Chaotic Model Using the Modular Discrete Derivative and Langton's Ant. *Mathematics*, *11*(10). doi: 10.3390/math11102396. Article.

ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
HIRAM EREDÍN PONCE ESPINOSA
***Senior Researcher D**, SNII Level I*
JORGE EDUARDO BRIEVA RICO
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DEVELOPMENT OF AN ELECTRIC POWERED ASSISTED CYCLE WITH A HEART RATE SENSOR CONTROL SYSTEM

ABSTRACT. In this paper, we present the development of an intelligent bicycle which will be able to help the user achieve a more efficient exercise routine via the control of a DC motor. This project was developed in several stages, from the approach of the system's functions to the components that would conform to it in order to achieve a detailed concept that can meet the requirements correctly. The sector of the population that motivated the realization of this project and to whom it is mainly directed are all those who cycle in Mexico City and find their routines inefficient. Through the use of this bicycle, which has a heart rate measurement system, it is possible to monitor it to regulate the intensity of the exercise. It will be made possible by incorporating a motor that is activated as soon as it detects an elevated heart rate, which may mean that the user requires assistance or has to stop the exercise altogether. The results provide evidence that assisting the user does indeed help reduce overexertion. © 2023 IEEE.

Cedillo, R. G., Lopez, D. M., Quintana, E. M., Guerra, A. P., Moreno, J. P. S. H., Hernández, J. M. V., Moya-Albor, E., Ponce, H., & Brieva, J. (2023). Development of an Electric Powered Assisted Cycle with a Heart Rate Sensor Control System. In *2023 IEEE 15th International Symposium on Autonomous Decentralized System (ISADS)* (pp. 1-7). IEEE. doi: 10.1109/ISADS56919.2023.10092070. Conference Paper.

ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
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MODELING OF THE MAJOR TEMPORAL ARCADE USING GENETIC ALGORITHMS AND ORTHOGONAL POLYNOMIALS

ABSTRACT. Nowadays eye diseases that are not treated in a timely manner can lead to blindness in the patient. Diabetic retinopathy and retinopathy of prematurity are a couple of conditions considered to be the main causes of blindness in both adults and children. The technique used to date to verify the status of the retina is a qualitative analysis by an ophthalmological expert of fundus images. However, this is entirely based on the experience acquired by the physician and being able to detect changes in the vascular structure of the retina is a great challenge which can be addressed through technology. This paper presents a novel method to carry out the numerical modeling of the major temporal arcade using orthogonal polynomials of Legendre, Chebyshev and Laguerre through a genetic algorithm that helps to determine the coefficients of the linear combination of each one. A set of twenty fundus images already outlined by an expert was used, which were processed by the algorithm, generating an adjustment curve on the set of pixels of the Major Temporal Arcade. The results obtained were compared with three existing methodologies in the literature by using two metrics, emerging the Legendre polynomials as the most suitable for modeling, as a consequence of the low values obtained in the metrics compared to the other methods. © 2023 SPIE.

Soto-Álvarez, J. A., Cruz-Aceves, I., Hernández-Aguirre, A., Hernández-González, M. A., Lopez-Montero, L. M., Moya-Albor, E., Brieva, J., Gomez-Coronel, S. L., & Pérez-Daniel, K. R. (2023). Modeling of the Major Temporal Arcade using Genetic Algorithms and Orthogonal Polynomials. In Brieva, J., Guevara, P., Lepore, N., Linguraru, M. G., Rittner, L. & Romero Castro, E. (Eds.), *Proceedings Volume 12567, 18th International Symposium on Medical Information Processing and Analysis: 125671G (6 March 2023)*. SPEI. doi: 10.1117/12.2669720. Conference Paper.

ISABEL JOAQUÍNA NIEMBRO GARCÍA
SNII Candidate Level

EVALUATION OF THE ENVIRONMENTAL PERFORMANCE OF ADSORBENT MATERIALS PREPARED FROM AGAVE BAGASSE FOR WATER REMEDIATION: SOLID WASTE MANAGEMENT PROPOSAL OF THE TEQUILA INDUSTRY

ABSTRACT. In the present research work, the use of agro-industrial waste such as agave bagasse from the tequila industry was carried out. The agave bagasse was treated to obtain biosorbent and hydrochar materials. Direct Blue 86 was used as an adsorbate model to evaluate the performance of both materials. The adsorption studies showed an adsorption capacity of 6.49 mg g−1 in static and 17.7 mg g−1 in dynamic, associated with a physisorption process between functional groups of the material and the dye. The characterization of the biosorbent showed that the material was mainly composed of macroporous fibers with a surface area <5.0 m2 g−1. Elemental analysis showed a majority composition of C (57.19 wt%) and O (37.49 wt%). FTIR and XPS analyses showed that the material had C-O, C=O, -OH, O-C=O, and -NH2 surface groups. RAMAN and TGA were used to evaluate the composition, being cellulose (40.94%), lignin (20.15%), and hemicellulose (3.35%). Finally, the life-cycle assessment at a laboratory scale showed that the proposed biosorbent presents a 17% reduction in several environmental aspects compared to hydrochar, showing promise as an eco-friendly and highly efficient method for the remediation of water contaminated with dye, as well as being a promising alternative for the responsible management of solid waste gene-

rated by the tequila industry. © 2022 by the authors.

Gómez-Navarro, C. S., Warren-Vega, W. M., Serna-Carrizales, J. C., Zárate-Guzmán, A. I., Ocampo-Pérez, R., Carrasco-Marín, F., Collins-Martínez, V. H., Niembro-García, J., & Romero-Cano, L. A. (2023). Evaluation of the Environmental Performance of Adsorbent Materials Prepared from Agave Bagasse for Water Remediation: Solid Waste Management Proposal of the Tequila Industry. *Materials*, *16*(1). doi: 10.3390/ma16010008. Article.

ISABEL JOAQUÍNA NIEMBRO GARCÍA

SNII Candidate Level

ROBUST OPTIMIZATION MODEL FOR SUSTAINABLE SUPPLY CHAIN DESIGN INTEGRATING LCA

ABSTRACT. Supply chain management is the basis for the operations in an organization. The development of realistic supply chain designs that work effectively in the presence of disturbances in a stochastic environment and incorporate sustainability factors, is a complex challenge being investigated in recent years. However, the inclusion of a methodological structured framework to evaluate environmental impacts constitutes a knowledge gap in the literature on supply chain design. This study developed a model for sustainable supply chain design, integrating Life Cycle Assessment and based on a robust optimization approach. The study follows a 4-stage methodology beginning with data collection and the execution of a Life Cycle Assessment. Then, the deterministic modeling is proposed, concluding with a robust model. A bi-objective model is proposed to maximize utility and minimize environmental impact based on demand scenarios. The model was validated with real data from a medium-sized enterprise that produces antibacterial gel, generating as a result, different configuration alternatives for the supply chain to transport the products and raw materials between its elements. The conclusions of this work highlight the importance of including sustainability factors during supply chain design, the consequences and costs of its inclusion, as well as the priority actions that promote sustainable designs. © 2023 by the authors.

Flores-Siguenza, P., Marmolejo-Saucedo, J. A., & Niembro-García, J. (2023). Robust Optimization Model for Sustainable Supply Chain Design Integrating LCA. *Sustainability*, *15*(19). doi: 10.3390/su151914039. Article.

SAMUEL MOISÉS NUCAMENDI GUILLÉN

***Senior Researcher D**, SNII Level I*

A BI-LEVEL VACCINATION POINTS LOCATION PROBLEM THAT AIMS AT SOCIAL DISTANCING AND EQUITY FOR THE INHABITANTS

ABSTRACT. Designing efficient vaccination programs that consider the needs of the population is very relevant to prevent reoccurrence of the COVID-19 pandemic. The government needs to provide vaccination points to give out vaccine doses to the population. In this paper, the authors analyze the location of vaccination points whilst addressing the inhabitants' preferences. Two objectives that prevent crowding of inhabitants are considered. The government aims for the minimum distance between located vaccination points is maximized, and for the number of inhabitants that attend the different vaccination points to be equitable. One of the key aspects of this problem is the assumption that inhabitants freely choose the located vaccination point to go. That decision affects the objectives of the government, since crowding at vaccination points may appear due to the inhabitants' decisions. This problem is modeled as a bi-objective, bi-level program, in which the upper level is associated to the government and the lower level to the inhabitants. To approximate the Pareto front of this problem, a cross-entropy metaheuristic is proposed. The algorithm incorporates criteria to handle two objective functions in a simultaneous manner, and optimally solve the lower-level problem for each government decision. The proposed algorithm is tested over an adapted set of benchmark instances and pertinent analysis of the results is included. An important managerial insight is that locating far vaccination points does not lead us to a more equitable allocation of inhabitants. © 2023 by the authors.

Salinas, E., Camacho-Vallejo, J. F., & Nucamendi-Guillén, S. (2023). A Bi-Level Vaccination Points Location Problem That Aims at Social Distancing and Equity for the Inhabitants. *Axioms*, *12*(3). doi: 10.3390/axioms12030305. Article.

SAMUEL MOISÉS NUCAMENDI GUILLÉN

***Senior Researcher D**, SNII Level I*

A CAPACITATED LOT-SIZING PROBLEM IN THE INDUSTRIAL FASHION SECTOR UNDER UNCERTAINTY: A CONDITIONAL VALUE-AT-RISK FRAMEWORK

ABSTRACT. In this study, we present a multi-product, multi-period inventory control problem under uncertainty in product demands that emerges in the fashion industry. A two-stage stochastic model is proposed to design a planning strategy where the total cost incurred by purchase orders, inventory and shortage is minimised. We incorporate the Conditional Value at Risk (CVaR) within the formulation to address exogenous uncertainty. An industrial case study involving a Mexican fashion retail company was considered to assess the performance of the two-stage stochastic model. Scenarios were considered using historical data provided by the company. A sensitivity analysis was also conducted on risk-aversion parameters to assess how the values of these parameters affect the behaviour of the proposed formulation. The results show that the proposed two-stage stochastic formulation is an efficient and practical approach to handle exogenous uncertainty in industrial-scale capacitated lot-sizing problems. © 2022 Informa UK Limited, trading as Taylor & Francis Group.

Cardona-Valdés, Y., Nucamendi-Guillén, S., & Ricardez-Sandoval, L. (2022). A capacitated lot-sizing problem in the industrial fashion sector under uncertainty: a conditional value-at-risk framework. *International Journal of Production Research*, *61*(21), 7181-7191. doi: 10.1080/00207543.2022.2147232. Article.

SAMUEL MOISÉS NUCAMENDI GUILLÉN

***Senior Researcher D**, SNII Level I*

A HIERARCHIZED GREEN SUPPLY CHAIN WITH CUSTOMER SELECTION, ROUTING, AND NEARSHORING

ABSTRACT. The COVID-19 pandemic forced upon the world, severe social distancing restrictions, which led to prolonged confinement across populations. The latter directly impacted actors along the supply chain in a variety of industrial sectors (for instance, raw material suppliers, manufacturers, distributors, and customers, among others). Some actors involved had to cease participation altogether due to closures. As a result, the supply chain requires restructuring and its reactivation requires careful consideration. In addition to the pandemic, poor air quality has brought about an environmental crisis in recent years. Primary polluters include greenhouse gas (GHG) emissions caused by

manufacturers and distributors. Therefore, this research studies the problem of restructuring a particular multicommodity and hierarchized supply chain. Specifically for companies dealing with situations derived from a reduction in manufacturing capacity and service level in light of the pandemic. In this case, a company (leader) is faced with selecting customers that it will service in pursuit of maximizing profit, all while looking to minimize GHG emissions. The consolidated demand is nearshored once the leader company decides on the customers to be supplied. That is, an order is placed on a company with a lower hierarchy (follower). The follower, in turn, aims to minimize its own manufacturing costs without exceeding the pollution limits imposed by the government. However, its manufacturing plan inevitably pollutes and incurs different costs. In addition, the follower's decisions impact both leader's objective functions. We propose a bi-objective bi-level programming model to study this situation. To solve the problem in reasonable computational time, a heuristic algorithm that takes into account existing asynchrony between leader and follower companies is proposed to approximate the Pareto front. Computational experimentation reveals that the proposed algorithm provides good trade-off solutions, which can reduce GHG emissions by 67% on average without significantly affecting company revenue. Moreover, the algorithm is able to provide solutions for instances of up to 1000 nodes in a competitive computational timeframe. In addition, we discuss the advantages of computing GHG emissions proposed herein. Finally, useful managerial insights are discussed by performing a sensitivity analysis regarding the distribution company's minimum acceptable level of profit. © 2023 Elsevier Ltd.

Camacho-Vallejo, J. F., Dávila, D., & Nucamendi-Guillén, S. (2023). A hierarchized green supply chain with customer selection, routing, and nearshoring. *Computers & Industrial Engineering*, *178*. doi: 10.1016/j.cie.2023.109151. Article.

SAMUEL MOISÉS NUCAMENDI GUILLÉN

***Senior Researcher D**, SNII Level I*

A LOCATION-ROUTING PROBLEM FOR LOCAL SUPPLY CHAINS

ABSTRACT. This study addresses a local Supply Chain problem by proposing the Collection and Delivery Location Open Routing Problem (CDLORP), a variant of the classical location-routing problem that considers both collection and distribution routes to decide where to locate facilities. Collection routes are responsible for picking up the required raw material from local suppliers, while distribution routes deliver the final product to local customers. This study is motivated by a public initiative that desires to seize the by-product generated by the agro-industrial local sector to produce and provide healthy and nutritional snacks to students in the public elementary school system in Saltillo, Coahuila, Mexico. A node-based formulation and a flow-based formulation are proposed to solve instances of the problem. The formulations are valid for the symmetric and asymmetric cases of the problem. Four families of valid inequalities from the literature are adapted for the problem and are used to implement two branch-and-cut algorithms based on the proposed formulations. Computational experiments using 42 benchmark instances of different sizes (25 to 260 vertices) are performed to assess the efficacy of the proposed formulations and algorithms. The best results are obtained by the branch-and-cut algorithm using the node-based formulation. Finally, a case study is also addressed and optimally solved with the branch-and-cut algorithm using the node-based formulation. The results obtained for the benchmark instances and the case study show that the proposed approach can solve real-life problems to develop local supply chains for new products. © 2023 Elsevier Ltd.

Soto-Mendoza, V., Ruiz-y-Ruiz, E., García-Calvillo, I., Nucamendi-Guillén, S., & Cardona-Valdés, Y. (2023). A location-routing problem for local supply chains. *Computers & Industrial Engineering*, *183*. doi: 10.1016/j.cie.2023.109528. Article.

ELÍAS OLIVARES BENÍTEZ

***Senior Researcher D**, SNII Level II*

SAMUEL MOISÉS NUCAMENDI GUILLÉN

***Senior Researcher D**, SNII Level I*

A FORMULATION FOR THE STOCHASTIC MULTI-MODE RESOURCE-CONSTRAINED PROJECT SCHEDULING PROBLEM SOLVED WITH A MULTI-START ITERATED LOCAL SEARCH METAHEURISTIC

ABSTRACT. This research introduces a stochastic version of the multi-mode resource-constrained project scheduling problem (MRCPSP) and its mathematical model. In addition, an efficient multi-start iterated local search (MS-ILS) algorithm, capable of solving the deterministic MRCPSP, is adapted to deal with the proposed stochastic version of the problem. For its deterministic version, the MRCPSP is an NP-hard optimization problem that has been widely studied. The problem deals with a trade-off between the amount of resources that each project activity requires and its duration. In the case of the proposed stochastic formulation, the execution times of the activities are uncertain. Benchmark instances of projects with 10, 20, 30, and 50 activities from well-known public libraries were adapted to create test instances. The adapted algorithm proved to be capable and efficient for solving the proposed stochastic problem. © 2023 by the authors.

Ramos, A. S., Miranda-González, P. A., Nucamendi-Guillén, S., & Olivares-Benitez, E. (2023). A Formulation for the Stochastic Multi-Mode Resource-Constrained Project Scheduling Problem Solved with a Multi-Start Iterated Local Search Metaheuristic. *Mathematics*, *11*(2). doi: 10.3390/math11020337. Article.

ELÍAS OLIVARES BENÍTEZ

***Senior Researcher D**, SNII Level II*

DECARBONIZATION IN MEXICO BY EXTENDING THE CHARGING STATIONS NETWORK FOR ELECTRIC VEHICLES

ABSTRACT. Climate change is an important phenomenon causing significant issues and concerns worldwide. As a consequence, many countries are making efforts to meet the goals proposed in the Kyoto Protocol and the Paris Agreement to reduce CO2 emissions. This paper explores the impact of electric vehicles on the decarbonization process in Mexico. Some scenarios are studied to propose an extension of the current charging stations network. These scenarios are modeled using a mathematical model that optimizes the location of such stations considering the origin-destination information available, a particular type of station, and different vehicle types and covered distances. The decarbonization impact is calculated based on the savings in CO2 emissions for the profile of electric energy generation in Mexico. The results for each scenario show that relevant coverage in the country can be achieved with a mild increase in the number of stations in strategic locations and with a benefit in the decarbonization effect. © 2023.

Ruiz-Barajas, F., Ramírez-Nafarrate, A., & Olivares-Benítez, E. (2023). Decarbonization in Mexico by extending the charging stations network for electric vehicles. *Results in Engineering*, *20*. doi: 10.1016/j.rineng.2023.101422. Article.

FRANCISCO ALEJANDRO OROZCO ARGOTE

***Senior Researcher D**, SNII Level I*

FRANCISCO MORENO ABRIL

Research Professor

GINI INDEX IN THE CONSTRUCTION INDUSTRY; THE CASE STUDY OF CHILE

ABSTRACT. This paper shows the results of the estimation of the Gini index from workers in the Chilean construction industry. As known, this coefficient is a measure of statistical dispersion intended to represent the income inequality within a social group. The Organization for Economic Cooperation and Development (OECD), the World Bank, and the United Nations Development Program (UNDP) have calculated this index for a significant number of countries to classify them according to their level of inequality, where this study may help expand the reach of this type of analyses to other economic sectors. Thus, in this research the Gini index for workers in the Chilean construction industry was calculated for each geographical region in Chile, to know the different economic conditions among the construction workers in the different regions of Chile, in terms of the workers' salary inequality, and along with it, to complement the limited studies in this regard. To estimate the Gini index, it was necessary to collect the data available in Chilean institutions. The results showed that there are no significant differences in terms of inequality when the Gini index is calculated for homogeneous groups of construction workers; however, when the analysis considers workers with different academic backgrounds (with and without professional degrees) important inequality levels appear.

Forcael, E., Sagredo, C., Garcés, G., Peña, C., Orozco, F., & Moreno, F. (2023). Gini Index in the Construction Industry; the case study of Chile. In *Proceedings of the 21th LACCEI International Multi-Conference for Engineering, Education and Technology (LACCEI 2023)*. LACCEI. doi: 10.18687/LACCEI2023.1.1.930. Conference Paper.

FRANCISCO ALEJANDRO OROZCO ARGOTE

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FRANCISCO MORENO ABRIL

Research Professor

RUBÉN ROMO GAMBOA

Research Professor

TOWARDS A MODEL THAT SEES HUMAN RESOURCES AS A KEY ELEMENT FOR COMPETITIVENESS IN CONSTRUCTION MANAGEMENT

ABSTRACT. The construction industry is continuously affected by external and internal agents that modify and define its competitiveness. Changing markets, currency fluctuations, and tremendous competition have made the issue of competitiveness increasingly important. The literature highlights factors that determine the competitiveness of construction firms, including easy-to-measure elements, such as financial, sales, return on investment, etc., while other elements are not as easily measurable, such as customer satisfaction, employee satisfaction, loyalty, and leadership, among many others. Within these factors, Human Resources (HR) has occupied a central place in the last decade, due to the enormous impact that labor has on project execution. This research mainly focuses on the study of HR and its components to reach a deeper understanding of the impact that HR has on the competitiveness of construction companies. After defining the most relevant variables, an interrelationships model was proposed with the Partial Least Square (PLS) technique. These HR variables impact the competitiveness variables: cost, utility, time, quality, Staff retention, and Health & Safety. The PSL analyses met the evaluation criteria using the structural model, confirming its viability. It was found that there are three important variables related to competitiveness: (i) leadership, (ii) innovation, and (iii) competitiveness.

Romo, R., Orozco, F., Forcael, E., & Moreno, F. (2023). Towards a Model That Sees Human Resources as a Key Element for Competitiveness in Construction Management. *Buildings*, *13*(3). doi: 10.3390/buildings13030774. Article.

MARÍA TERESA ORVAÑANOS GUERRERO

***Senior Researcher B**, SNII Candidate Level*

SPICE COMPACT MODEL OF CONTROLLING ELECTRONS OF SPIN QUBITS USING FINFET

ABSTRACT. Semiconductor qubits have garnered attention in the field of device physics. Owing to the limited coherence of electrons and holes, smaller and more compact qubits are desirable. This requirement is aligned with the miniaturization of conventional transistors. In this study, we consider a compact spin qubit based on the FinFET (Fin Field-Effect Transistor) by using the SPICE (Simulation Program with Integrated Circuit Emphasis) simulator. The qubits are represented by the quantum dots (QDs) between the Fin structure. In order to setup the qubit, we have to control the number of electrons through the FinFET. Here, we consider the circuit model of our system by treating the transport properties of the QD and the FinFET as single-electron phenomena. We provide the SPICE simulation results and show the single-electron current as the functions of the FinFET parameters such as the channel length and width including the operation temperature.

Pérez-Rodríguez, E. A., Orvañanos-Guerrero, M. T., & Tanamoto, T. (2023). SPICE compact model of controlling electrons of spin qubits using FinFET. *Japanese Journal of Applied Physics*, *62*(SC). doi: 10.35848/1347-4065/acb4f8. Article.

HIRAM EREDÍN PONCE ESPINOSA

***Senior Researcher D**, SNII Level I*

CARDIOVASCULAR DISEASE DETECTION USING MACHINE LEARNING

ABSTRACT. The detection of Cardiovascular Diseases (CVDs) prematurely is of great interest for the Healthcare Industry. According to the World Health Organization, heart diseases represent 32% of global deaths by 2019. In this work, we propose building an interpretable machine learning model to detect CVDs. For this, we use a public dataset consisting of over 320 thousand records and 279 features. We explore the performance of three well-known classifiers and we build them using hyper-parameter techniques. For interpretability, feature relevance is tested. After the experimental results, we found Random Forest to performed the best with 94% of accuracy and 81% of area under the ROC curve. We also implement an easy web application as a tool for detecting CVDs using relevant features information.

Ibarra, R., León, J., Ávila, I., & Ponce, H. (2022). Cardiovascular Disease Detection Using Machine Learning. *Computación y Sistemas*, *26*(4), 1661-1668. doi: 10.13053/CyS-26-4-4422. Article.

HIRAM EREDÍN PONCE ESPINOSA
***Senior Researcher D**, SNII Level I*
ERNESTO MOYA ALBOR
***Senior Researcher D**, SNII Level I*
JORGE EDUARDO BRIEVA RICO
***Senior Researcher D**, SNII Level I*

DESIGN OF A SOFT GRIPPER HAND FOR A QUADRUPED ROBOT

ABSTRACT. This work aims to solve a current balancing problem for a quadruped robot by proposing a soft gripper. The main problem for the project is the lack of modules to make a quadruped robot walk through tough environments, which is designed to help in accidents to look for people and maintenance in factories. Viable solutions for the main body were found with a look alike chameleon robot. With that premise, the goal for the chameleon robot is to have a capable of moving through difficult surfaces and to have enough movement so to get better results in the displacement. To fulfill this requirement, the proposed key idea presented here is to design a gripper capable of helping the main body to achieve difficult places being as safe as possible. Furthermore, the gripper is an actual module for the main robot, and should be easy to substitute and build, in case it is needed in other situations. Because of that, the gripper is designed with the help of soft robotics. Experimental results in lab show the effectiveness of the soft gripper. We anticipate this system will help the robot to use the force effectively through each step. © 2023 IEEE.

González, J., Poza, J., Robles, J., Ponce, H., Brieva, J., & Moya-Albor, E. (2023). Design of a Soft Gripper Hand for a Quadruped Robot. In *2023 IEEE 15th International Symposium on Autonomous Decentralized System (ISADS)* (pp. 1-6). IEEE. doi: 10.1109/ISADS56919.2023.10091976. Conference Paper.

HIRAM EREDÍN PONCE ESPINOSA
***Senior Researcher D**, SNII Level I*
RICARDO ABEL ESPINOSA LOERA
Research Professor

ESTIMATION OF LOW NUTRIENTS IN TOMATO CROPS THROUGH THE ANALYSIS OF LEAF IMAGES USING MACHINE LEARNING

ABSTRACT. Tomato crops are considered the most important agricultural products worldwide. However, the quality of tomatoes depends mainly on the nutrient levels. Visual inspection is made by farmers to anticipate the nutrient deficiency of the plants. Recently, precision agriculture has explored opportunities to automate nutrient level monitoring. Previous work has demonstrated that a convolutional neural network is able to estimate low nutrients in tomato plants using images of their leaves. However, the performance of the convolutional neural network was not adequate. Thus, this work proposes a novel convolutional neural network-based classifier, namely, CNN+AHN, for estimating low nutrients in tomato crops using an image of the tomato leaves. The CNN+AHN incorporates a set of convolutional layers as the feature extraction part, and a supervised learning method called artificial hydrocarbon network as the dense layer. Different combinations of the architecture of CNN+AHN were examined. Experimental results showed that our best CNN+AHN classifier is able to estimate low nutrients in tomato plants with an accuracy of 95.57% and F1-score of 95.75%, outperforming the literature. © The Author(s) 2021.

Ponce, H., Cevallos, C., Espinosa, R., & Gutiérrez, S. (2021). Estimation of Low Nutrients in Tomato Crops Through the Analysis of Leaf Images Using Machine Learning. *Journal of Artificial Intelligence and Technology*, *1*(2), 131-137. doi: 10.37965/jait.2021.0006. Article.

HIRAM EREDÍN PONCE ESPINOSA
***Senior Researcher D**, SNII Level I*

EYE CONTROL AND MOTION WITH DEEP REINFORCEMENT LEARNING: IN VIRTUAL AND PHYSICAL ENVIRONMENTS

ABSTRACT. Attention mechanism in computer vision refers to scan, detect, and track a target object. This paper aims to develop and virtually train a machine learning model for object attention mechanism, combining object detection and mechanical automation. For this, we use Unity 3D Engine to model a simple scene in which two virtual cameras align together to realize a monocular attention in specific objects. Deep reinforcement learning, via ML-agent's library, was used to train a model that aligns the virtual cameras. Moreover, the model was transferred to a physical camera to replicate the performance of attention mechanism. © 2024, The Author(s), under exclusive license to Springer Nature Switzerland AG.

Arizmendi, S., Paz, A., González, J., & Ponce, H. (2024). Eye Control and Motion with Deep Reinforcement Learning: In Virtual and Physical Environments. In Calvo, H., Martínez-Villaseñor, L., Ponce, H. (Eds.) *Advances in Computational Intelligence. MICAI 2023. Series Lecture Notes in Computer Science (Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 14391 LNAI* (pp. 99-109). Springer. doi: 10.1007/978-3-031-47765-2_8. Conference Paper.

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EXPLORING THE CHALLENGES AND LIMITATIONS OF UNSUPERVISED MACHINE LEARNING APPROACHES IN LEGAL CONCEPTS DISCOVERY

ABSTRACT. The utilization of machine learning methods for the analysis and interpretation of legal documents has been growing over the years, yet their potential and limitations remain under-explored. This study aims to address this gap, using unsupervised machine learning techniques to discover legal concepts from a corpus of Spanish legal documents. In addition to striving for optimal results, our research also embarks on an exploration of the challenges and limitations of unsupervised machine learning, investigating its capabilities and limitations in legal text analysis. We demonstrate that even relatively simplistic methodologies can yield noteworthy insights, with the highest identification rate of 70% achieved by Topic Modeling with Latent Dirichlet Allocation (LDA). However, challenges were encountered with the identification of some concepts, suggesting potential improvements in the corpus preprocessing and tokenization stages or the techniques to be used. The findings underscore the potential of unsupervised learning algorithms in legal text analysis, offering an intriguing path for future research. While acknowledging the need for higher accuracy in practical applications, this study emphasizes the remarkable feat achieved and proposes a way forward for a hybrid or adaptable approach. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Prince-Tritto, P., & Ponce, H. (2024). Exploring the Challenges and Limitations of Unsupervised Machine Learning Approaches in Legal Concepts Discovery. In Calvo, H., Martínez-Villaseñor, L., Ponce, H. (Eds.) *dvances in Soft Computing. MICAI 2023. Series Lecture Notes in Computer Science (Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 14392 LNAI* (pp. 952-67). Springer. doi: 10.1007/978-3-031-47640-2_5. Conference Paper.

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MECHATRONIC DESIGN OF A LOW-COST SMART WHEELCHAIR CONTROLLED BY JOYSTICK AND VOICE COMMANDS

ABSTRACT. Elderly people have increased at an accelerated rate in recent years. In Mexico, one of the main problems affecting this population are related to disabilities, specifically limited mobility, i.e., arthritis in older adults. Different technological solutions have been proposed, such as electrical wheelchairs. However, for arthritic people, these wheelchairs are difficult to operate, lacking comfortability, and might be very expensive. In this work, we propose the development of a smart wheelchair for arthritic older adults able to move automatically and controlled by using slight manual movements of the hand and by voice commands. We followed the general methodology of a mechatronic design. A proof-of-concept model of the wheelchair was implemented. For validation, we tested the prototype in different real indoor scenarios. Results conclude that our proposed smart wheelchair complies with the user requirements, it is easy to operate, and the cost is reduced considerably. We anticipate this is a low-cost efficient smart wheelchair prototype that can be further considered for real technological solutions.

Bobadilla-Rendón, D., Monroy-Rueda de León, I. J., Salazar-Salinas, G., Stefan-Lepe De Soto, A., Ponce, H., Moya-Albor, E., & Brieva, J. (2023). Mechatronic Design of a Low-Cost Smart Wheelchair Controlled by Joystick and Voice Commands. *Computación y Sistemas*, *27*(2), 525-543. doi: 10.13053/CyS-27-2-4375. Article.

HIRAM EREDÍN PONCE ESPINOSA
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MARÍA DE LOURDES MARTÍNEZ VILLASEÑOR
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OPTIMIZATION OF THE CONTAINMENT LEVELS FOR THE REOPENING OF MEXICO CITY DUE TO COVID-19

ABSTRACT. One of the main problems that governments face in a pandemic is preserving the public health of the country whilst reducing the negative effects on the economy. In tackling the COVID-19 pandemic, there is an implicit trade-off between the economy and the reduction in the number of cases and deaths by the virus. If governmental restrictions to combat the pandemic are very strong, the economy could be seriously damaged. Conversely, if restrictions are very mild to minimize economic losses, it would be very difficult to stop the spread of the virus. It is necessary to find an optimization model to support government decisions balancing the impacts of COVID-19 in health and economic aspects. In this paper, we propose a methodology to find out the optimal number of days per contingency phase, in such a way that public health is prioritized and the damage to the economic impact is reduced. Then, our methodology is applied to one of the most densely populated areas in the world, Mexico City. Our methodology uses an SEIR (Susceptible-Exposed-Infected-Removed) model to simulate the evolution of the pandemic, and it can be implemented utilizing either a genetic algorithm or a Deep Q-Learning algorithm. For the experiments, we propose two scenarios in which the number of days for each phase is predicted within a 120-day period. The first experiment guarantees that the number of beds is not exceeded, considering the economic impact less relevant. By contrast, the second experiment reduces the number of days in which beds are exceeded as long as the economic losses are not higher than 20 %, prioritizing the economy. According to the experiments, the implementation based on genetic algorithms has a higher performance.

Miralles-Pechuán, L., Ponce, H., & Martínez-Villaseñor, L. (2021). Optimization of the Containment Levels for the Reopening of Mexico City due to COVID-19. *IEEE Latin America Transactions*, *19*(6), 1065-1073. doi: 10.1109/TLA.2021.9451253. Article.

HIRAM EREDÍN PONCE ESPINOSA
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PREDICT EMAIL SUCCESS BASED ON TEXT CONTENT

ABSTRACT. Email marketing works as a top channel to generate leads for many businesses. The marketing automation platforms are part of this strategy and can improve the success of email campaigns. Many of these platforms use subject line tools to predict if an email will be opened or not, as a success metric. However, the text content is unused. Thus, this work proposes to predict the likelihood of a user clicking the Call to Action button of an email based on the content. We implement our proposal in a real-case scenario of corporate communication emails from a private university in Mexico. After building a machine learning model, the results were promising and validated our proof-of-concept. We consider the results relevant for further investigation around other ways to improve the success of an email using the text content, and this model could be reliable in most campaigns and could be used to determine which words influence the click rate metric the most.

Bernardo, E., Lorenzo, K., Reyes, G., & Ponce, H. (2024). Predict Email Success Based on Text Content. In Calvo, H., Martínez-Villaseñor, L., Ponce, H. (Eds.) *Advances in Computational Intelligence. MICAI 2023. Series Lecture Notes in Computer Science (Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 14391 LNAI* (pp. 77-83). Springer. doi: 10.1007/978-3-031-47765-2_6. Conference Paper.

HIRAM EREDÍN PONCE ESPINOSA
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RECURRENT EMBEDDED TOPIC MODEL

ABSTRACT. In this paper we propose the Recurrent Embedded Topic Model (RETM) which is a modification of the Embedded Topic Modelling (ETM) by reusing the Continuous Bag of Words (CBOW) that the model had implemented and applying it to a recurrent neural network (LSTM), using the order of the words of the text, in the CBOW space as the recurrency of the LSTM, while calculating the topic–document distribution of the model. This approach is novel because the ETM and Latent Dirichlet Allocation (LDA) do not use the order of the words while calculating the topic proportions for each text, making worse predictions in the end. The RETM is a topic-modelling technique that vastly improves (by more than 15 times in train data and between 10% and 90% better based on test dataset values for perplexity) the quality of the topics that were calculated for the datasets used in this paper. This model is explained in detail throughout the paper and presents results on different use cases on how the model performs against ETM and LDA. The RETM can

be used with better accuracy for any topic model-related problem.

Vargas, C. & Ponce, H. (2023). Recurrent Embedded Topic Model. *Applied Sciences*, *13*(20). doi: 10.3390/app132011561. Article.

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TOWARDS THE DISTRIBUTED WOUND TREATMENT OPTIMIZATION METHOD FOR TRAINING CNN MODELS: ANALYSIS ON THE MNIST DATASET

ABSTRACT. Convolutional neural network (CNN) is a prominent algorithm in Deep Learning methods. CNN architectures have been used successfully to solve various problems in image processing, for example, segmentation, classification, and enhancement task. However, automatic search for suitable architectures and training parameters remain an open area of research, where metaheuristic algorithms have been used to fine-tuning the hyperparameters and learning parameters. This work presents a bio-inspired distributed strategy based on Wound Treatment optimization (WTO) for training the learning parameters of a LenNet CNN model fast and accurate. The proposed method was evaluated over the popular benchmark dataset MNIST for handwritten digit recognition. Experimental results showed an improvement of 36.87% in training time using the distributed WTO method compared to the baseline with a single learning agent, and the accuracy increases 4.69% more using the proposed method in contrast with the baseline. As this is a preliminary study towards the distributed WTO method for training CNN models, we anticipate this approach can be used in robotics, multi-agent systems, federated learning, complex optimization problems, and many others, where an optimization task is required to be solved fast and accurate. © 2023 IEEE.

Ponce, H., Moya-Albor, E., & Brieva, J. (2023). Towards the Distributed Wound Treatment Optimization Method for Training CNN Models: Analysis on the MNIST Dataset. In *2023 IEEE 15th International Symposium on Autonomous Decentralized System (ISADS)* (pp. 1-6). IEEE. doi: 10.1109/ISADS56919.2023.10092078. Conference Paper.

JOSÉ ALBERTO DEL PUERTO FLORES
SNII Level I

EFFICIENT INDEX MODULATION-BASED MIMO OFDM DATA TRANSMISSION AND DETECTION FOR V2V HIGHLY DISPERSIVE CHANNELS

ABSTRACT. Vehicle-to-vehicle (V2V) communication networks are based on vehicles that wirelessly exchange data, traffic congestion, and safety warnings between them. The design of new V2V systems requires increasingly energetically and spectrally efficient systems. Conventional multiple-input–multiple-output (MIMO) orthogonal frequency division multiplexing (OFDM) systems have been used successfully for the last decade. However, MIMO-OFDM systems need to be improved to face future communication networks in high-mobility environments. This article proposes an efficient index modulation (IM)-based MIMO-OFDM system for V2V channels. The proposed transmission system is evaluated in high Doppler-spread channels. The results demonstrate that the proposed scheme reduces the required computational complexity in data detection and exhibits gains of up to 3 dB in bit error rate (BER) performance when compared to the conventional MIMO-OFDM system under the same conditions and parameters, along with achieving superior spectral efficiency. The results show the viability of implementing the proposed system in practical applications for high-transmission-rate V2V channels. © 2023 by the authors.

Del Puerto-Flores J.A., Castillo-Soria F.R., Gutiérrez C.A., & Peña-Campos F. (2023). Efficient Index Modulation-Based MIMO OFDM Data Transmission and Detection for V2V Highly Dispersive Channels. *Mathematics*, *11*(12). doi: 10.3390/math11122773. Article.

JOSÉ ALBERTO DEL PUERTO FLORES
SNII Level I

MAXIMAL RATIO COMBINING DETECTION IN OFDM SYSTEMS WITH VIRTUAL CARRIERS OVER V2V CHANNELS

ABSTRACT. This paper examines the performance of orthogonal frequency division multiplexing (OFDM) systems for vehicle-to-vehicle (V2V) communication channels. More specifically, a doubly selective channel under high intercarrier interference (ICI) is considered. Current solutions involve complex detection and/or reduced spectral efficiency receivers. This paper proposes the use of virtual carriers (VC) in an OFDM system with a low-complexity maximal ratio combining (MRC) detector to improve the bit error rate (BER) performance. The results show that VC provides diversity in received data, resulting in a ≥5 dB gain compared to previous OFDM systems with conventional linear/nonlinear detectors used as a reference. The detector presented in this paper has linear complexity, making it a suitable solution for real-time V2V communication systems. © 2023 by the authors.

Del Puerto-Flores, J. A., Castillo-Soria, F. R., Vázquez-Castillo, J., & Palacio Cinco, R. R. (2023). Maximal Ratio Combining Detection in OFDM Systems with Virtual Carriers Over V2V Channels. *Sensors*, *23*(15). doi: 10.3390/s23156728. Article.

JOSÉ ALBERTO DEL PUERTO FLORES
SNII Level I

PRECODING FOR RIS-ASSISTED MULTI-USER MIMO-DQSM TRANSMISSION SYSTEMS

ABSTRACT. This paper presents two precoding techniques for a reconfigurable intelligent surface (RIS)-assisted multi-user (MU) multiple-input multiple-output (MIMO) double quadrature spatial modulation (DQSM) downlink transmission system. Instead of being applied at the remote RIS, the phase shift vector is applied at the base station (BS) by using a double precoding stage. Results show that the proposed RIS-MU-MIMO-DQSM system has gains of up to 17 dB in terms of bit error rate (BER) and a reduction in detection complexity of 51% when compared with the conventional MU-MIMO system based on quadrature amplitude modulation (QAM). Compared with a similar system based on amplify and forward (AF) relay-assisted technique, the proposed system has a gain of up to 18 dB in terms of BER under the same conditions and parameters. © 2023 by the authors.

Castillo-Soria, F. R., Del Puerto-Flores, J. A., Azurdia-Meza, C. A., Babu Kumaravelu, V., Simón, J., & Gutiérrez, C.A. (2023). Precoding for RIS-Assisted Multi-User MIMO-DQSM Transmission Systems. *Future Internet*, *15*(9). doi: 10.3390/fi15090299. Article.

ISAÍ GERARDO REYES CEDEÑO

Research Professor

DETERMINATION OF SUSCEPTIBILITY TO THE GENERATION OF DISCONTINUITIES RELATED TO LAND SUBSIDENCE USING THE FREQUENCY RATIO METHOD IN THE CITY OF AGUASCALIENTES, MEXICO

ABSTRACT. Land subsidence in the Aguascalientes Valley, documented since the 1980s, has developed a large number of discontinuities that damage infrastructure. There is currently no methodology to accurately predict the site and time at which a discontinuity will occur, making it difficult to make decisions in urban planning or risk management. However, it is possible to determine the susceptibility of an area to the generation of fractures based on the factors associated with their formation. This study presents a zoning method based on the ground failure susceptibility index (GFSI) in the city of Aguascalientes, using the frequency ratio (FR) method and employing the depth of the basement, the subsidence rate, the subsidence gradient, and the groundwater level drawdown as variables. The zoning method included three categories of land subsidence susceptibility to fracturing, moderate, high, and very high, which were divided using the first (3.76) and second (4.24) quartiles of the GFSI. The zoning method was created with the discontinuities reported in 2010 and was validated with data from 2022. The results obtained show that 11.19% of the discontinuities developed between 2010 and 2022 were located in a zone of moderate susceptibility, 41.97% were located in a zone of high susceptibility, and 46.87% were located in a zone classified as having very high susceptibility. © 2023 by the authors.

Luna-Villavicencio, H., Pacheco-Martínez, J., Ochoa-González, G. H., Hernández-Marín, M., Hernández-Madrigal, V. M., López-Doncel, R. A., & Reyes-Cedeño, I. G. (2023). Determination of Susceptibility to the Generation of Discontinuities Related to Land Subsidence Using the Frequency Ratio Method in the City of Aguascalientes, Mexico. *Remote Sensing*, *15*(10). doi: 10.3390/rs15102597. Article.

HÉCTOR ROBLES CAMPOS

SNII Level I

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

ANTONIO VALDERRÁBANO GONZÁLEZ

SNII Level I

IMPROVED INTERLEAVED ĆUK POWER CONVERTER

ABSTRACT. An improved interleaved Ćuk power converter called in short –"Interleaved Two"- is designed and presented in this article. It is investigated and compared to a similar interleaved Ćuk power converter named as –"Interleaved One"-. The result is that the "Interleave Two"topology requires less reactive elements than the "Interleaved One"to achieve same performance, it will offer the possibility to reduce its size and economic cost. The operational principle and modeling is presented thoroughly. Moreover, simulation results comparing steady state time, output voltage, input current ripple and efficiency are presented. Additionally, in order to validate the performance of the "Interleaved Two"converter experimental results are included. © 2023 IEEE.

Robles-Campos, H. R., Rosas-Caro, J. C., Valderrábano-González, A., & Posada, J. (2023). Improved interleaved Ćuk power converter. In *2023 IEEE Workshop on Power Electronics and Power Quality Applications (PEPQA)*, Cali, Colombia, 2023 (pp. 1-6). IEEE. doi: 10.1109/PEPQA59611.2023.10325820. Conference Paper.

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COMPREHENSIVE GROUND COVERAGE ANALYSIS OF LARGE-SCALE FIXED-TILT BIFACIAL PHOTOVOLTAIC PLANTS

ABSTRACT. In the design of large-scale photovoltaic plants, decisions on array pitch and tilt play an essential role in life-cycle economics. These design issues have been studied extensively in traditional monofacial systems. However, bifacial systems, which are in increasing demand, are being studied and face challenges in system modeling, particularly in characterizing rear irradiance. Studies considering bifacial panels in plant layouts are recent and must be extensive. Existing studies are based on computationally intensive software and are limited to specific configurations. This study presents the development and validation of an analytical model of a multirow bifacial photovoltaic plant against Bifacial Radiance and DUET ray-tracing software. Comprehensive ground coverage and array tilt analyses are carried out for all ranges of configuration parameters (clearance height, albedo, collector length, bifaciality, or yield loss) and latitudes of up to 60° using this model. The results of extensive simulations were used to train the artificial neural networks. These mathematical architectures allow easy and fast execution of the proposed model with a slight accuracy loss and are provided in the supplementary material. In-depth analysis and developed tools will facilitate decision-making to obtain photovoltaic layouts more efficiently in terms of energy and economy for large-scale bifacial plants. © 2023 Elsevier Ltd.

Rodrigo, P. M., Mouhib, E., Fernández, E. F., Almonacid, F., Rosas-Caro, J. C. (2024). Comprehensive ground coverage analysis of large-scale fixed-tilt bifacial photovoltaic plants. *Renewable and Sustainable Energy Reviews*, *192*. doi: 10.1016/j.rser.2023.114229. Article.

PEDRO MANUEL RODRIGO CRUZ

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DESIGN, MANUFACTURING AND INDOOR/OUTDOOR TESTING OF A HYBRID THERMOELECTRIC-CONCENTRATOR PHOTOVOLTAIC MONO-MODULE AT UNPRECEDENTED ULTRA-HIGH CONCENTRATION LEVELS

ABSTRACT. Hybrid concentrator photovoltaic-thermoelectric systems aim to increase the conversion efficiency of sunlight to electricity by recovering part of the waste heat generated in the photovoltaic cells by means of thermoelectricity. They are in a research stage, with many theoretical predictions of their potential benefits, especially when increasing the light concentration ratio, but few experimental demonstrations. They have been never tested under ultra-high concentration levels (>2000x). In this paper, the results of an experimental assessment of the state-of-the-art technology to develop such hybrid systems under extreme concentrations are presented. A hybrid mono-module was designed, manufactured and tested under ultra-high concentration both indoors and outdoors. Indoor experiments used a steady light sun simulator for effective low concentrations from 1.3 to 17.2 suns and a multi-flash simulator for geometric concentrations from 476x to 3600x. Outdoor experiments covered concentrations

between 476x and 2066x. A conventional concentrator photovoltaic-only mono-module was also tested outdoors for comparison purposes. The experimental characterization of the prototype showed that some optimistic values used in the theoretical predictions (such as the temperature coefficients of the solar cell, the thermoelectric efficiency or the optical efficiency of conventional concentrators) cannot be fulfilled with the current commercially available components. Results of the outdoor measurements exhibit a similar energetic behaviour of the hybrid system compared to the conventional system at 476x. For higher concentrations, the performance of the hybrid system is poorer than that of the conventional system due to a faster degradation of the optical, thermal and electrical behaviour. The solar cell was damaged when it reached 194 °C at 2066x outdoors. The study sheds light on the limits of the current technology and identifies improvement research areas: optical systems for ultra-high concentration, solar cells with a wider operating temperature range and lower temperature and series resistance losses, thermoelectric generators with higher figure-of-merit and innovative cooling systems. These areas need to be explored to reach experimentally the potential benefits of this technology. © 2023 Elsevier B.V.

Valera, Á., Rodrigo, P. M., Ceballos, M. A., Almonacid, F., & Fernández, E. F. (2023). Design, manufacturing and indoor/outdoor testing of a hybrid thermoelectric-concentrator photovoltaic mono-module at unprecedented ultra-high concentration levels. *Solar Energy Materials and Solar Cells*, *254*. doi: 10.1016/j.solmat.2023.112269. Article.

PEDRO MANUEL RODRIGO CRUZ

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HÉCTOR EDUARDO GILARDI VELÁZQUEZ

***Senior Researcher B**, SNII Level I*

DETERMINING THE ACCURACY AND FEASIBILITY OF MEASURING ATMOSPHERIC DENSITY IN THE IONOSPHERE THROUGH A NANOSATELLITE

ABSTRACT. Atmospheric research impacts various sectors such as commercial aviation activities, maritime transport, climatological analysis, and space research, among others. Knowing the atmospheric density of the ionosphere is useful in space research because is the principal perturbation in aircrafts to follow a pure geodesic orbit. Nowadays, there are models to estimate atmospheric density, such as the Jacchia-Bowman model. However, there are very few measurements of this parameter in situ. On the other hand, currently, there is great interest in the space industry for the development and deployment of nanosatellites as low-cost instruments that can be used to carry out scientific research and validation of new developments. In this work, the necessary requirements for the design of a nanosatellite as a tool for the study of the ionosphere are analyzed and determined, as well as its limitations and the necessary processes to carry out a mission that provides useful information. Said contributions include the contribution of information for the improvement of the different atmospheric models such as the Jacchia-Bowman that will help us with the nanosatellite mission. © 2022 IEEE.

Moreno, J. P. S. H., Fischer-Meza, A. R., Mejía-Torres, A., Arellano-Serrano, M. A., Rodrigo, P. M., & Gilardi-Velázquez, H. E. (2022). Determining the accuracy and feasibility of measuring atmospheric density in the ionosphere through a nanosatellite. In *2022 IEEE 40th Central America and Panama Convention (CONCAPAN)*, Panama, Panama, 2022 (pp. 1-6). IEEE. doi: 10.1109/CONCAPAN48024.2022.9997696. Conference Paper.

PEDRO MANUEL RODRIGO CRUZ

***Senior Researcher C**, SNII Level I*

THE POTENTIAL OF A HYBRID OPTICAL PHOTOVOLTAIC CONVERTER–THERMOELECTRIC RECEIVER TO ENHANCE CONVERSION EFFICIENCY

ABSTRACT. This letter presents a 3D simulation model for an optical photovoltaic power converter hybridized with a thermoelectric generator and shows the potential of hybridization for applications at very low temperatures. To carry out the study, the methodology for designing the hybrid converter optimizes the thermoelectric couple height under different air temperature conditions. This design considers two thermoelectric device scenarios: a low ZT (1) and a high ZT (2.4). Additionally, a state-of-the-art power converter based on a multijunction vertical structure made up of GaAs is considered. The results of the simulation procedure show maximum relative efficiency improvement factors of 6.16% (temperature matched) and 48.71% (temperature mismatched) compared to a nonhybrid power converter at 200 K of air temperature and high ZT. These results open a promising path for the development of a new generation of highly efficient hybrid converters. © 1980-2012 IEEE.

Valera-Albacete, A., Almonacid, F., Rodrigo, P. M., & Fernández, E. F. (2023). The Potential of a Hybrid Optical Photovoltaic Converter–Thermoelectric Receiver to Enhance Conversion Efficiency. *IEEE Electron Device Letters*, *44*(8), 1360-1363. doi: 10.1109/LED.2023.3288173. Article.

RODRIGO ROMERO SILVA

Research Professor

MARGARITA HURTADO HERNÁNDEZ

SNII Level I

THE EFFECTS OF SUPPLY VARIABILITY ON THE PERFORMANCE OF ASSEMBLY SYSTEMS

ABSTRACT. Assembly processes play a big role in the current business context as global supply chains depend on many subcomponents to produce a single finished product. Previous studies have shown contrasting results regarding the effect that supply variability (the variability of feeding stations) has on the performance of assembly systems, as opposed to the variability of the station matching and assembling the components. This paper aims to close this gap by studying the behaviour of simple assembly systems with differing degrees of variability allocation among the stations through an experimental simulation study. Results suggest that a reduction in feeding station variability results in higher throughput, even in systems where the variability of one of the feeding stations increases while the other decreases. Furthermore, in scenarios with high total variance, the highest throughput is reached by transferring both variance and work from one of the feeding stations to any other station, whereas in low variance systems symmetrical work transfer to the feeding stations results in the highest throughput, as previously shown. Finally, reducing feeding station variability decreased the time spent in the assembly station (waiting time for component matching plus time for the assembly operation) only in experiments with high total variance. © 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Romero-Silva, R., & Hurtado-Hernández, M. (2022). The effects of supply variability on the performance of assembly systems. *International Journal of Production Research*, *61*(15), 4973-4990. doi: 10.1080/00207543.2022.2086085. Article.

RODRIGO ROMERO SILVA

Research Professor

TRADE-OFFS IN THE LANDSIDE OPERATIONS OF AIR CARGO HUBS: HORIZONTAL COOPERATION AND SHIPMENT CONSOLIDATION POLICIES CONSIDERING CAPACITATED NODES

ABSTRACT. Landside operations in air cargo terminals consist of many freight forwarders (FFWs) delivering and picking up cargo at the capacity-constrained loading docks at the airport's ground handlers' (GHs) facilities. To improve the operations of the terminal and take advantage of their geographical proximity a small set of FFWs can build a coalition to consolidate stochastically-arriving shipments and share truck fleet capacity while other FFWs continue bringing cargo to the terminal in a non-cooperative manner. Results from a detailed discrete-event simulation model of the cargo landside operations in Amsterdam Aiport showed that all operational policies had trade-offs in terms of the average shipment cycle time of coalition FFWs, the average shipment cycle time of non-coalition FFWs, and the total distance traveled by the coalition fleet, suggesting that horizontal cooperation in this context was not always beneficial, contrary to what previous studies on horizontal cooperation have found. Since dock capacity constitutes a significant constraint on operations in air cargo hubs, this paper also investigates the effect of dock capacity utilization and horizontal cooperation on the performance of consolidation policies implemented by the coalition. Thus, we built a general model of the air cargo terminal to analyze the effects caused by dock capacity utilization without the added complexity of landside operations at Amsterdam Airport to investigate whether the results hold for more general scenarios. Results from the general simulation model suggest that, in scenarios where dock and truck capacity become serious constraints, the average shipment cycle times of non-coalition FFWs are reduced at the expense of an increase in the cycle times of FFWs who constitute the coalition. A good balance among all the performance measures considered in this study is reached by following a policy that takes advantage of consolidating shipments based on individual visits to GH. © 2022 The Authors.

Romero-Silva, R., & Mujica Mota, M. (2022). Trade-offs in the landside operations of air cargo hubs: Horizontal cooperation and shipment consolidation policies considering capacitated nodes. *Journal of Air Transport Management*, *103*. doi: 10.1016/j.jairtraman.2022.102253. Article.

LUIS ALBERTO ROSA SIERRA

SNII Level II

INDUSTRIAL RECYCLING AND CIRCULAR ECONOMY IN CIUDAD JUAREZ: PROPOSAL FOR THE DESIGN OF A BUOY TO IMPROVE STREET ACCESSIBILITY

[APLICACIÓN DE LA ECONOMÍA CIRCULAR EN EL DISEÑO DE UNA BOYA PARA MEJORAR LA ACCESIBILIDAD EN CIUDAD JUÁREZ, MÉXICO]

ABSTRACT. This article describes the development of a recycling and circular economy project in Ciudad Juarez, Mexico. The current situation of the region with regard to waste management and its relationship with the manufacturing industry is presented. The design process used by a local recycling company is presented, where a case study is analyzed and a proposal for a buoy with compression molding manufacturing processes is elaborated. The functional and economic advantages of the product, its application and use, superior to existing commercial proposals are highlighted. The method presented uses elements of a simplified life cycle analysis to determine improvements in the production stage and mentions the potential for creating an environmental product declaration. A formal redesign is also proposed, the design requirements consider the end of life of the buoy, in order to facilitate the recovery of materials at the end of its useful life using the principles of the circular economy. The proposal will be evaluated internally by the company to consider the manufacturing processes. © 2022 by the authors. Licensee AEIPRO, Spain.

Reyes Pulido, A., Cortés Sáenz, D., Rosa Sierra, L. A., & Soto Nogueira, L. (2022). Industrial Recycling and Circular Economy in Ciudad Juarez: Proposal for the Design of a Buoy to Improve Street Accessibility [Aplicación de la economía circular en el diseño de una boya para mejorar la accesibilidad en Ciudad Juárez, México]. In *Proceedings from the International Congress on Project Management and Engineering, 2022-July* (pp. 860-872). AEIPRO. http://dspace.aeipro.com/xmlui/handle/123456789/3187. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

A DOUBLE DUAL FLOATING CAPACITOR BOOST CONVERTER WITH REDUCED CAPACITANCE REQUIREMENT

ABSTRACT. This paper introduces a modified double dual boost converter with the same voltage and current transfer ratio as the cascade type. However, the proposed converter can use substantially smaller capacitances and be applied in different applications such as distributed generation and microgrids. This paper presents the steady-state analysis of the proposed converter in continuous conduction mode. The ripples on capacitor voltage are deeply analyzed to provide design guidelines. A comparison of the proposed converter against the traditional double dual boost converter is discussed. The capability of effectively reducing the output voltage ripple, even with small individual capacitances, is evaluated via simulation. Finally, experimental results are provided to verify the principle of the proposed converters in different operating conditions. © 2023 IEEE.

García-Vite, P. M., Rebullosa-Castillo, F. J., García-Perales, M. A., Rosas-Caro, J. C., & Posada-Contreras, J. (2023). A Double Dual Floating Capacitor Boost Converter with Reduced Capacitance Requirement. In *2023 IEEE Workshop on Power Electronics and Power Quality Applications (PEPQA)*, Cali, Colombia, 2023 (pp. 1-6). IEEE. doi: 10.1109/PEPQA59611.2023.10325735. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

AVELINA ALEJO REYES

SNII Level I

A FAMILY OF DOUBLE DUAL DC-DC CONVERTERS

ABSTRACT. This paper studies a set of converters that have been individually introduced to the literature, but when analysing their topological principle, it can be concluded that they belong to the same family of double dual dc-dc converters. Several of them share the advantage of getting low common-mode voltage at the output side, which is a benefit in renewable energy generation applications. We explore the concept of double dual energy conversion, a systematic approach to obtaining double dual converters. We also present several state-of-the-art topologies, some existing and some new. Experimental results with one of the

new topologies are presented to corroborate the principle of the described topological derivation. © IET Conference Proceedings. All right reserved.

Valdez-Resendiz, J. E., Mayo-Maldonado, J. C., Alejo-Reyes, A., Rosas-Caro, J. C., & Beltran-Carbajal, F. (2022). A family of double dual DC-DC converters. In *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 107-113). IET. doi: 10.1049/icp.2022.1100. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

A MULTILEVEL BOOST CONVERTER WITH REDUCED INDUCTOR CURRENT

ABSTRACT. DC–DC converters are gaining attention due to their importance in key applications like renewable energy generation. A desirable feature in new DC–DC converters is a reduction in the size, which can be achieved with a reduction in the energy stored in the inductors. This article introduces a new step-up DC–DC converter topology with the following advantages: (i) a larger relation of duty cycle vs. voltage gain compared with the classical boost topology and (ii) an inductor with smaller current and smaller inductance (for the same power conversion characteristics) compared to the traditional boost converter. The smaller inductor current is an advantage against many step-up topologies with the inductor in series with the input (and then the input and the inductor currents are equal). The necessary inductance to achieve a certain current ripple is also reduced compared to the classical boost topology. This results in an inductor with a smaller amount of stored energy, lower inductance, and lower current. The proposed topology can be scaled to have a full family of large-voltage-gain converters. This paper presents the mathematical analysis, simulations, and experiments to assess the benefits of the proposition. © 2023 by the authors.

Rosas-Caro, J. C., Valdez-Resendiz, J. E., Escobar, G., & Beltran-Carbajal, F. (2023). A Multilevel Boost Converter with Reduced Inductor Current. *Electronics*, *12*(22). doi: 10.3390/electronics12224585. Article.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

A SWITCHED-CAPACITOR-BASED 7-LEVEL SELF-BALANCING HIGH-GAIN INVERTER EMPLOYING A SINGLE DC SOURCE

ABSTRACT. This paper discloses a novel switched capacitor (SC)-based 7-level inverter with a single DC source. The proposed inverter has the ability to self-balancing the voltage of the capacitor without using a closed-loop voltage balancing circuit. Two capacitors are equally charged by the input source owing to the series-parallel charging and discharging continuously in a full cycle. The proposed 7-level SC inverter requires less number of switches, driver diodes, and capacitors and a lower number of semiconductor switches than most recently developed topologies. Furthermore, four out of the eight switches operate at the fundamental frequency, which simplifies the control scheme. A fundamental frequency switching scheme is used to control the output of the inverter. The self-balancing and voltage-boosting features of the proposed structure are validated on MATLAB/software platform and verified experimentally. © 2023 Yatindra Gopal et al.

Gopal, Y., Panda, K. P., Kumari, A., & Rosas-Caro, J. C. (2023). A Switched-Capacitor-Based 7-Level Self-Balancing High-Gain Inverter Employing a Single DC Source. *International Transactions on Electrical Energy Systems*, *2023*. doi: 10.1155/2023/5545081. Article.

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***Senior Researcher D**, SNII Level I*

HÉCTOR ROBLES CAMPOS

SNII Level I

IVÁN EMMANUEL DUEÑAS GARCÍA

Research Professor

A TWO-PHASE SIXTH-ORDER BOOTS CONVERTER WITH SMALL PASSIVE COMPONENTS

ABSTRACT. A two-phase sixth order (2P6O) non-isolated boost converter is introduced in this article with an improved operation and an innovative design that considers an interleaved switching strategy for the transistors. The result is that this 2P6O converter achieves outstanding performance. In this article, the 2P6O converter is compared against the well-known and very competitive traditional interleaved boost converter for a design exercise with similar performance and equivalent switching ripples. The 2P6O contains more passive components, but the design showed that those passive components are smaller in terms of stored energy. The introduction of the additional inductor and capacitor in the 2P6O converter was compensated by the fact that all energy-stored elements became smaller. This advancement can provide more compact, efficient, and economical solutions in various power electronics applications. Experimental results are provided to demonstrate the principle of the proposition. © 2023 IEEE.

Rosas-Caro, J. C., Dueñas-García, I., Robles-Campos, H., & Posada, J. (2023). A Two-Phase Sixth-Order Boots Converter with Small Passive Components. In *2023 IEEE Workshop on Power Electronics and Power Quality Applications (PEPQA)*, Cali, Colombia, 2023 (pp. 1-6). IEEE. doi: 10.1109/PEPQA59611.2023.10325741. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

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SNII Level I

COMPREHENSIVE REVIEW OF CONVENTIONAL AND EMERGING MAXIMUM POWER POINT TRACKING ALGORITHMS FOR UNIFORMLY AND PARTIALLY SHADED SOLAR PHOTOVOLTAIC SYSTEMS

ABSTRACT. Renewable energy utilization is the only suitable solution to diminish the increasing level of greenhouse gas emissions, fuel costs, and energy crisis in the next generation. Out of many renewable sources, solar energy sources that are clean, green, and emissions-free have gained wide utilization despite their intermittency nature. Several solar photovoltaic (PV) panels are connected in parallel to achieve the energy demand. In such a system, each panel operates differently due to uneven temperature and irradiation, resulting in a uniform and partial shading conditions. Thus, a unique and efficient mechanism is required to extract maximum power from uniformly and partially shaded PV systems. Many researchers across the world have developed various maximum power point tracking (MPPT) techniques to increase the efficiency and lifetime of PV systems. This study provides a unique, in-depth, and organized review of MPPT methods under four categories: classical, intelligent, optimization, and hybrid techniques. All possible selection benchmarks are considered to do a

comprehensive review, which is not deliberated in the existing review literature. Based on the selection benchmarks, the advantages and disadvantages of each MPPT technique under different categories are summarized in tabulated form. To address the research gaps for further investigation in this field, a concise discussion is included at the end. This review article may find an accessible reference for engineers to understand the most useful MPPT method and to undertake extensive research in PV systems.

Kumar, M., Panda, K. P., Rosas-Caro, J. C., Valderrábano-González, A., & Panda, G. (2023). Comprehensive Review of Conventional and Emerging Maximum Power Point Tracking Algorithms for Uniformly and Partially Shaded Solar Photovoltaic Systems. *IEEE Access*, *11*, 31778-31812. doi: 10.1109/ACCESS.2023.3262502. Article.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

DIFFERENT OPERATION OF THE MSC CONVERTER TO REDUCE THE INPUT CURRENT RIPPLE

ABSTRACT. This article examines a recently proposed dc-dc converter topology, the Modified Series Capacitor (MSC) converter, a kind of interleaved converter with reduced voltage on semiconductors. The current operation of the converter is driven by two transistors with the same duty cycle, in which switching functions are shifted 180° (like the traditional interleaved buck converter). The converter has two inductors of equal inductance. This article proposes a new design and operation in which different duty cycles are used. The main advantage of the proposed design and operation is that the input current ripple can be reduced without increasing the inductance. Another option is to achieve a certain amount of input current ripple with inductors of lower inductance (compared to the current MSC converter). An experiment was built, tested, and verified to demonstrate the principle of the proposition. © IET Conference Proceedings. All right reserved.

Ibarra-Nuño, C., Rosas-Caro, J. C., Ramírez, J. M., Mayo-Maldonado, J. C., & Valdez-Resendiz, J. E. (2022). Different operation of the MSC converter to reduce the input current ripple. In *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 485-492). IET. doi: 10.1049/icp.2022.1098. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

PEDRO MANUEL RODRIGO CRUZ

***Senior Researcher C**, SNII Level I*

DOUBLE DUAL CONVERTER TOPOLOGIES FOR RENEWABLE ENERGY POWER CONDITIONING SYSTEMS

ABSTRACT. This article examines a system composed of two recently proposed dc-dc converter topologies, the double dual buck and boost converters, which are variations of the interleaved converters. In this setup, the individual converters operate in synchronous mode and are connected in cascade. Its operation involves the double dual boost increasing a low voltage, unregulated dc source, while the double dual buck acts as an inverter with a 120V ac output. The benefits of this system are a large voltage gain and power balance between stages, which lead to good performance and power quality, which makes it feasible for renewable energy system applications. Prototypes were built to validate experimentally the advantages of the proposed system. © IET Conference Proceedings. All right reserved.

Garza-Arias, E., Valdez-Resendiz, J. E., Rosas-Caro, J. C., Mayo-Maldonado, J. C., Soriano-Rangel, C. A., Escobar, G., Rodríguez, A., & Rodrigo P. M. (2022). Double dual converter topologies for renewable energy power conditioning systems. In *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 606-611). IET. doi: 10.1049/icp.2022.1122. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

AVELINA ALEJO REYES

SNII Level I

DOUBLE-DUAL DC-DC CONVERSION: A SURVEY OF CONTRIBUTIONS, GENERALIZATION, AND SYSTEMATIC GENERATION OF NEW TOPOLOGIES

ABSTRACT. The integration of renewable energy into the grid demands the development of increasingly more sophisticated power electronics configurations. This situation has motivated the current boom of new power converter topologies. Even though most of the recently proposed converters are scattered across the literature, some of them can be classified in a taxonomical fashion. This action permits studying their properties, generalizing principles, and generating new contributions with improved features - these are the general aims and overall research direction reported in this paper. In this work, we are devoted to generating a well-defined corpus of knowledge by characterizing an emerging family of DC-DC double dual converters. We show that the underlying principle of dualization can be fully enclosed within a systematic procedure and applied not only to classical DC-DC converters but also to any modern configuration. This contribution thus permits the diversification of new topologies that hold relevant features, such as low common-mode voltages and currents, high-voltage gains, and efficient harmonic mitigation - among other advantages that are oriented to renewable energy management. We thus demonstrate that systematic dualization leads to the development of new designs with enhanced features. Experimental results of new topologies are also presented to corroborate the proposed principles and advantages. © 2013 IEEE.

Valdez-Resendiz, J. E., Mayo-Maldonado, J. C., Alejo-Reyes, A., & Rosas-Caro, J. C. (2023). Double-Dual DC-DC Conversion: A Survey of Contributions, Generalization, and Systematic Generation of New Topologies. *IEEE Access*, *11*, 38913-38928. doi: 10.1109/ACCESS.2023.3268230. Article.

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ANTONIO VALDERRÁBANO GONZÁLEZ

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HÉCTOR ROBLES CAMPOS

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DOUBLE DUAL HIGH STEP-UP POWER CONVERTER WITH REDUCED STORED ENERGY

ABSTRACT. This paper introduces a dual-switchhigh step-up DC-DC power converter. The proposed converter features a high step-up voltage gain, relatively low cumulative stored energy over its inductors, low voltage stress on the active switches, and high efficiency, even at a relatively high duty ratio. An assessment of the proposed converter against conventional boost and a high step-up power converter is presented in terms of steady-state time, voltage gain, stored energy over its inductors, and efficiency. The assessment shows a reduction of 81.25% and 62.5% of stored energy in inductors to comply with the same operational conditions. Simulation and experimental results are provided to validate the benefits of the proposed dual-switch high step-up power converter. © 2023 by the authors.

Robles-Campos, H. R., Valderrábano-González, A., Rosas-Caro, J. C., Gabbar, H. A., & Babaiahgari, B. (2023). Double Dual High Step-Up Power Converter with Reduced Stored Energy. *Energies*, *16*(7). doi: 10.3390/en16073194. Article.

JULIO CÉSAR ROSAS CARO
***Senior Researcher D**, SNII Level I*
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SNII Level I

IMPROVED OPERATION OF THE STEP-UP CONVERTER WITH LARGE VOLTAGE GAIN AND LOW VOLTAGE ON CAPACITORS

ABSTRACT. This work proposes an improvement for a recently proposed converter. The discussed converter is the so-called low-voltage in capacitors (LVC). It offers a larger voltage gain compared to the standard step-up or boost converter while operating with a relatively low voltage in their capacitors (lower than the voltage at the output port). The improvement consists of a modification in the pulse width modulation (PWM) scheme. The new modulation scheme allows for a reduction in the voltage ripple at the output port, which means an improvement in the power quality. The LVC converter contains two transistors, but it was proposed to operate with a single switching signal. The new PWM scheme is based on two switching signals with the same duty cycle (same waveform and same average time in high) but 180° of phase shift among them. The PWM scheme significantly affects the voltage ripple at the converter's output port. The voltage ripple reduction at the converter's output port is achieved without increasing the transistor switching frequency and without modifying the circuit parameters (capacitance in capacitors or inductance in inductors). The article starts by introducing the converter. Then, it presents its mathematical model, including the calculation of the voltage ripple at its output port. The experimental results performed on the LCV in both the former and the proposed operation prove the reduction in the voltage ripple, and the comparison also includes the traditional boost converter. © 2023 by the authors.

Hernández-Ochoa, J. C., Alejo-Reyes, A., Rosas-Caro, J. C., & Valdez-Resendiz, J. E. (2023). Improved Operation of the Step-Up Converter with Large Voltage Gain and Low Voltage on Capacitors. *Applied Sciences*, *13*(5). doi: 10.3390/app13052854. Article.

JULIO CÉSAR ROSAS CARO
***Senior Researcher D**, SNII Level I*

LEAKAGE-GROUND CURRENT REDUCTION IN THE DOUBLE-DUAL BUCK INVERTER

ABSTRACT. In this work, the use of the double-dual buck converter, working as a transformer-less inverter is analysed. The analysis presented here shows that the designed inverter based on double-dual buck topology is able to reduce the leakage currents that could appear as common mode currents flowing in the paths to ground. This is a natural benefit of this topology that makes it especially attractive for grid-tied applications, e.g. for power injection provided by renewable energy sources, as well as for electric vehicle applications (vehicle to grid). The theoretical analysis of the behaviour of the leakage current is presented based on the common-mode model and the equivalent circuits of the double-dual buck converter working as a transformer-less inverter. The converter efficiency analysis is also presented considering a conventional modulation scheme. Finally, the performance of the system is evaluated by means of an experimental prototype and steady-state tests. © IET Conference Proceedings. All right reserved.

Rosas-Caro, J. C., Valdez-Resendiz, J. E., Mayo-Maldonado, J. C., Martínez-Rodríguez, P. R., Escobar, G., Soriano-Rangel, C. A., Guillen, D., & Iturriaga-Medina, S. (2022). Leakage-ground current reduction in the double-dual buck inverter. In *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 612-617). IET. doi: 10.1049/icp.2022.1123. Conference Paper.

JULIO CÉSAR ROSAS CARO
***Senior Researcher D**, SNII Level I*

NEURAL NETWORK TRAJECTORY TRACKING CONTROL ON ELECTROMAGNETIC SUSPENSION SYSTEMS

ABSTRACT. A new adaptive-like neural control strategy for motion reference trajectory tracking for a nonlinear electromagnetic suspension dynamic system is introduced. Artificial neural networks, differential flatness and sliding modes are strategically integrated in the presented adaptive neural network control design approach. The robustness and efficiency of the magnetic suspension control system on desired smooth position reference profile tracking can be improved in this fashion. A single levitation control parameter is tuned on-line from a neural adaptive perspective by using information of the reference trajectory tracking error signal only. The sliding mode discontinuous control action is approximated by a neural network-based adaptive continuous control function. Control design is firstly developed from theoretical modelling of the nonlinear physical system. Next, dependency on theoretical modelling of the nonlinear dynamic system is substantially reduced by integrating B-spline neural networks and sliding modes in the electromagnetic levitation control technique. On-line accurate estimation of uncertainty, unmeasured external disturbances and uncertain nonlinearities are conveniently evaded. The effective performance of the robust trajectory tracking levitation control approach is depicted for multiple simulation operating scenarios. The capability of active disturbance suppression is furthermore evidenced. The presented B-spline neural network trajectory tracking control design approach based on sliding modes and differential flatness can be extended to other controllable complex uncertain nonlinear dynamic systems where internal and external disturbances represent a relevant issue. Computer simulations and analytical results demonstrate the effective performance of the new adaptive neural control method. © 2023 by the authors.

Beltran-Carbajal, F., Yañez-Badillo, H., Tapia-Olvera, R., Rosas-Caro, J. C., Sotelo, C., & Sotelo, D. (2023). Neural Network Trajectory Tracking Control on Electromagnetic Suspension Systems. *Mathematics*, *11*(10). doi: 10.3390/math11102272. Article.

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ABRAHAM MENDOZA ANDRADE
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AVELINA ALEJO REYES
SNII Level I

NUMERICAL OPTIMIZATION OF THE CAPACITORS SELECTION IN THE MSBA CONVERTER TO REDUCE THE OUTPUT VOLTAGE RIPPLE

ABSTRACT. DC–DC power electronics converters are widely used in many applications, such as renewable energy systems. The multistage-stacked boost architecture (MSBA) converter is a large voltage gain converter whose PWM scheme may reduce

a percentage of the output voltage ripple, taking advantage of the symmetry of the voltage signals in capacitors (they are triangular waveforms) to have a symmetry cancelation. The switching ripple is unavoidable; the correct selection of components can reduce it, but this may result in a large amount of stored energy (larger size). The selection of capacitors influences the output voltage ripple magnitude. This article proposes a design methodology that combines a recently introduced PWM scheme with a numerical optimization method to choose the capacitors for the MSBA converter. The objective is to minimize the output voltage ripple by choosing two capacitors simultaneously while ensuring the constraint of a certain (maximum) amount of stored energy in capacitors is not overpassed. The internal optimization was performed with the differential evolution algorithm. The results demonstrate that the proposed method that includes numerical optimization allows having a very low output voltage ripple with the same stored energy in capacitors compared to the traditional converter. In a design exercise, up to 60% reduction was observed in the output voltage ripple with the same stored energy in capacitors. © 2022 by the authors.

Alejo-Reyes, A., Rodríguez, A., Mendoza, A., & Rosas-Caro, J. C. (2022). Numerical Optimization of the Capacitors Selection in the MSBA Converter to Reduce the Output Voltage Ripple. *Symmetry*, *14*(11). doi: 10.3390/sym14112383. Article.

JULIO CÉSAR ROSAS CARO
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SNII Level I

OPTIMAL SELECTION OF CAPACITORS FOR A LOW ENERGY STORAGE QUADRATIC BOOST CONVERTER (LES-QBC)

ABSTRACT. This article studies a recently proposed dc-dc converter and its optimization in terms of capacitors selection through the Particle Swarm Optimization (PSO) algorithm. The converter under study is the so-called Low Energy Storage Quadratic Boost Converter (LES-QBC), a quadratic type of converter that offers a smaller Output Voltage Ripple (OVR) compared to the traditional quadratic boost topology with capacitors of the same characteristics. This study presents a way to select the capacitors for minimizing the OVR while achieving a constraint of a maximum stored energy in capacitors. The capacitor's stored energy is given as a design specification. The results are compared against the traditional quadratic boost converter and the LES-QBC without optimization (equal capacitance in capacitors). The optimization algorithm used was the so-called Particle Swarm Optimization (PSO). The experimental results demonstrate the effectiveness of the proposition. For the design exercise used for the results, the capacitor's stored energy was kept almost the same, and a reduction in the OVR was achieved versus the non-optimized LES-QBC. © 2023 by the authors.

Solis-Rodríguez, J., Rosas-Caro, J. C., Alejo-Reyes, A., & Valdez-Resendiz, J. E. (2023). Optimal Selection of Capacitors for a Low Energy Storage Quadratic Boost Converter (LES-QBC). *Energies*, *16*(6). doi: 10.3390/en16062510. Article.

JULIO CÉSAR ROSAS CARO
***Senior Researcher D**, SNII Level I*

SERIES-CAPACITOR BOOST CONVERTER AS POWER CONDITIONER FOR FUEL CELL ELECTRIC VEHICLES

ABSTRACT. This article deals with the development of a power electronics system for a fuel cell based electric vehicle. The main task of the power electronics converter is to regulate the output voltage of the fuel cell stack which typically has low and current dependent output voltage. The proposed power electronics system is based on a recently proposed series-capacitor boost converter. This converter has several advantages, such as reduced input current ripple, reduced average current through inductors and high voltage conversion ratio. The analysis of the converter, and the derivation of the dynamic model along with steady state equations are presented. An experimental prototype was also built to corroborate the claimed benefits of the power electronics converter. This work shows that the proposed converter is a compelling solution in applications where high gain converter ratio and low input current ripple is required. © 2022 IEEE.

Valdez-Resendiz, J. E., Rosas-Caro, J. C., Mayo-Maldonado, J. C., Guillen-Aparicio, D., Escobar, G., & Garza-Arias, E. (2022). Series-Capacitor Boost Converter as Power Conditioner for Fuel Cell Electric Vehicles. In *2022 International Symposium on Electromobility (ISEM)*, Puebla, Mexico, 2022 (pp. 1-7). IEEE. doi: 10.1109/ISEM55847.2022.9976578. Conference Paper.

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ANTONIO VALDERRÁBANO GONZÁLEZ
SNII Level I
HÉCTOR ROBLES CAMPOS
SNII Level I

SINGLE-PHASE FIVE-LEVEL MULTILEVEL INVERTER BASED ON A TRANSISTORS SIX-PACK MODULE

ABSTRACT. This article introduces a single-phase five-level multilevel inverter based on six switches and two transformers. The proposed converter requires a single dc input source with low voltage. The disposition of switches makes it possible to build the converter with a transistors six-pack module off-the-shelves, traditionally used to build three-phase inverters, which simplifies the manufacturing process. The converter increases the voltage with two transformers; for that reason, it does not require an auxiliary step-up converter. The use of transformers (with the transformer's turns ratio) allows for using the same topology for several input voltage levels. To verify the operation of the proposed multilevel inverter, a computer-based simulation was performed with PSIM, a software that considers parasitic components. The results show that the proposed converter can work properly. © 2022 by the authors.

García-Santiago, F. A., Rosas-Caro, J. C., Valdez-Resendiz, J. E., Mayo-Maldonado, J. C., Valderrábano-González, A., & Robles-Campos, H. R. (2022). Single-Phase Five-Level Multilevel Inverter Based on a Transistors Six-Pack Module. *Energies*, *15*(24). doi: 10.3390/en15249321. Article.

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***Senior Researcher D**, SNII Level I*
OMAR FERNANDO RUÍZ MARTÍNEZ
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SLIDING MODE REGULATION OF A BOOST CIRCUIT FOR DC-BIASED SINUSOIDAL POWER CONVERSION

ABSTRACT. The boost converter is mostly used as a DC–DC converter, but two boost converter power stages can be configured to perform the DC–AC conversion. In this case, the control system of the power stage must be designed for trajectory tracking (instead of regulation), which brings interesting challenges. This work deals with the design of a

higher-order sliding mode output regulator for a DC-biased sinusoidal power conversion problem on a single boost converter stage of a boost inverter for asymptotic trajectory tracking of the voltage capacitor. The steady-state reference signal for the inductor current is proposed as an approximated solution of the well-known Francis–Isidori–Byrnes equations. The used approach is the direct control of the output, where the nonminimum phase variable, i.e., an adequate sliding function, stabilizes the current through the inductor. Lastly, by means of real-time experimentation, the good performance of the proposed control strategy is verified.

Rivera, J., Ortega-Cisneros, S., Rosas-Caro, J. C., & Ruíz-Martínez, O. F. (2023). Sliding Mode Regulation of a Boost Circuit for DC-Biased Sinusoidal Power Conversion. *Applied Sciences*, *13*(10). doi: 10.3390/app13105963. Article.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

STATCOM DATA-DRIVEN CONTROL FOR GRID DYNAMIC PERFORMANCE IMPROVEMENT

ABSTRACT. This work proposes a control technique based on Data-driven theory to regulate the grid voltage utilizing a static compensator (STATCOM). Fast dynamic reaction is obtained by injecting reactive power to correct the voltage profile during load fluctuations and based on the grid operating point. An improved dynamic grid performance is the goal of this control strategy, which considers a specific operating point in the grid. As a result, a mathematical foundation for the suggested control approach is presented in the form of a (model-free) data-driven controller. Mathematical simulations utilizing the Matlab/Simulink software demonstrate the robustness of the suggested method. The suggested controller may improve dynamic performance under transient situations with the well-known test power system of two zones. Compared with the current state of the art, the proposed controller development does not need any previous knowledge of the systems to regulate, such as a model or system representation. The controller's synthesis is derived strictly numerically from data by obeying Lyapunov requirements. At the same time, it can maintain stability rigorously. © IET Conference Proceedings. All right reserved.

Rivera, D., Guillen, D., Mayo-Maldonado, J. C., Valdez-Resendiz, J. E., Rosas-Caro, J. C., & Soriano-Rangel, C. A. (2022). Statcom data-driven control for grid dynamic performance improvement. In *11th International Conference on Power Electronics, Machines and Drives (PEMD 2022), Hybrid Conference*, Newcastle, UK, 2022 (pp. 630-637). IET. doi: 10.1049/icp.2022.1124. Conference Paper.

JULIO CÉSAR ROSAS CARO

***Senior Researcher D**, SNII Level I*

TRANSFORMERLESS WIND ENERGY SYSTEM BASED ON A SERIES DOUBLE NPC MULTILEVEL RECTIFIER AND A SIX-PHASE ASYMMETRICAL PMSG

ABSTRACT. This paper introduces a transformerless configuration of generator and power converter that is suitable for offshore wind energy systems. The proposed configuration is based on a series connection of two neutral point clamped (NPC) multilevel rectifiers, powered by a six-phase asymmetrical permanent magnet synchronous generator (PMSG). Additionally, this work proposes a control strategy that opens the door to a fault-tolerance mode, by the use of independent controllers for each NPC converter, directly operating in a large-signal nonlinear space. This closed-loop system permits to prevent disruptions due to faults at either the generator winding or one of the NPC converter, by allowing a modular modification of set-points over the whole system operating region. Simulation results show the feasibility of the proposed configuration, rendering a promising solution for future wind energy generation systems. © 2023 IEEE.

Mayo-Maldonado, J. C., Panagiotou, P. A., Masoud, M. I., Lambourne, A., Valdez-Resendiz, J. E., & Rosas-Caro, J. C. (2023). Transformerless Wind Energy System Based on a Series Double NPC Multilevel Rectifier and a Six-Phase Asymmetrical PMSG. In *2023 IEEE 14th International Symposium on Diagnostics for Electrical Machines, Power Electronics and Drives (SDEMPED)* (pp. 613-619). IEEE. doi: 10.1109/SDEMPED54949.2023.10271483. Conference Paper.

CLAUDIA NALLELY SÁNCHEZ GÓMEZ

***Senior Researcher B**, SNII Candidate Level*

BAYESIAN NETWORK-BASED MULTI-OBJECTIVE ESTIMATION OF DISTRIBUTION ALGORITHM FOR FEATURE SELECTION TAILORED TO REGRESSION PROBLEMS

ABSTRACT. Feature selection is an essential pre-processing step in Machine Learning for improving the performance of models, reducing the time of predictions, and, more importantly, identifying the most significant features. Sometimes, this identification can reduce the time and cost of obtaining feature values because it could imply buying fewer sensors or spending less human time. This paper proposes an Estimation of Distribution Algorithm (EDA) for feature selection tailored to regression problems with a multi-objective approach. The objective is to maximize the performance of learning models and minimize the number of selected features. We use a Bayesian Network (BN) as the EDA distribution probability model. The main contribution of this work is the process used to create this BN structure. It aims to capture the redundancy and relevance among features. Also, the BN is used to create the initial EDA population. We test and compare the performance of our proposal with other multi-objective algorithms: an EDA with a Bernoulli distribution probability model, NSGA II, and AGEMOEA, using different datasets. The experimental results show that the proposed algorithm found solutions with a considerably fewer number of features. Additionally, the proposed algorithm achieves comparable results on models' performance compared with the other algorithms. Our proposal generally expended less time and had fewer objective function evaluations. © 2024, The Author(s), under exclusive license to Springer Nature Switzerland AG.

López, J. A., Morales-Osorio, F., Lara, M., Velasco, J., & Sánchez, C. N. (2024). Bayesian Network-Based Multi-objective Estimation of Distribution Algorithm for Feature Selection Tailored to Regression Problems. In Calvo, H., Martínez-Villaseñor, L., Ponce, H. (Eds.) *Advances in Computational Intelligence. MICAI 2023. Series Lecture Notes in Computer Science (Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 14391 LNAI* (pp. 309-326). Springer. doi: 10.1007/978-3-031-47765-2_23. Conference Paper.

CLAUDIA NALLELY SÁNCHEZ GÓMEZ

***Senior Researcher B**, SNII Candidate Level*

PEDRO MANUEL RODRIGO CRUZ

***Senior Researcher C**, SNII Level I*

ESTIMATING THE MAXIMUM POWER OF A CONCENTRATOR PHOTOVOLTAIC MODULE THROUGH RANDOM FOREST

ABSTRACT. Concentrator photovoltaics achieves the highest conversion efficiencies of sunlight to electricity and is a promising

alternative for mass production of energy. However, these systems are complex and predicting their power generation is difficult. In this study, the maximum power of a real concentrator photovoltaic module is estimated by a new method based on random forest. The method has the advantage that only atmospheric variables relatively easy to be measured are used as inputs, i.e. no measurements on the physical module are required, enabling the energy prediction from atmospheric databases to be performed. Results of applying the method to data registered in an experimental campaign show a good behavior of the method for maximum power estimation. Therefore, the method can contribute to give certainty to the energy predictions, promoting the deployment of this technology. © 2023 IEEE.

Sánchez, C. N., & Rodrigo, P. M. (2023). Estimating the Maximum Power of a Concentrator Photovoltaic Module through Random Forest. In *2023 3rd International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME), 2023*. IEEE. doi: 10.1109/ICECCME57830.2023.10252263. Conference Paper.

FIDENCIO TAPIA RODRÍGUEZ

***Senior Researcher C**, SNII Candidate Level*

HÉCTOR RUBÉN ACEVEDO PARRA

Research Professor

DESIGN AND OPTIMIZATION METHODOLOGY FOR DIFFERENT 3D PROCESSED MATERIALS (PLA, ABS AND CARBON FIBER REINFORCED NYLON PA12) SUBJECTED TO STATIC AND DYNAMIC LOADS

ABSTRACT. This research presents a methodology for the design and optimization of 3D printed parts with material extrusion (MEX) technology with three different commercial materials: PLA, ABS and N + CF (PA12) subjected to tensile and fatigue stresses, which included three stages: pretreatment, design of experiments and sequential optimization by statistical modeling. In the pretreatment stage, mainly the printing control factors (inner layer and contour height, printing speed, extrusion temperature, nozzle, infill arrangement and printing orientation) were determined; then, factors to optimize tensile strength as a function of printing pattern (linear, 3D, hexagonal), infill percentage (33%, 66%, 100°) and printing orientation (+45°/-45°, 0°/90°) were evaluated. Fatigue analysis was performed as a function of impression orientation using 100% infill, linear impression pattern, 5 Hz and a load range between 90 and 50% UTS. Optimization of tensile strength resulted in parts that exceeded the UTS of their corresponding filament, leading to infinite life relative to fatigue tests. Results were presented for fatigue life prediction based on Weibull analysis, Basquiń s model and a multivariate response surface correlation analysis. The best fatigue behavior was related to the optimized tensile strength, the infill pattern applied to the printing orientation and the intrinsic properties of ABS (1 × 107cycles, stress up to 20 MPa). With respect to the other materials, a good fatigue behavior was highlighted at the number of cycles achieved 1 × 106 (stress up to 18 MPa) and 1 × 105 (stress up to 24 MPa) for N + CF and PLA, respectively. This study contributes to a better understanding of how printing parameters correlate with tensile and fatigue properties. © 2023 Elsevier Ltd.

Rodríguez-Reyna, S. L., Díaz-Aguilera, J. H., Acevedo-Parra, H. R., García, C. J., Gutierrez-Castañeda, E. J., & Tapia, F. (2024). Design and optimization methodology for different 3D processed materials (PLA, ABS and carbon fiber reinforced nylon PA12) subjected to static and dynamic loads. *Journal of the Mechanical Behavior of Biomedical Materials*, *150*. doi: 10.1016/j.jmbbm.2023.106257. Article.

RAMIRO VELÁZQUEZ GUERRERO

SNII Level I

PROCESSING OF LIDAR AND IMU DATA FOR TARGET DETECTION AND ODOMETRY OF A MOBILE ROBOT

ABSTRACT. In this paper, the processing of the data of a 3D light detection and distance measurement (LiDAR) sensor mounted on a mobile robot is demonstrated, introducing an innovative methodology to manage the data and extract useful information. The LiDAR sensor is placed on a mobile robot which has a modular design that permits the easy change of the number of wheels, was designed to travel through several environments, and saves energy by changing the number and arrangement of the wheels in each environment. In addition, the robot can recognize landmarks in a structured environment by using a classification technique on each frame acquired by the LiDAR. Furthermore, considering the experimental tests, a new simple algorithm based on the LiDAR data processing together with the inertial data (IMU sensor) through a Kalman filter is proposed to characterize the robot's pose by the surrounding environment with fixed landmarks. Finally, the limits of the proposed algorithm have been analyzed, highlighting new improvements in the future prospective development for permitting autonomous navigation and environment perception with a simple, modular, and low-cost device. © 2022 Giannoccaro et al.

Giannoccaro, N. I., Nishida, T., Lay-Ekuakille, A., Velazquez, R., & Visconti, P. (2022). Processing of Lidar and IMU Data for Target Detection and Odometry of a Mobile Robot. *Journal of Automation Mobile Robotics and Intelligent Systems*, *16*(1), 3-13. doi: 10.14313/JAMRIS/1-2022/1. Article.

ANTONIO VALDERRÁBANO GONZÁLEZ

SNII Level I

ADAPTIVE NEURAL TRAJECTORY TRACKING CONTROL FOR SYNCHRONOUS GENERATORS IN INTERCONNECTED POWER SYSTEMS

ABSTRACT. The synchronous generator is one of the most important active components in current electric power systems. New control methods should be designed to guarantee an efficient dynamic performance of the synchronous generator in strongly interconnected nonlinear power systems over a wide range of variable operating conditions. In this context, active suppression capability for different uncertainties and external disturbances represents a current trend in the development of new control design methodologies. In this paper, a new adaptive neural control scheme based on differential flatness with a modified structure including B-spline Neural Networks for transient stabilization and tracking of power-angle reference profiles for synchronous generators in interconnected electric power systems is introduced. These features are attained due to the advantages extracted of these two approaches: (a) a control design stage based on a power system model by differential flatness and (b) an adaptive performance using a correct design of B-spline Neural Networks, minimizing parameter dependency. The effectiveness of the proposed algorithm is demonstrated by simulation results in two test systems: single machine infinite bus and an interconnected power system. Transient stability and robust power-angle reference profile tracking are both verified. © 2022 by the authors.

Tapia-Olvera, R., Beltran-Carbajal, F., Valderrábano-González, A. (2023). Adaptive Neural Trajectory Tracking Control for Synchronous Generators in Interconnected Power Systems. *Applied Sciences*, *13*(1). doi: 10.3390/app13010561. Article.

ANTONIO VALDERRÁBANO GONZÁLEZ

SNII Level I

AN EFFICIENT NEUROCONTROLLER POSITION METHOD FOR PMSM DRIVE SYSTEM

ABSTRACT. PMSM has been widely used in high-precision variable-speed applications, however, the control scheme demands normally a high dynamic performance under several operating contidions. Due to the non-linear nature of the PMSM, the use of an adaptive controller based on B-spline neural networks is proposed to determine the control signals. The proposed control technique through neural networks exhibits the best performance because it can be adapted to each operating condition, demanding low computational cost for an online operation, and considering non-linearities of the system. The performance of the proposed controller is evaluated in the presence of uncertainties. The results are compared with the conventional PI controller, optimized using whale optimization algorithm. © 2022 IEEE.

Aguilar-Mejía, O., Popocatl, H. M., García-Morales, J. M., Castillo-Ibarra, C. O., & Valderrabano-González, A. (2022). An Efficient Neurocontroller Position Method for PMSM Drive System. In *2022 IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC)*, Ixtapa, Mexico, 2022 (pp. 1-6). IEEE. doi: 10.1109/ROPEC55836.2022.10018717. Conference Paper.

ANTONIO VALDERRÁBANO GONZÁLEZ

SNII Level I

ECONOMIC DISPATCH IN MICRO-GRIDS WITH ALTERNATIVE ENERGY SOURCES AND BATTERIES

ABSTRACT. The problem of economic dispatch in a micro-grid interconnected to the conventional electrical system consists of optimizing the operating cost to satisfy the different operating requirements and the demand for electrical power required by the users. In the development of this proposal, there are challenges caused by the random nature of electricity generation systems based on renewable energy sources, for an adequate operation of the micro-grid, which can be solved through systems Energy Storage System (BESS). This paper addresses the problem of optimal economic dispatch in a microgrid that includes an energy storage system based on a battery bank and interconnected to the main grid through a mathematical programming approach, considering the benefits for customers by reducing their demand of electrical power and taking into account the costs of treatment pollutants produced by conventional energy sources. The generation systems used to satisfy the energy demand of the customers within the interconnected microgrid are: a) conventional diesel generators, b) wind generation systems, c) photovoltaic systems, d) a hydroelectric turbine, and e) a storage system based on electric batteries. The results of the effectiveness of the proposed mathematical model show that the demand for electrical power to the main grid can be reduced and customers obtain economic benefits by integrating the incentive-based demand response program into the energy management problem when environmental contingency events occur. The results show that when there are peaks in energy demand, the operating costs of the micro-grid increase by up to 380%. In the same way, when there are failures in renewable energy sources, storage systems (BESS) and diesel generators work at 100% of their capacities. The proposal is implemented in Lingo 17.0 software and simulation results show the feasibility of the proposal through the optimization of the operation of the micro-grid. © 2003-2012 IEEE.

Minor-Popocatl, H., Aguilar-Mejía, O., Santillan-Lemus, F. D., Valderrábano-González, A., & Samper-Torres, R. I. (2023). Economic dispatch in micro-grids with alternative energy sources and batteries. *IEEE Latin America Transactions*, *21*(1), 124-132. doi: 10.1109/TLA.2023.10015134. Article.

ANTONIO VALDERRÁBANO GONZÁLEZ

SNII Level I

SLIDING MODE WITH EQUIVALENT CONTROL FOR INDUCTION MOTOR DRIVE BASED ON MULTI-PULSE VSC

ABSTRACT. In this work, the application of a sliding mode equivalent control for an induction motor drive based on a multi-pulse Voltage Source Converter is proposed. This is accomplished by transforming the squirrel-cage induction motor mathematical model into a block control form. The equivalent control method is applied to the sliding manifold, where the voltages are obtained in the stationary reference frame to control the angular velocity of the motor. In addition, a proportional-integral control is designed and applied to the motor represented in this form in order to make performance comparisons with the equivalent control method. Multi-pulse converters of 6, 12, and 84 pulses are used directly to feed the plant that is being controlled. The outcomes of using these power electronics devices are used to perform comparisons among the velocity tracking performance, control voltages in stationary reference frame, tracking errors, and rejection of external disturbances. Furthermore a dynamic and steady-state analysis of the velocity tracking performance is executed. The energy profiles for the startup, torque variations, and steady-state are also obtained. Additionally, total harmonic distortion values are added. All comparisons are carried out using the established plan for the motor, both with and without the use of power electronics converters, and with both control algorithms. The obtained results demonstrate that the use of a high-quality voltage source converter, along with a good control strategy, allows for a general improvement in the overall system and a significant reduction in energy usage, whilst also reducing controller complexity. © 2023 by the authors.

Castañeda, C. E., Valderrábano-González, A., Gabbar, H. A., & Morfín, O. A. (2023). Sliding Mode with Equivalent Control for Induction Motor Drive Based on Multi-Pulse VSC. *Energies*, *16*(13). doi: 10.3390/en16134866. Article.

CAROLINA DEL VALLE SOTO

***Senior Researcher D**, SNII Level I*

A SURVEY OF ENERGY-EFFICIENT CLUSTERING ROUTING PROTOCOLS FOR WIRELESS SENSOR NETWORKS BASED ON METAHEURISTIC APPROACHES

ABSTRACT. The increase in proposed clustering routing protocols for Wireless Sensor Networks has motivated the development of survey studies that provide quick access to clear and meaningful information about state-of-the-art approaches. This review focuses on the most recent clustering routing protocols for WSNs based on metaheuristic techniques. Since there is a lack of survey studies that provide a comprehensive analysis of this field, we present a more in-depth study of different metaheuristic-based strategies mainly for selecting optimal cluster heads. The primary objective of the proposed work is to review approaches that have developed novel

cluster-based routing protocols primarily for reducing the energy consumption of WSNs. In this survey, we examine every protocol considering its methodology and properties from the perspective of the metaheuristic community. Additionally, we present a comparative analysis of the reviewed approaches regarding the implemented network structure, the network characteristics, the metaheuristic algorithm used, the proposed search strategy, reported metrics, and the obtained results. © 2023, The Author(s), under exclusive licence to Springer Nature B.V.

Del-Valle-Soto, C., Rodríguez, A., & Ascencio-Piña, C. R. (2023). A survey of energy-efficient clustering routing protocols for wireless sensor networks based on metaheuristic approaches. *Artificial Intelligence Review*, *56*(9), 9699-9770. doi: 10.1007/s10462-023-10402-w. Article.

CAROLINA DEL VALLE SOTO
***Senior Researcher D**, SNII Level I*
LEONARDO JESÚS VALDIVIA PARGA
SNII Level I
JUAN CARLOS LÓPEZ PIMENTEL
***Senior Researcher B**, SNII Level I*

COMPARISON OF COLLABORATIVE AND COOPERATIVE SCHEMES IN SENSOR NETWORKS FOR NON-INVASIVE MONITORING OF PEOPLE AT HOME

ABSTRACT. This paper looks at wireless sensor networks (WSNs) in healthcare, where they can monitor patients remotely. WSNs are considered one of the most promising technologies due to their flexibility and autonomy in communication. However, routing protocols in WSNs must be energy-efficient, with a minimal quality of service, so as not to compromise patient care. The main objective of this work is to compare two work schemes in the routing protocol algorithm in WSNs (cooperative and collaborative) in a home environment for monitoring the conditions of the elderly. The study aims to optimize the performance of the algorithm and the ease of use for people while analyzing the impact of the sensor network on the analysis of vital signs daily using medical equipment. We found relationships between vital sign metrics that have a more significant impact in the presence of a monitoring system. Finally, we conduct a performance analysis of both schemes proposed for the home tracking application and study their usability from the user's point of view. © 2023 by the authors.

Del-Valle-Soto, C., Valdivia, L. J., López-Pimentel, J. C., & Visconti, P. (2023). Comparison of Collaborative and Cooperative Schemes in Sensor Networks for Non-Invasive Monitoring of People at Home. *International Journal of Environmental Research and Public Health*, *20*(7). doi: 10.3390/ijerph20075268. Article.

CAROLINA DEL VALLE SOTO
***Senior Researcher D**, SNII Level I*

ENERGY HARVESTING TECHNOLOGIES AND DEVICES FROM VEHICULAR TRANSIT AND NATURAL SOURCES ON ROADS FOR A SUSTAINABLE TRANSPORT: STATE-OF-THE-ART ANALYSIS AND COMMERCIAL SOLUTIONS

ABSTRACT. The roads we travel daily are exposed to several energy sources (mechanical load, solar radiation, heat, air movement, etc.), which can be exploited to make common systems and apparatus for roadways (i.e., lighting, video surveillance, and traffic monitoring systems) energetically autonomous. For decades, research groups have developed many technologies able to scavenge energy from the said sources related to roadways: electromagnetism, piezoelectric and triboelectric harvesters for the cars' stress and vibrations, photovoltaic modules for sunlight, thermoelectric solutions and pyroelectric materials for heat and wind turbines optimized for low-speed winds, such as the ones produced by moving vehicles. Thus, this paper explores the existing technologies for scavenging energy from sources available on roadways, both natural and related to vehicular transit. At first, to contextualize them within the application scenario, the available energy sources and transduction mechanisms were identified and described, arguing the main requirements that must be considered for developing harvesters applicable on roadways. Afterward, an overview of energy harvesting solutions presented in the scientific literature to recover energy from roadways is introduced, classifying them according to the transduction method (i.e., piezoelectric, triboelectric, electromagnetic, photovoltaic, etc.) and proposed system architecture. Later, a survey of commercial systems available on the market for scavenging energy from roadways is introduced, focusing on their architecture, performance, and installation methods. Lastly, comparative analyses are offered for each device category (i.e., scientific works and commercial products), providing insights to identify the most promising solutions and technologies for developing future self-sustainable smart roads. © 2023 by the authors.

De Fazio, R., De Giorgi, M., Cafagna, D., Del-Valle-Soto, C., & Visconti, P. (2023). Energy Harvesting Technologies and Devices from Vehicular Transit and Natural Sources on Roads for a Sustainable Transport: State-of-the-Art Analysis and Commercial Solutions. *Energies*, *16*(7). doi: 10.3390/en16073016. Review.

CAROLINA DEL VALLE SOTO
***Senior Researcher D**, SNII Level I*

GENRE CLASSIFICATION OF BOOKS ON SPANISH

ABSTRACT. Genre categorization of published titles is a common practice in publishing houses, libraries, and bookstores, as well as a fundamental element of editorial marketing. However, assigning subject codes to each title proves to be an arduous task for both publishers and data aggregators. The problem with automatic genre categorization is that some publishers use more than 200 categories, making it a highly complex task. Moreover, even though these publishers based their categorization on standards, they ofthen alter the names of these standards as they consider to be too technical. In this paper, we proposed Thema-based categorization as a tool to facilitate editors' work by advancing the categorization process, allowing them to focus on finer category granularity. This categorization has four key features: first, it clusters the most important categories for Latin American publishers. Second, it stops grouping when the number of thematic categories remains practical for the purposes of the publishing business. Third, we assign names to these categories that resonate with Latin American stakeholders. Finally, the number of categories is optimized to provide reasonable classification performance. We worked on the description of books in Spanish of two publishers, and mapped them to this proposed categorization. This allowed us to created a database for train a model to automate categorization. After conducting our analysis, we determined that 26 thematic categories were an appropriate number that fulfilled the three features mentioned earlier. However, we recognized that classifying into 26 categories was still a complex task, so to overcome this challenge, we decided to augment data by back-translating it into Spanish using the translation function, TlS S, where TSl is the translation function from

Spanish, s, to language, l; Tls is the translation function from language, l, to Spanish, S, and TSl and TlS are not-invertible functions. Experimental results, obtained using 5-fold cross-validation, were approximately 57%, 57%, 63.38%, and 65.26% for the F1-score of Support Vector Machine (SVM), Logist Regression (LR), BERT, and RoBERTa models, respectively. We utilized the F1-score metric because our categories were not perfectly balanced. The results achieved by RoBERTa outperform those reported in the literature. Furthermore, these results are built upon the foundation of the Thema standard for categorizing book genres. Additionally, the categories have been specifically designed to align with the preferences and needs of Latin American publishers.

Nolazco-Flores, J. A., Guerrero-Galvan, A. V., Del-Valle-Soto, C., & García-Perera, L. P. (2023). Genre classification of books on Spanish. *IEEE Access*, *11*, 132878-132892. doi: 10.1109/ACCESS.2023.3332997. Article.

CAROLINA DEL VALLE SOTO
***Senior Researcher D**, SNII Level I*
LEONARDO JESÚS VALDIVIA PARGA
SNII Level I

MIXED REALITY FOR EDUCATION (MRE) IMPLEMENTATION AND RESULTS IN ONLINE CLASSES FOR ENGINEERING

ABSTRACT. The COVID-19 pandemic has changed many industries, empowering some sectors and causing many others to disappear. The education sector is not exempt from major changes; in some countries or cities, classes were taught 100% online for at least 1 year. However, some university careers need laboratory practices to complement learning, especially in engineering areas, and having only theoretical lessons online could affect their knowledge. For this reason, in this work, a mixed reality system called mixed reality for education (MRE) was developed to help students develop laboratory practices to complement online classes. An experiment was carried out with 30 students; 10 students did not use MRE, 10 used MRE, and 10 more used MRE with teacher feedback. With this, one can see the advantages of mixed reality in the education sector. The results show that using MRE helps to improve knowledge in engineering subjects; the students obtained qualifications with grades 10% to 20% better than those who did not use it. Above all, the results show the importance of feedback when using virtual reality systems.

Valdivia, L. J., Del-Valle-Soto, C., Castillo-Vera, J., & Rico-Campos, A. (2023). Mixed Reality for Education (MRE) Implementation and Results in Online Classes for Engineering. *Journal of Visualized Experiments*, (196). doi: 10.3791/65091. Article.

CAROLINA DEL VALLE SOTO
***Senior Researcher D**, SNII Level I*
LEONARDO JESÚS VALDIVIA PARGA
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RAMIRO VELÁZQUEZ GUERRERO
SNII Level I

NON-INVASIVE MONITORING OF VITAL SIGNS FOR THE ELDERLY USING LOW-COST WIRELESS SENSOR NETWORKS: EXPLORING THE IMPACT ON SLEEP AND HOME SECURITY

ABSTRACT. Wireless sensor networks (WSN) are useful in medicine for monitoring the vital signs of elderly patients. These sensors allow for remote monitoring of a patient's state of health, making it easier for elderly patients, and allowing to avoid or at least to extend the interval between visits to specialized health centers. The proposed system is a low-cost WSN deployed at the elderly patient's home, monitoring the main areas of the house and sending daily recommendations to the patient. This study measures the impact of the proposed sensor network on nine vital sign metrics based on a person's sleep patterns. These metrics were taken from 30 adults over a period of four weeks, the first two weeks without the sensor system while the remaining two weeks with continuous monitoring of the patients, providing security for their homes and a perception of well-being. This work aims to identify relationships between parameters impacted by the sensor system and predictive trends about the level of improvement in vital sign metrics. Moreover, this work focuses on adapting a reactive algorithm for energy and performance optimization for the sensor monitoring system. Results show that sleep metrics improved statistically based on the recommendations for use of the sensor network; the elderly adults slept more and more continuously, and the higher their heart rate, respiratory rate, and temperature, the greater the likelihood of the impact of the network on the sleep metrics. The proposed energy-saving algorithm for the WSN succeeded in reducing energy consumption and improving resilience of the network.

Del-Valle-Soto, C., Briseño, R. A., Valdivia, L. J., Velázquez, R., & Nolazco-Flores, J. A. (2023). Non-Invasive Monitoring of Vital Signs for the Elderly Using Low-Cost Wireless Sensor Networks: Exploring the Impact on Sleep and Home Security. *Future Internet*, *15*(9). doi: 10.3390/fi15090287. Article.

CAROLINA DEL VALLE SOTO
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Research Professor

SMART-HOME TECHNOLOGY AND ITS IMPACT ON THE ELDERLY HEALTH

ABSTRACT. Technological adaptations in homes allow older people to continue living in their homes, remaining in their environment. A better quality of life is achieved, tending to reduce accidents within the home. This study analyzes the impact of a wireless system to improve the life quality at home on the feeling of well-being in the elderly. This perception is analyzed by measuring health variables such as body temperature, sleep rhythm sensors, heart rate, and breathing frequency. We statistically analyze the real impact on the sensation of men and women and their perception of safety against accidents and on the improvement of their quality day by day. We obtain that this feeling of well-being is more significant in women than in men and only on certain days of the week. Finally, we present statistics of the most stable vital signs under the presence of the wireless network in the person's home.

Del-Valle-Soto, C., Valdivia, L. J., Cortes-Chavez, F., & Velázquez, R. (2022). Smart-home technology and its impact on the elderly health. In *2022 IEEE 40th Central America and Panama Convention (CONCAPAN)*, Panama, Panama, 2022 (pp. 1-6). IEEE. doi: 10.1109/CONCAPAN48024.2022.9997629. Conference Paper.

CAROLINA DEL VALLE SOTO
***Senior Researcher D**, SNII Level I*

UTILIZATION OF 5G TECHNOLOGIES IN IOT APPLICATIONS: CURRENT LIMITATIONS BY INTERFERENCE AND NETWORK OPTIMIZATION DIFFICULTIES—A REVIEW

ABSTRACT. 5G (fifth-generation technology) technologies are becoming more mainstream thanks to great efforts from telecommunication companies, research facilities, and governments. This technology is often associated with the Internet of Things to improve the quality of life for citizens by automating and gathering data recollection processes. This paper presents the 5G and IoT technologies, explaining common architectures, typical IoT implementations, and recurring problems. This work also presents a detailed and explained overview of interference in general wireless applications, interference unique to 5G and IoT, and possible optimization techniques to overcome these challenges. This manuscript highlights the importance of addressing interference and optimizing network performance in 5G networks to ensure reliable and efficient connectivity for IoT devices, which is essential for adequately functioning business processes. This insight can be helpful for businesses that rely on these technologies to improve their productivity, reduce downtime, and enhance customer satisfaction. We also highlight the potential of the convergence of networks and services in increasing the availability and speed of access to the internet, enabling a range of new and innovative applications and services.

Pons, M., Valenzuela, E., Rodríguez, B., Nolazco-Flores, J. A., & Del-Valle-Soto, C. (2023). Utilization of 5G Technologies in IoT Applications: Current Limitations by Interference and Network Optimization Difficulties—A Review. *Sensors*, *23*(8). doi: 10.3390/s23083876. Article.

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[1] Collaboration in one article in the School of Philosophy, p. 73.

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SANDRA ANCHONDO PAVÓN

SNII Level I

FUTURE AND TRANSHUMANISM: THE CULMINATION OF THE MODERN PROJECT OF RATIONAL CONTROL OR THE END OF EDUCATION

[FUTURO Y TRANSHUMANISMO: LA CULMINACIÓN DEL PROYECTO MODERNO DE CONTROL RACIONAL O EL FIN DE LA EDUCACIÓN]

ABSTRACT. The absolute trust in the progress of human beings through science and technology not only affects the way in which we conceive the nature of man, but also influences the construction of the future we desire for the generations to come. In that sense, a critique towards the modern project helps to shed light to the possible consequences that scientific and technocratic vision of education could have on young people. Above all, by revisiting the main premises of transhumanism it is possible to elucidate the capacitist and instrumental criterion that seeks to impose itself as the ultimate paradigm of education. That is why it is important to point out how transhumanists propose an educative model that, rather than promoting the cultural and integral growth of children, it promotes an anthropological reductionism, which requires only a functional and successful development of the members of contemporary societies. Therefore, the objective of this article consists, on one hand, in denouncing the transhumanists' rejection of education, based on a defense of instrumental capacities and, on the other hand, to highlight the importance that a humanistic education provides by enriching the value of human nature. This text is, then rooted in a reassessment of the contemplation of beauty and the search for truth as the goal of man.

Pavón, S. A., & Macip, C. G. (2023). Future and Transhumanism: the Culmination of the Modern Project of Rational Control or the End of Education [Futuro y transhumanismo: la culminación del proyecto moderno de control racional o el fin de la educación]. *Open Insight*, *14*(32), 70-97. doi: 10.23924/OI.V14I32.563. Article.

SANDRA ANCHONDO PAVÓN

SNII Level I

THE INDIGENOUS COMMUNALITY AS A RESPONSE TO MODERN INDIVIDUALISM

[LA COMUNALIDAD INDÍGENA COMO RESPUESTA AL INDIVIDUALISMO MODERNO]

ABSTRACT. The objective of this article is to show how, although contemporary individualism has fragmented social bonds in such a way that it seems impossible to speak of communities, the study of indigenous communalities shows how it is possible to conceive a society where the common good is the main factor to compensate for the union between individuals even in liberal capitalist societies. It will be argued that, since modernity, the rise of the individual laid the foundations for the way we conceive social relations; however, the indigenous proposal shows us that there are other non-hegemonic paths that can help us understand subjects as interdependent beings in tune with the natural world.

Pavón, S.A., & Macip, C.G. (2023). The indigenous communality as a response to modern individualism [La comunalidad indígena como respuesta al individualismo moderno]. *Isegoria*, (68). doi: 10.3989/isegoria.2023.68.26. Article.

FEDERICO NASSIM BRAVO JORDÁN

***Senior Researcher B**, SNII Level I*

POPPER AND PLATO: JUSTICE IN TIMES OF IMPERIAL DEMOCRACY

ABSTRACT. La presencia de Platón y del pensamiento platónico se ha mantenido de manera incesante a lo largo de la historia de la cultura. En esta historia, el siglo XX refleja el rechazo y la aceptación, la recepción, en suma, de un modo inusitado tal vez porque, durante este siglo, la humanidad se vio cara a cara con los infiernos que supo crear: un mundo en ruinas hacía imposible intuir la perfecta quietud de las Formas. La recepción de Platón en el siglo XX bucea en la recepción de Platón en aquel mundo contradictorio: ¿cómo se integra su pensamiento fundacionalmente metafísico con la deconstrucción de la metafísica? ¿Cuáles son los alcances de la crítica que la teoría política hace, desde la época de los totalitarismos, al autor de la República? ¿Qué valor cognoscitivo y pedagógico puede tener en mito platónico para filósofos cristianos que se ocupan del pensamiento platónico? ¿Cómo recibe la poesía hispanoamericana su voz de demiurgo? Estas preguntas, de las que se ofrecen diversas respuestas en este libro, son tratadas con rigor académico y confrontadas doblemente con las fuentes: en primer término, con Platón y luego con quienes son estudiados en el presente volumen, aunque desde ángulos muy diversos: M. Heidegger, H. G. Gadamer, K. Popper, E. Cassirer, L. Marechal. La seguridad del tratamiento metodológico y lingüístico que se refleja en esta obra hace que sea altamente recomendable para alumnos de grado y de posgrado en Filosofía, Teoría Política, Literatura y Humanidades en general.

Bravo, F. N. (2020). Popper and Plato: justice in times of imperial democracy. In Calabrese, C. C., & Junco, E. (Eds.), *La recepción de Platón en el siglo XX: Una "poíesis" de la percepción* (pp. 9-34). Peter Lang. doi: 10.3726/b16608. Book Chapter.

FEDERICO NASSIM BRAVO JORDÁN

***Senior Researcher B**, SNII Level I*

TAKING ON THE HABIT: KIERKEGAARDIAN FAITH AS AN ARISTOTELIAN VIRTUE

ABSTRACT. In this article, we would like to argue that the notion of faith, as seen in the anthropology that Kierkegaard presents in works such as The Sickness unto Death or Postscript, among others, shows striking similarities with the Aristotelian ethics of virtue. In a more specific manner, we wish to propose that faith can be interpreted as a virtue in the Aristotelian sense since one can find the following three aspects in it: (1) faith is a state based on habit; (2) faith makes human beings good; and (3) faith makes the human being perform her characteristic activity well. In our view, these features correspond to Aristotle's definition of virtue: "If this is so in all cases, the virtue of a human being too will be the state that makes a human being good and makes him perform his characteristic activity well". (Nicomachean Ethics, 1106a).

Rojas, F., & Bravo, N. (2023). Taking on the Habit: Kierkegaardian Faith as an Aristotelian Virtue. *Religions*, *14*(10). doi: 10.3390/rel14101283. Article.

CLAUDIO CÉSAR CALABRESE RUÍZ

***Senior Researcher D**, SNII Level II*

HEIDEGGER AND THE SIMILE OF THE CAVE. THE ASSUMPTIONS OF ITS INTERPRETATION

ABSTRACT. La presencia de Platón y del pensamiento platónico se ha mantenido de manera incesante a lo largo de la historia de la cultura. En esta historia, el siglo XX refleja el rechazo y la aceptación, la recepción, en suma, de un modo inusitado tal vez porque, durante este siglo, la humanidad se vio cara a cara con los infiernos que supo crear: un mundo en ruinas hacía imposible intuir la perfecta quietud de las Formas. La recepción de Platón en el siglo XX bucea en la recepción de Platón en aquel mundo contradictorio: ¿cómo se integra su pensamiento fundacionalmente metafísico con la deconstrucción de la metafísica? ¿Cuáles son los alcances de la crítica que la teoría política hace, desde la época de los totalitarismos, al autor de la República? ¿Qué valor cognoscitivo y pedagógico puede tener en mito platónico para filósofos cristianos que se ocupan del pensamiento platónico? ¿Cómo recibe la poesía hispanoamericana su voz de demiurgo? Estas preguntas, de las que se ofrecen diversas respuestas en este libro, son tratadas con rigor académico y confrontadas doblemente con las fuentes: en primer término, con Platón y luego con quienes son estudiados en el presente volumen, aunque desde ángulos muy diversos: M. Heidegger, H. G. Gadamer, K. Popper, E. Cassirer, L. Marechal. La seguridad del tratamiento metodológico y lingüístico que se refleja en esta obra hace que sea altamente recomendable para alumnos de grado y de posgrado en Filosofía, Teoría Política, Literatura y Humanidades en general.

Calabrese, C. C. (2020). Heidegger and the simile of the cave. The assumptions of its interpretation. In Calabrese, C. C., & Junco, E. (Eds.), *La recepción de Platón en el siglo XX: Una "poíesis" de la percepción* (pp. 35-49). Peter Lang. doi: 10.3726/b16608. Book Chapter.

CLAUDIO CÉSAR CALABRESE RUÍZ

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***Senior Researcher D**, SNII Level I*

LA RECEPCIÓN DE PLATÓN EN EL SIGLO XX: UNA "POÍESIS" DE LA PERCEPCIÓN

ABSTRACT. La presencia de Platón y del pensamiento platónico se ha mantenido de manera incesante a lo largo de la historia de la cultura. En esta historia, el siglo XX refleja el rechazo y la aceptación, la recepción, en suma, de un modo inusitado tal vez porque, durante este siglo, la humanidad se vio cara a cara con los infiernos que supo crear: un mundo en ruinas hacía imposible intuir la perfecta quietud de las Formas. La recepción de Platón en el siglo XX bucea en la recepción de Platón en aquel mundo contradictorio: ¿cómo se integra su pensamiento fundacionalmente metafísico con la deconstrucción de la metafísica? ¿Cuáles son los alcances de la crítica que la teoría política hace, desde la época de los totalitarismos, al autor de la República? ¿Qué valor cognoscitivo y pedagógico puede tener en mito platónico para filósofos cristianos que se ocupan del pensamiento platónico? ¿Cómo recibe la poesía hispanoamericana su voz de demiurgo? Estas preguntas, de las que se ofrecen diversas respuestas en este libro, son tratadas con rigor académico y confrontadas doblemente con las fuentes: en primer término, con Platón y luego con quienes son estudiados en el presente volumen, aunque desde ángulos muy diversos: M. Heidegger, H. G. Gadamer, K. Popper, E. Cassirer, L. Marechal. La seguridad del tratamiento metodológico y lingüístico que se refleja en esta obra hace que sea altamente recomendable para alumnos de grado y de posgrado en Filosofía, Teoría Política, Literatura y Humanidades en general.

Calabrese, C., & Junco, E. (Eds.) (2020). *La recepción de Platón en el siglo XX: Una "poíesis" de la percepción*. Peter Lang. doi: 10.3726/b16608. Book.

CLAUDIO CÉSAR CALABRESE RUÍZ

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MYTH AND MEANING ACCORDING TO ELENA GARRO. THE PERCEPTION OF THE FEMININE IN LOS PERROS

[MITO Y SENTIDO SEGÚN ELENA GARRO. LA PERCEPCIÓN DE LO FEMENINO EN «LOS PERROS»]

ABSTRACT. We present an interpretation of the play Los Perros by Elena Garro to relate the historical approach with the mythical foundation. We focus on the themes of male violence, female submission and social tolerance according to the reading of the myth of Demeter and Persephone and its referential value. In this way, we intend to expand the limit of sociological interpretation and follow the analogies established by the author with the Mesoamerican myth and with the Greek myth. The conclusion imposes the idea of a cosmic destiny that affirms the continuity of life.

Junco, E., & Calabrese, C. C. (2022). Myth and Meaning According to Elena Garro. The Perception of the Feminine in Los perros [Mito y sentido según Elena Garro. La percepción de lo femenino en «Los perros»]. *Castilla. Estudios de Literatura*, (13), 352-374. doi: 10.24197/cel.13.2022.352-374. Article.

CLAUDIO CÉSAR CALABRESE RUÍZ

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ODYSSEUS AND THE SELF-INFLICTED WOUND. MYTHICAL TALE AND TEMPORALITY

ABSTRACT. In our work, we show that Helen's recollection of Odysseus' self-inflicted wound places us in an eternal present, emerging "from"and disappearing "in"the nature of the Homeric hexameter, et retour, to create and recreate semantic spaces that make possible the return of the hero and the heroic action, giving the temporal correlation an unexpected meaning through the past-future / future-past correspondence.

Calabrese, C., & Junco, E. (2023). Odysseus and the self-inflicted wound. Mythical tale and temporality. *Schole*, *17*(1), 45-62. doi: 10.25205/1995-4328-2023-17-1-45-62. Article.

CLAUDIO CÉSAR CALABRESE RUÍZ

***Senior Researcher D**, SNII Level II*

RESEÑA DE DESCUBRIR EL NOMBRE. SUBJETIVIDAD, IDENTIDAD, SOCIALIDAD, GONZÁLEZ, ANA MARTA, GRANADA: EDITORIAL COMARES, 2021, 309 PP.

ABSTRACT. La autora presenta los tres conceptos apuntados en el subtítulo de su libro (en la parte conclusiva de esta recensión, me ocuparé de los niveles de significación que encuentro en el título) en cuanto

dimensiones de la existencia humana que no alcanzan a ser explicadas desde la pura naturaleza ni replicados tecnológicamente, pues aquella experiencia queda grabada en un yo como vida y lenguaje; este proceso de discernimiento se lleva la totalidad del tiempo vivido, porque los conceptos que se generan no alcanzan a formalizar el núcleo de aquella experiencia. Esta preocupación coloca al libro en el marco de la antropología filosófica, aunque su tratamiento sea inusual para esta diciplina, debido a su impronta novedosa y creativa.

Calabrese, C. (2021). Reseña de Descubrir el nombre. Subjetividad, Identidad, Socialidad, González, Ana Marta, Granada: Editorial Comares, 2021, 309 pp. *Open Insight*, *12*(26), 217-223. doi: 10.23924/oi.v12i26.524. Review.

CLAUDIO CÉSAR CALABRESE RUÍZ

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RESEÑA DE LA CONSTRUCCIÓN SIMBÓLICA DE SÍ MISMO. FUNCIÓN, SÍMBOLO Y CULTURA EN ERNEST CASSIRER, DE GUSTAVO ADOLFO ESPARZA

ABSTRACT. El libro que presentamos se constituye sobre la tesis que el autor presentó ante la Universidad Autónoma de Aguascalientes (México) para la obtención del grado de Doctor en Humanidades y Ciencias Sociales; se estructura de la siguiente manera: una introducción, ocho capítulos, el último de los cuales funge de conclusión, y un apartado bibliográfico.

El conjunto del libro se ordena a partir de una de las ideas centrales de Cassirer, esto es, el conocimiento del ser personal como la tarea prioritaria de la cultura; en efecto, toda reflexión personal es siempre de naturaleza relacional: el ser humano se conoce a sí mismo en la medida en que se reconoce como «ser» del mundo, mediante su característica diferenciadora: la capacidad de simbolización. En razón de ello, Cassirer considera que toda investigación filosófica debe traducirse en un estudio crítico que no se ajuste completamente a la razón, pues esta no permite una aproximación a todos los fenómenos en los que se revela la universalidad del ser.

Calabrese, C. C. (2019). Reseña de La construcción simbólica de sí mismo. Función, símbolo y cultura en Ernest Cassirer, de Gustavo Adolfo Esparza. *Open Insight*, *10*(18), 281-286. doi: 10.23924/OI.V10I18.308. Review.

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***Senior Researcher* D**, *SNII Level I*

THE LUMEN MENTIUM METAPHOR IN PHILOSOPHICAL ARGUMENTATION. THE RESOURCE IN SAINT AUGUSTINE AND JOHN SCOTUS ERIUGENA

[LA METÁFORA LUMEN MENTIUM EN LA ARGUMENTACIÓN FILOSÓFICA. EL RECURSO EN SAN AGUSTÍN Y EN JUAN ESCOTO ERIÚGENA]

ABSTRACT. From the Neoplatonic line drawn by Saint Augustine and Scotus Eriugena, we follow the consequences of the dialogue between the lumen menlium metaphor and philosophical argumentation, in epistemological terms and applied to the exegesis of Genesis 1, 1; in this dialogue the sensitive-intelligible continuity is raised, according to the model that we find in Plotinus. Both the Augustinian illumination and the understanding of what is believed in Scotus Eriugena express the way in which the believer can approach the knowledge of the Unknowable, in the book of the world and in the Scriptures. Both authors conduct the reflection on God from the way in which the believer relates to Him, and only in this circumstance, they examine the hierarchy of being. For this reason, the common point between both Neoplatonists is that the unity of being is understood through the triadic form of our thought: measure, number and weight (Wis. 11, 21). The exegesis of Genesis 1,1 bases the deep link between religio el philosophia, not so much as determinations in themselves, but as realities acting in the human being: the revelation of the Scriptures and the reason for exegesis; this identity implies the impossibility of contradiction between them.

Calabrese, C., & Junco, E. (2023). The lumen mentium metaphor in philosophical argumentation. the resource in saint augustine and john scotus eriugena [La metáfora lumen mentium en la argumentación filosófica. El recurso en San Agustín y en Juan Escoto Eriúgena]. *SVMMA. Revista de cultures medievals*, (21), 90-109. doi: 10.1344/Svmma2023.21.5. Article.

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THE PLAGUE CONFESSION: APPROACH TO SOPHOCLES' PHILOCTETES

[LA CONFESIÓN DE LA PESTE: APROXIMACIÓN AL FILOCTETES DE SÓFOCLES]

ABSTRACT. We propose a reading of the plague in the tragedy of Sophocles Philoctetes, based on the interpretive paradigms of Paul Ricœur, which emphasizes the role of the mythical model in updating the symbols of origin and especially the presence of evil. We go through the notions associated with dirt as guilt and wound as expiation. From there we offer lines of reflection to think about the non-physical implications of the current pandemic; if the cosmic plane of events connects with an ethical plane, the relationship with present evil demands new community responses.

Junco, E., & César Calabrese, C. (2022). The Plague Confession: Approach to Sophocles' Philoctetes [La confesión de la peste: aproximación al Filoctetes de Sófocles]. *Bajo Palabra*, (30), 461-478. doi: 10.15366/bp2022.30.024. Article.

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THE RECEPTION OF A CLASSICAL MYTH IN A CHRISTIAN KEY: THE PHOENIX IN CLEMENT OF ROME

[LA RECEPCIÓN DE UN MITO CLÁSICO EN CLAVE CRISTIANA: EL AVE FÉNIX EN CLEMENTE DE ROMA]

ABSTRACT. In the First Letter to the Corinthians, Clement of Rome establishes a correlation between Hellenistic-Roman culture and revelation, through Stoic cosmology and the myth of the Phoenix. Such a cosmology maintains that each element of the real is in solidarity with the rest, which establishes the foundation for a symbolic reading of the world. The Phoenix is presented as a prodigious sign of the resurrection; For this reason, our author does not ask himself if the story is true

or not, but he offers the reader those elements that can contribute to the understanding of the central dogma of the resurrection.

Calabrese C., Junco E. (2023). the reception of a classical myth in a christian key: the phoenix in clement of rome [La recepción de un mito clásico en clave cristiana: el ave fénix en clemente de roma]. *Revista de Humanidades*, (47), 167-191. doi: 10.53382/ISSN.2452-445X.700. Article.

CLAUDIO CÉSAR CALABRESE RUÍZ

***Senior Researcher D**, SNII Level II*

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THE RECEPTION OF PLATO IN TWO CHRISTIAN PHILOSOPHERS: JOSEF PIEPER AND MICHELE FEDERICO SCIACCA

ABSTRACT. La presencia de Platón y del pensamiento platónico se ha mantenido de manera incesante a lo largo de la historia de la cultura. En esta historia, el siglo XX refleja el rechazo y la aceptación, la recepción, en suma, de un modo inusitado tal vez porque, durante este siglo, la humanidad se vio cara a cara con los infiernos que supo crear: un mundo en ruinas hacía imposible intuir la perfecta quietud de las Formas. La recepción de Platón en el siglo XX bucea en la recepción de Platón en aquel mundo contradictorio: ¿cómo se integra su pensamiento fundacionalmente metafísico con la deconstrucción de la metafísica? ¿Cuáles son los alcances de la crítica que la teoría política hace, desde la época de los totalitarismos, al autor de la República? ¿Qué valor cognoscitivo y pedagógico puede tener en mito platónico para filósofos cristianos que se ocupan del pensamiento platónico? ¿Cómo recibe la poesía hispanoamericana su voz de demiurgo? Estas preguntas, de las que se ofrecen diversas respuestas en este libro, son tratadas con rigor académico y confrontadas doblemente con las fuentes: en primer término, con Platón y luego con quienes son estudiados en el presente volumen, aunque desde ángulos muy diversos: M. Heidegger, H. G. Gadamer, K. Popper, E. Cassirer, L. Marechal. La seguridad del tratamiento metodológico y lingüístico que se refleja en esta obra hace que sea altamente recomendable para alumnos de grado y de posgrado en Filosofía, Teoría Política, Literatura y Humanidades en general.

Calabrese, C. C., & Junco, E. (2020). The reception of Plato in two Christian philosophers: Josef Pieper and Michele Federico Sciacca. In Calabrese, C. C., & Junco, E. (Eds.), *La recepción de Platón en el siglo XX: Una "poíesis" de la percepción* (pp. 149-170). Peter Lang. doi: 10.3726/b16608. Book Chapter.

CECILIA MARÍA CORONADO ANGULO

***Senior Researcher C**, SNII Level I*

INSTRUMENTAL REASON, TECHNOLOGY, AND SOCIETY

ABSTRACT. Technological development is accompanied by a paradox: while it often promises enormous benefits for humanity, it can also lead to inconceivable tragedy, including the instrumentalization of the individual, growing social inequality, environmental impact, etc. What causes this paradox? a) Could it be that the nature of technology generates this contradiction? b) Is it the agent that uses it? c) Or is it the circumstances in which technology is used that determine its suitability or disservice? My aim in this paper is to revise nature, causes and political explanations of the paradox. To do so, the first section will give a historical overview of this phenomenon, the second will assess three proposals that attempt to explain its origin, and, finally, the paper will weigh such approaches from the view of the Frankfurt School. Evaluating the paradoxical conditions that surround technology allows us to better understand its role in our societies. © 2023, Polish Academy of Sciences - Institute of Philosophy and Sociology. All rights reserved.

Coronado-Angulo, C. (2023). Instrumental Reason, Technology, and Society. *Dialogue and Universalism*, *33*(1), 59-76. doi: 10.5840/du20233314. Article.

MARÍA TERESA ENRÍQUEZ GÓMEZ

***Research Associate**, Research Professor*

MARÍA DE LOURDES MARTÍNEZ VILLASEÑOR

***Senior Researcher D**, SNII Level I*

THE LANGUAGE OF NATURE AND ARTIFICIAL INTELLIGENCE IN PATIENT CARE

ABSTRACT. Given the development of artificial intelligence (AI) and the conditions of vulnerability of large sectors of the population, the question emerges: what are the ethical limits of technologies in patient care? This paper examines this question in the light of the "language of nature" and of Aristotelian causal analysis, in particular the concept of means and ends. Thus, it is possible to point out the root of the distinction between the identity of the person and the entity of any technology. Nature indicates that the person is always an end in itself. Technology, on the contrary, should only be a means to serve the person. The diversity of their respective natures also explains why their respective agencies enjoy diverse scopes. Technological operations (artificial agency, artificial intelligence) find their meaning in the results obtained through them (poiesis). Moreover, the person is capable of actions whose purpose is precisely the action itself (praxis), in which personal agency and, ultimately, the person themselves, is irreplaceable. Forgetting the distinction between what, by nature, is an end and what can only be a means is equivalent to losing sight of the instrumental nature of AI and, therefore, its specific meaning: the greatest good of the patient. It is concluded that the language of nature serves as a filter that supports the effective subordination of the use of AI to its specific purpose, the human good. The greatest contribution of this work is to draw attention to the nature of the person and technology, and about their respective agencies. In other words: listening to the language of nature, and attending to the diverse nature of the person and technology, personal agency, and artificial agency. © 2023 by the authors.

Enríquez T., Alonso-Stuyck P., Martínez-Villaseñor L. (2023). The Language of Nature and Artificial Intelligence in Patient Care. *International Journal of Environmental Research and Public Health*, *20*(15). doi: 10.3390/ijerph20156499. Article.

GUSTAVO ADOLFO ESPARZA URZÚA

***Senior Researcher C**, SNII Level I*

ARE COMPUTERS INTELLIGENT AGENTS CAPABLE OF KNOWLEDGE?

[¿SON LAS COMPUTADORAS AGENTES INTELIGENTES CAPACES DE CONOCIMIENTO?]

ABSTRACT. The aim of this paper is to study the philosophical foundations of the programming architecture in two Artificial Intelligence systems (AlphaGo and Hide and Seek). The problem elucidates the epistemological dis-

tinction of the concepts "knowledge," "intuition" and "abduction," in order to define whether the successful fulfillment of a programmed metric, by a computer, is a sufficient condition to attribute intelligent behavior to it. Through the analysis of both examples, two issues are shown: i) the successful fulfillment of a programmed objective offers new knowledge resources, ii) such knowledge depends on the execution of a program whose processing is developed by an AI and, therefore, the operations exceed human intellectual capabilities. The conclusions point to the fact that computers are special hypothesis-testing knowledge resources.

Esparza, G., & Martínez, D. (2023). Are computers intelligent agents capable of knowledge? [¿Son las computadoras agentes inteligentes capaces de conocimiento?]. *Daimon*, (90), 13-28. doi: 10.6018/daimon.557551. Article.

GUSTAVO ADOLFO ESPARZA URZÚA

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ÓSCAR DÁVALOS OROZCO

Research Professor

IMAGE AND REPRESENTATION ON E. CASSIRER. A REFLECTION SINCE THE COMPUTED TOMOGRAPHY SCAN

[IMAGEN Y REPRESENTACIÓN EN E. CASSIRER. UNA REFLEXIÓN A PARTIR DEL TOMÓGRAFO AXIAL COMPUTARIZADO]

ABSTRACT. This article studies the concepts of image and representation in Ernst Cassirer's philosophy. In this text the symbolic value with which the neo-Kantian defines images becomes evident. Based on this, it is explained how these can be presented as a relationship of identity between a defined object and the concept constructed by an epistemic agent. To illustrate such theory, the operation of the Computed Axial Tomography (CAT) is considered to show that the purpose of medical images is to represent reality digitally, for which it is only required to symbolize the shape of the body. Finally, the use of the Doppler Effect is suggested as an alternative method to consider in the operation of the CAT.

Urzúa, G. E., Dávalos, O., & Brambila-Paz, F. (2022). Image and Representation on E. Cassirer. A Reflection since the Computed Tomography Scan [Imagen y representación en E. Cassirer. Una reflexión a partir del Tomógrafo Axial Computarizado]. *Open Insight*, *13*(29), 105-131. doi: 10.23924/oi.v13i29.451. Article.

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***Senior Researcher C**, SNII Level I*

FEDERICO NASSIM BRAVO JORDÁN

***Senior Researcher B**, SNII Level I*

MYTH AND POLITICAL CARE IN ERNST CASSIRER. THE FUNCTION OF PHILOSOPHY AS A BUILDER OF PEACE

[MITO Y CUIDADO POLÍTICO EN ERNST CASSIRER. LA FUNCIÓN DE LA FILOSOFÍA COMO CONSTRUCTORA DE LA PAZ]

ABSTRACT. Cassirer proposed as Philosophical responsibility to take care that the totality of symbols operate according to their individual form. Particularly, the author considers that, due to the evocative power of myth and its pre-logical structure, it constituted a fertile field of foundation for political systems such as Nazism and Fascism, two systems characterized by the abandonment and neglect of inclusive anthropological foundations. The aim of the present paper is to reconstruct the critique adduced by the Neo-Kantian to the emergence and emergence of political myth. As a result, it will be shown how a critique of culture, in the terms proposed in the Philosophy of Symbolic Forms and in The Myth of the State, offers new interpretative resources for the construction of model of political care whose purpose is the construction of a culture of peace.

Esparza G., & Bravo N. (2023). Myth and Political Care in Ernst Cassirer. The Function of Philosophy as a Builder of Peace [Mito y cuidado político en Ernst Cassirer. La función de la Filosofía como constructora de la Paz]. *En-Claves del Pensamiento*, *17*(34). doi: 10.46530/ecdp.v0i31.635. Article.

GUSTAVO ADOLFO ESPARZA URZÚA

***Senior Researcher C**, SNII Level I*

THE MYSTIC STRUCTURES OF THE IMAGINARY IN A MEXICAN SCIENCE FICTION NOVEL: GEL AZUL, BY BERNARDO FERNANDEZ (BEF)

[LAS ESTRUCTURAS MÍSTICAS DEL IMAGINARIO EN UNA NOVELA DE CIENCIA FICCIÓN MEXICANA: GELAZUL, DE BERNARDO FERNÁNDEZ (BEF)]

ABSTRACT. The implications of the instauration of a technoscientific symbolic of the intimacy in the Mexican science fiction novel Gel azul (2006). by Bernardo Fernández (Bef), are studied. The orientation of the analysis is figurative-structuralist, and it addresses the configuration of the mystic structures of the imaginary through the identification and interpretation of such a symbolic, because this is the fundamental imaginary determinant. We concentrate ourselves in the categories of space, subject-body, and technology in this manifestation of the nocturnal regime of the image and the conclusion is an interpretation of its sense in the current cultural context.

Pérez-Amezcua, L.A., & Esparza, G. (2022). The Mystic Structures of the Imaginary in a Mexican Science Fiction Novel: Gel azul, by Bernardo Fernandez (Bef) [Las estructuras místicas del imaginario en una novela de ciencia ficción mexicana: gelazul, de Bernardo Fernández (BEF)]. *Mitologias Hoy. Revista de pensamiento, crítica y estudios literarios latinoamericano*, (27), 145-158. doi: 10.5565/rev/mitologias.749. Article.

GUSTAVO ADOLFO ESPARZA URZÚA

***Senior Researcher C**, SNII Level I*

THE PEDAGOGICAL ROOTS OF THE APOLOGY OF SOCRATES. PLATONIC INFLUENCES IN THE PHILOSOPHY OF EXILE OF E. CASSIRER (1933-1945)

ABSTRACT. La presencia de Platón y del pensamiento platónico se ha mantenido de manera incesante a lo largo de la historia de la cultura. En esta historia, el siglo XX refleja el rechazo y la aceptación, la recepción, en suma, de un modo inusitado tal vez porque, durante este siglo, la humanidad se vio cara a cara con los infiernos que supo crear: un mundo en ruinas hacía imposible intuir la perfecta quietud de las Formas. La recepción de Platón en el siglo XX bucea en la recepción de Platón en aquel mundo contradictorio: ¿cómo se integra su pensamiento fundacionalmente metafísico con la deconstrucción de la metafísica? ¿Cuáles son los alcances de la crítica que la teoría política hace, desde la época de los totalitarismos, al autor de la República? ¿Qué valor cognoscitivo y pedagógico puede tener en mito platónico para filósofos cristianos que se ocupan del pensamiento platónico? ¿Cómo recibe la poesía hispanoamericana su voz de demiurgo? Estas preguntas, de las que se ofrecen diversas respuestas en este

libro, son tratadas con rigor académico y confrontadas doblemente con las fuentes: en primer término, con Platón y luego con quienes son estudiados en el presente volumen, aunque desde ángulos muy diversos: M. Heidegger, H. G. Gadamer, K. Popper, E. Cassirer, L. Marechal. La seguridad del tratamiento metodológico y lingüístico que se refleja en esta obra hace que sea altamente recomendable para alumnos de grado y de posgrado en Filosofía, Teoría Política, Literatura y Humanidades en general.

Esparza, G. (2020). The pedagogical roots of the Apology of Socrates. Platonic influences in the philosophy of exile of E. Cassirer (1933-1945). In Calabrese, C. C., & Junco, E. (Eds.), *La recepción de Platón en el siglo XX: Una "poíesis" de la percepción* (pp. 51-73). Peter Lang. doi: 10.3726/b16608. Book Chapter.

YURIXHI GALLARDO MARTÍNEZ

***Research Associate**, SNII Level I*

ARE LEGAL ETHICS AN ESSENTIAL ELEMENT OF THE LAWYER PROFESSIONAL IDENTITY? STUDENTS' REMARKS

[¿ES LA ÉTICA JURÍDICA UN ELEMENTO DE LA IDENTIDAD PROFESIONAL DEL ABOGADO? LOS ESTUDIANTES OPINAN]

ABSTRACT. The professional performance of lawyers requires thinking about how their identity develops, particularly in the years of university training. This work shows the link between legal ethics and professional identity. In addition, it discusses the assessment of final year students of the law degree in a university of Mexico to ethics as professional competence. The work is divided into three sections: the first, explains what is meant by professional identity and how it is developed in law schools in Mexico; The second part presents ethics as a professional competence; Finally, it analyzes the results of a study among students of the final year of a law degree in the university above mentioned. The study shows that professional ethics is a constituent element of professional identity. It addresses ethics as professional competence from three different perspectives. On the other hand, it identifies that the students make a high valuation of the ethics in front of other professional competences.

Gallardo, Y. (2019). Are Legal Ethics an Essential Element of the Lawyer Professional Identity? Students' Remarks [¿Es la ética jurídica un elemento de la identidad profesional del abogado? Los estudiantes opinan]. *Díkaion*, *28*(2), 284-309. doi: 10.5294/dika.2019.28.2.3. Article.

YURIXHI GALLARDO MARTÍNEZ

***Research Associate**, SNII Level I*

PROFESSIONAL ETHICS AND LAW: DOCUMENTARY RESEARCH TO UNDERSTAND THEIR SCOPE

[ÉTICA PROFESIONAL Y DERECHO: UNA INVESTIGACIÓN DOCUMENTAL PARA COMPRENDER SU ALCANCE]

ABSTRACT. This paper intends to explore the literature on professional ethics in law. The research is twofold, descriptive and analytical, to offer an overview of how professional ethics is understood in this field; that is, the approaches and con-cerns of those who reflect on it. This exercise, in turn, aims at making a norma-tive proposal to understand professional ethics in law and its implementation in learning and practicing legal professions. A mixed method is used for this purpose; the works from a search in Google Scholar and Mendeley databases are selected and analyzed. This paper is divided into five sections: The first presents the theoretical framework for approaching ethics and professional ethics in law; the second part explains the methodology followed; the third part shows the results; the fourth part discusses the results, and the last one proposes some lines of research concerning professional ethics in law.

Gallardo, Y., & Torres Ortega, I. C. T. (2023). Professional Ethics and Law: Documentary Research to Understand Their Scope [Ética profesional y Derecho: una investigación documental para comprender su alcance]. *Díkaion*, *32*(1). doi: 10.5294/dika.2023.32.1.9. Article.

YURIXHI GALLARDO MARTÍNEZ

***Research Associate**, SNII Level I*

ARTURO SOTO GONZÁLEZ

Research Professor

TEACHING BUSINESS ETHICS: INNOVATIVE EXPERIENCE TO PROMOTE LEADERSHIP

[ENSEÑANZA DE LA ÉTICA EMPRESARIAL: EXPERIENCIA DE INNOVACIÓN PARA PROMOVER EL LIDERAZGO]

ABSTRACT. The primary objective of this study is to show an innovative experience of teaching business ethics that promotes leadership in the Business School of a university in western Mexico. Business ethics students apply a virtue approach to promote their leadership skills. For this, students require general ethics knowledge, as a starting point, to make an in-depth critical analysis of the reality they face in their professional practice. A test of ethical knowledge is applied. The results show that there is a need for minimum knowledge of general ethics to promote leadership in the context of professional ethics undertaken from a virtue approach. In regards to leadership, it can be concluded that ethics is a pivotal factor as the leader's actions profoundly affect her/his followers and since teaching virtues is primarily conducted by setting examples.

Gallardo, Y., De la Serna-Tuya, A. S., Soto, A., Hernández, G., & Gallardo, Y. (2023). Teaching business ethics: innovative experience to promote leadership [Enseñanza de la ética empresarial: experiencia de innovación para promover el liderazgo]. *Formación Universitaria*, *16*(3), 1-10. doi: 10.4067/S0718-50062023000300001. Article.

MARÍA JOSÉ GARCÍA CASTILLEJOS

Research Professor

PUNISHMENT AS A MEASURE OF SOCIAL REORGANIZATION. AN APPROACH TO JOHN LOCKE'S THEORY

[EL CASTIGO COMO MEDIDA DE REORDENAMIENTO SOCIAL. UNA APROXIMACIÓN A LA TEORÍA DE JOHN LOCKE]

ABSTRACT. Within the framework of the theory of punishment, it is consistent to defend Locke as a consequentialist author and at the same time as a radical defender of natural rights. In Locke's philosophy, the right to punishment is a natural and instrumental ius whose function is to preserve the rights, also natural, to life, liberty and wealth. Based on Lockean philosophy, I will state that the determination of punishment must primarily consider the fault: restitution and retribution for crimes against material goods, and deterrence for offenses against freedom and life. Forgiveness, in none of its manifestations, can meet these objectives.

Castillejos, M. J. G. (2021). Punishment as a Measure of Social Reorganization. An Approach to John Locke's Theory [El castigo como medida de reordenamiento social. Una aproximación a la teoría de John Locke]. *Open Insight*, *12*(25), 91-109. Article.

MARÍA JOSÉ GÓMEZ RUIZ

Research Professor

TWO SIDES OF THE SAME COIN: POLITICAL EQUALITY AND ELECTORAL RIGHTS, A STUDY OF FORMAL QUALIFICATIONS ON THE RIGHT TO CANDIDACY

[DOS CARAS DE LA MISMA MONEDA: LA IGUALDAD POLÍTICA Y LOS DERECHOS ELECTORALES, UN ESTUDIO DE LAS RESTRICCIONES FORMALES SOBRE EL DERECHO A SER ELEGIDO]

ABSTRACT. In popular democratic conceptions, the right to candidacy and the right to vote are two sides of the same coin. Nonetheless, as the legislative analysis in this paper shows, their sets of right holders are not symmetrical in the extant practice of otherwise paradigmatically democratic countries. This fact is problematic as democratic legitimacy is, first and foremost, predicated upon the formal equality of citizens. As such, this stark asymmetry between the two most fundamental electoral rights demands a sound normative account, one which has been seriously neglected by electoral scholars. After outlining what the most plausible account would look like, the paper argues that, all other things being equal, countries currently have no way to comply with it. It normatively follows that the qualification bars for candidacy, which formally demarcate its set of rightsholders, should be lowered and expanded to match those currently in place for the right to vote.

Ruiz, M. J. G. (2023). Two sides of the same coin: political equality and electoral rights, a study of formal qualifications on the right to candidacy [Dos caras de la misma moneda: la igualdad política y los derechos electorales, un estudio de las restricciones formales sobre el derecho a ser elegido]. *Revista Derecho del Estado*, *57*, 85-108. doi: 10.18601/01229893.n57.04. Article.

SANDRA HERNÁNDEZ GONZÁLEZ

Research Professor

BOSCH, M. (ED.). (2020). DESIRE AND HUMAN FLOURISHING: PERSPECTIVES FROM POSITIVE PSYCHOLOGY, MORAL EDUCATION AND VIRTUE ETHICS. SPRINGER. 451 PP

ABSTRACT. In recent years, moral education, emotional intelligence, and character education have been a focal point in the studies of human action theory and affective formation. However, philosophy addresses the role of desire in action theory and affectivity poorly. It has not been studied systematically; thus, a greater understanding of its nature and role in human development is required. Based on these considerations of the role of desire in moral life and virtue, and as a result of deep reflection and research throughout her academic career, Dr. Magdalena Bosch lays the first stone in constructing a bridge between virtue ethics, desire, and character formation.

Due to its relationship with human action, desire is of enormous relevance for character formation. It is necessarily a moral formation that shows how to tend towards the good with freedom and joy. The key to this type of education is the learning of desire, for which the representation of the good through imagination, beauty, and the joyful experience of the good play a fundamental role.

For Bosch, "trying to create habits without educating desire would leave individuals in a situation lacking moral quality and internal coherence" (2020, p. 35). The rationale behind this statement is that "another way of learning virtue is possible" (p. 34). one in which behavior analysis highlights the decisive importance of an element prior to action: desire. So, education of desire aims to go beyond the scope of action and anticipate behavior by entering into the scope of decision prior to action. From this perspective, desire is considered a positive and necessary factor for human growth and a state of flourishing, where the challenge of moral education is to make the educated subject want the good.

González, S. H. (2023). Bosch, M. (ed.). (2020). Desire and Human Flourishing: Perspectives from Positive Psychology, Moral Education and Virtue Ethics. Springer. 451 pp. *Tópicos*, *65*, 465-470. doi: 10.21555/top.v650.2614. Review.

RAFAEL HURTADO DOMÍNGUEZ

***Senior Researcher B**, Research Professor*

A PLATONIC APPROACH TO THE BUSINESS ENTERPRISE

ABSTRACT. It is difficult to define the business enterprise. We offer a philosophical definition within the Platonic tradition. Plato inaugurated the philosophical discipline of ontology in an attempt to understand better the notion of being and the different forms of beings. By its very existence, the business enterprise must belong to some kind of being, and we try to explain to which one and in which way it manifestly does.

Galindo, F., & Domínguez, R. H. (2023). A Platonic Approach to the Business Enterprise. *Open Insight*, *14*(32), 127-163. doi: 10.23924/OI.V14I32.529. Article.

ETHEL BEATRIZ JUNCO DE CALABRESE

***Senior Researcher D**, SNII Level I*

PLATONISM IN ARGENTINE POETRY OF THE 20TH CENTURY: LEOPOLDO MARECHAL, A DEMIURGE OF THE SOUTH

ABSTRACT. La presencia de Platón y del pensamiento platónico se ha mantenido de manera incesante a lo largo de la historia de la cultura. En esta historia, el siglo XX refleja el rechazo y la aceptación, la recepción, en suma, de un modo inusitado tal vez porque, durante este siglo, la humanidad se vio cara a cara con los infiernos que supo crear: un mundo en ruinas hacía imposible intuir la perfecta quietud de las Formas. La recepción de Platón en el siglo XX bucea en la recepción de Platón en aquel mundo contradictorio: ¿cómo se integra su pensamiento fundacionalmente metafísico con la deconstrucción de la metafísica? ¿Cuáles son los alcances de la crítica que la teoría política hace, desde la época de los totalitarismos, al autor de la República? ¿Qué valor cognoscitivo y pedagógico puede tener en mito platónico para filósofos cristianos que se ocupan del pensamiento platónico? ¿Cómo recibe la poesía hispanoamericana su voz de demiurgo? Estas preguntas, de las que se ofrecen diversas respuestas en este libro, son tratadas con rigor académico y confrontadas doblemente con las fuentes: en primer término, con Platón y luego con quienes son estudiados en el presente volumen, aunque desde ángulos muy diversos: M. Heidegger, H. G. Gadamer, K. Popper, E. Cassirer, L. Marechal. La seguridad del tratamiento metodológico y lingüístico que se refleja en esta obra hace que sea altamente recomendable para alumnos de grado y de posgrado en Filosofía, Teoría Política, Literatura y Humanidades en general.

Junco, E. (2020). Platonism in Argentine poetry of the 20th century: Leopoldo Marechal, a demiurge of the south. In Calabrese, C. C., & Junco, E. (Eds.), *La recepción de Platón en el siglo XX: Una "poíesis" de la percepción* (pp. 95-113). Peter Lang. doi: 10.3726/b16608. Book Chapter.

JOSÉ ALBERTO ROSS HERNÁNDEZ

SNII Level II

GOD CAUSALITY AND MOTION IN THOMAS AQUINAS'S SUMMA THEOLOGI

[DIOS, CAUSALIDAD Y MOVIMIENTO EN LA SUMA TEOLÓGICA DE SANTO TOMÁS DE AQUINO]

ABSTRACT. This paper aims to offer a reconstruction of the First Way (Prima Via) proposed by Thomas Aquinas to demonstrate the existence of God in the Summa Theologiae. The Thomist argument in that work explains, first, what kind of rational discourse can be articulated to talk about God's existence and essence. After he elaborates on the previous point, Aquinas proposes a series of arguments intended to resolve the question of the existence of a divine being and his attributes. In what concerns this present text, we will focus on the first way proposed there in favour of the thesis "God exists" and we will also talk about the discursive context in which this proof appears. Thomas refers to it as the first and clearest proof of them all.

Ross, A. (2022). God causality and motion in Thomas Aquinas's Summa Theologi [Dios, causalidad y movimiento en la Suma Teológica de santo Tomás de Aquino]. *Espíritu*, *71*(164), 265-281. Article.

JOSÉ ALBERTO ROSS HERNÁNDEZ

SNII Level II

HEDONÉ, TELEÍOSIS AND ENÉRGEIA IN ARISTOTLE

[HEDONÉ, TELEÍOSIS Y ENÉRGEIA EN ARISTÓTELES]

ABSTRACT. The aim of this paper is to discuss the Aristotelian definition of pleasure in Nicomachean Ethics x 4. In those passages, Aristotle offers several arguments to prove that pleasure is not a movement (kínesis), or a coming into being. The nature of pleasure would imply a different kind of assimilation, something closer to an enérgeia. Even though, it is not clear in those texts, if pleasure is strictly speaking an activity or something that completes it. We find passages pointing out in both directions. In any case, a pleasure would complete an activity not as the inherent state does, but as an end which supervenes, just «as the bloom of youth does on those in the flower of their age». I will try to clarify the sense of this metaphor in the framework of Aristotle's ontology and his ethical account in order to explain the Aristotelian definition of pleasure.

Ross Hernández, J. A. (2019). Hedoné, teleíosis and enérgeia in Aristotle [Hedoné, teleíosis y enérgeia en Aristóteles]. *Antiqvorvm Philosophia*, *13*, 91-100. doi: 10.19272/201930201005. Article.

PABLO IGNACIO SAHAGÚN KUNHARDT

Research Professor

THE STUDY OF THE WILL IN THE BEGINNINGS OF THE MUNICH PHENOMENOLOGY

[EL ESTUDIO DE LA VOLUNTAD EN LOS INICIOS DE LA FENOMENOLOGÍA DE MÚNICH]

ABSTRACT. Pfänder is one of the leading thinkers of the Munich school of phenomenology and one of Husserl's most esteemed colleagues. In 1931 Manuel García Morente translated into Spanish two works by Pfänder with direct reference to the will - Phänomenologie des Wollens (1900) and Motive und Motivation (1911). The description made by the Munich phenomenologist of the act of the will is fed by his psychological studies and connects with phenomenology, incipient at that time. In this article, after contextualizing the subject in the beginnings of phenomenology in Munich, it is explained what Pfänder understands by striving (tending) in a broad sense, as well as the necessary assumptions for such a phenomenon. Finally, the parts of the analysis that our author makes of the act of will are systematically exposed.

Sahagún-Kunhardtm, P. (2023). The study of the will in the beginnings of the Munich phenomenology. [El estudio de la voluntad en los inicios de la fenomenología de Múnich]. *Encuentros*, (19), 51-59. doi: 10.5281/zenodo.8270579. Article.

LAURA TRUJILLO LIÑÁN

***Senior Researcher B**, SNII Level I*

GENERAL SEMANTICS: A SCIENCE FOR COMMON LIFE

[LA SEMÁNTICA GENERAL: UNA CIENCIA PARA LA VIDA COMÚN]

ABSTRACT. The language, concepts, and scientific theories from which the world and society have been built have been developed from the influence of intellectuals who dedicated their lives to building science from scratch like the ancient Greeks and more in specifically Aristotle. However, science is not attached to everyday situations, daily life, hence the theory of General Semantics by Alfred Korzybski that proposes a new non-Aristotelian theory more in line with people, with everyday life.

Liñán, L. T. (2023). General Semantics: A Science for Common Life [La semántica general: una ciencia para la vida común]. *Revista Internacional de Humanidades*, *18*(5), 1-8. doi: 10.37467/revhuman.v18.4903. Article.

LAURA TRUJILLO LIÑÁN

***Senior Researcher B**, SNII Level I*

ONE WORLD, ONE GLOBAL VILLAGE

[UN MUNDO, UNA ALDEA GLOBAL]

ABSTRACT. Through the COVID-19 pandemic, the world was involved in a series of changes that impacted aspects as important as education. Some digital platforms took this as an opportunity to evaluate and improve educational conditions around the world. This is the case of Coursera, which, through its data mining and online courses, showed the world the need to change the way education is taught to provide students with the necessary tools to work in today's world.

Liñán, L.T. (2022). One World, One Global Village [Un mundo, una aldea global]. *Revista Internacional de Humanidades*, *14*(5), 2-7, Monografico, doi: 10.37467/revhuman.v11.4168. Article.

LAURA TRUJILLO LIÑÁN

***Senior Researcher B**, SNII Level I*

PLANNING FOR MIGRATION OF EXPORT MATERIALS INTO FINISHED PRODUCTS CPG (CONSUMER PACKAGED GOODS)

[PLANEACIÓN PARA MIGRACIÓN DE MATERIALES EN EMPRESAS CPG (CONSUMER PACKAGED GOODS)]

ABSTRACT. The production of materials can lead to unnecessary inventory in plants and reduce living space in the warehouse. It is for this reason that the objective of this research is an innovative proposal that has to do with an optimized process to reduce wasted materials in inventory. For this, a market investigation will be carried out to do analysis with average base data for changes in materials in finished products. In the end, our proposal will achieve better productivity levels, better calculations of lead time with

the supplier and alignment with the plant, and greater visibility of materials in development. © GKA Ediciones, authors.

Liñán, L. T., & Trujillo, R. M. (2022). Planning for Migration of Export Materials into Finished products CPG (Consumer Packaged goods) [Planeación para migración de materiales en empresas cpg (consumer packaged goods)]. *Techno Review. Revista Internacional de Tecnología, Ciencia y Sociedad*, *11*(4). doi: 10.37467/revtechno.v11.4444. Article.

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