



UNIVERSIDAD NACIONAL DE ASUNCIÓN
FACULTAD POLITÉCNICA
DIRECCIÓN DE INVESTIGACIÓN

VOLUMEN 2
MAYO, 2024

PRODUCCIÓN CIENTÍFICA DE LA FP-UNA 2023

ABSTRACT BOOK

CAMPUS DE LA UNA
SAN LORENZO, PARAGUAY

PRODUCCIÓN CIENTÍFICA DE LA FP-UNA 2023

Abstract Book

Volumen 2

UNIVERSIDAD NACIONAL DE ASUNCIÓN
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Campus de la UNA, San Lorenzo
mayo 2024

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Aprobada por Resolución de la Decana de la Facultad Politécnica N° 0497/2024
del 19 de junio de 2024

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mayo, 2024

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PRESENTACIÓN

Nos complace presentar una nueva edición de los resúmenes de la producción científica de la Facultad Politécnica de la Universidad Nacional de Asunción (FP-UNA). Esta publicación, que nació con la idea de reunir en un documento la generación de conocimiento de nuestros investigadores, y ponerlo a disposición de la sociedad para compartirlo, también tiene como objetivo transparentar parte de los frutos de la inversión que se realiza en investigación en la FP-UNA.

Como el año anterior, en este volumen —correspondiente a 2023— sólo se incluyen publicaciones en revistas científicas internacionales y trabajos completos y resúmenes presentados en eventos internacionales, publicados en las respectivas actas. No se incluyen los trabajos publicados en revistas y eventos nacionales, además de aquellos trabajos presentados en eventos internacionales, cuyas actas aún no se publicaron al cierre de esta edición.

En esta publicación, se incorpora una nueva sección que está dedicada a datos estadísticos para visibilizar la producción científica por investigadores, estudiantes de grado y postgrado, egresados y docentes.

Además de esta novedad, se agregan en el índice de autores de este libro, los nombres de todos aquellos que hayan publicado con adscripción FP-UNA, sean estudiantes, egresados o docentes. También, al listado de Grupos de Investigación en Formación (GIF), se suman dos nuevos, cuyos registros provisorios se aprobaron en el 2023.

Como parte de la cultura de seguir creciendo para “construir el futuro”, ponemos a disposición este aporte que, consideramos, será de utilidad para las personas e instituciones interesadas en las líneas de investigación que se desarrollan en la FP-UNA, tanto en las ciencias básicas como aplicadas.

**Artículos
publicados en
revistas científicas**

A Herglotz-based integrator for nonholonomic mechanical systems

Elias Maciel, Inocencio Ortiz, Christian E. Schaerer

DOI: 10.3934/jgm.2023012

<https://arxiv.org/abs/2210.07388>

Journal of Geometric Mechanics

Abstract

We propose a numerical scheme for the time-integration of nonholonomic mechanical systems, both conservative and nonconservative. The scheme is obtained by simultaneously discretizing the constraint equations and the Herglotz variational principle. We validate the method using numerical simulations and contrast them against the results of standard methods from the literature. Submission history

A posteriori superlinear convergence bounds for block conjugate gradient

Christian E. Schaerer, Daniel B. Szyld, and Pedro J. Torres

DOI: 10.1553/etna_vol58s115

<https://etna.math.kent.edu/volumes/2021-2030/vol58/abstract.php?vol=58&pages=115-135>

Electronic Transactions on Numerical Analysis

Abstract

In this paper, we extend to the block case the a posteriori bound showing superlinear convergence of the conjugate gradient method developed by van der Vorst and Vuik in [J. Comput. Applied Math., 48 (1993), pp. 327–341]. That is, we obtain similar bounds but now for the block conjugate gradient method. We also present a series of computational experiments, illustrating the validity of the bound developed here as well as the bound by Simoncini and Szyld from [SIAM Review, 47 (2005), pp. 247–272] using angles between subspaces. Using these bounds, we make some observations on the onset of superlinearity and how this onset depends on the eigenvalue distribution and the block size.

Analysis and design of algorithms for the manufacturing process of integrated circuits

Sonia Fleytas, Diego P. Pinto-Roa, Jose Colbes

DOI: <https://doi.org/10.19153/cleiej.26.2.2>
<https://www.clei.org/cleiej/index.php/cleiej/article/view/595>

CLEI Electronic Journal

Abstract

The stage of transporting semiconductor chips from the wafer to the support strip is crucial in the integrated circuit manufacturing process. This process can be modeled as a combinatorial optimization problem where the objective is to reduce the total distance the robotic arm must travel to pick up each chip and place it in its corresponding position within the support structure. This problem is of the pick-and-place type and is NP-hard. The (approximate) solution proposals of state-of-the-art methods include rule based approaches, genetic algorithms, and reinforcement learning. In the present work, one of these methods is analyzed, which models the problem as one of binary integer programming and proposes a genetic algorithm. Based on this analysis, we proposed and evaluated other methods, including a greedy algorithm and a genetic algorithm that improve the state-of-the-art results for test cases usually used in the literature. Additionally, the results obtained from a new ILP model for this problem indicate that the genetic algorithm results are very close to the optimal values.

Análisis comparativo del índice de satisfacción y calidad percibida en la distribución de energía en el mercado brasileño: caso de estudio con los métodos IASC y PHD

Eduardo Adrián Ortigoza Moreno, Fernando César Ferreira, Juan Carlos Cabral Figueredo, Victorio Enrique Oxilia Dávalos

<https://enerlac.olade.org/index.php/ENERLAC/article/view/205>

ENERLAC: Revista de Energía de Latinoamérica y El Caribe

Resumen

En este trabajo se presenta la comparación entre modelos Índice de satisfacción de los consumidores de Aneel (IASC) - utilizado por la agencia reguladora brasilera del sector eléctrico de Brasil (ANEEL) - y el modelo Perceptor Hierarchical Decision (PHD) con datos obtenidos de encuestas llevadas a cabo para cuatro empresas de distribución de energía eléctrica en el año de 2020. Se muestra que los resultados finales son coincidentes. Además, se analizan las diferencias y similitudes de resultados de las metodologías en la medición de satisfacción y calidad percibida por los clientes residenciales. Se plantea que modelos múltiples criterios del tipo PHD pueden brindar nuevas alternativas de evaluación, con un abordaje más simple y con la ventaja que puede tener el decisor (regulador) de gestionar en puntos que son claves tales como: los pesos del modelo y la definición de funciones que representen de manera más natural las variables, que aquellas lineales del modelo de ANEEL.

Caracterização do distrito de Filadélfia como potencial para o turismo de reuniões e negócios no âmbito do Corredor Bioceânico

Mario Gustavo Leiva Enrique, Eliane Elizabeth Alderete Garcete, Mónica Concepción Balbuena Portillo, Viviana Dejesús González Rodríguez

DOI: <https://doi.org/10.20435/inter.v24i4.4230>

<https://www.interacoes.ucdb.br/interacoes/article/view/4230>

Interações

Resumo

O presente artigo surge na sequência de uma visita à área de influência do Projeto do Corredor Rodoviário Bioceânico, que ligará o Oceano Atlântico aos portos do norte do Chile, atravessando uma vasta área do território paraguaio, e que agilizará o transporte e o comércio entre os países do Brasil, Argentina e Chile, o que, por sua vez, gerará impactos locais. A ideia do documento é situar o leitor na referida região do Chaco, com o objetivo de analisar as potencialidades do turismo de reuniões e de negócios como efeito positivo do desenvolvimento económico esperado para a zona em análise, em resultado da implementação deste projeto de grande envergadura. Apresenta-se uma caracterização do distrito de Filadélfia, departamento de Boquerón, na região ocidental do Paraguai, tendo em conta os factores e condições que se encontram actualmente, em termos de serviços e produtos turísticos, culturais e ambientais. Para além da observação direta dos locais visitados, que incluíram as zonas circundantes da cidade, das entrevistas às autoridades locais e aos residentes, e dos circuitos disponíveis oferecidos a quem chega a esta cidade, foram considerados dados atualizados obtidos de fontes secundárias. O estudo considera que o desenvolvimento económico impulsionado pelo Corredor Bioceânico poderá ter um impacto positivo no turismo de negócios e de reuniões na Filadélfia.

Cluster-based LSTM models to improve Dengue cases forecast

J. V. Bogado, D. H. Stalder, C. H. Schaerer

<https://clei.org/cleiej/index.php/cleiej/article/view/580>

DOI: <https://doi.org/10.19153/cleiej.26.1.4>

CLEI Electronic Journal

Abstract

Public health problems such as dengue fever need accurate forecasts so governments can take effective preventive measures. Deep learning (DL) and machine learning have become increasingly popular as the volume of data increases continuously. Nevertheless, performing accurate predictions in areas with fewer cases can be challenging. When we apply DL models using long short-term memory (LSTM) in different cities considering weekly dengue incidence and climate, some models may present heterogeneous behaviors and poor accuracy because of the need for more data. To mitigate this problem, clustering analysis across time series is performed based on scores to measure the clustering quality in 217 Paraguayan cities. First, we compare the raw and feature-based clustering techniques considering several metrics. Our results indicate that hierarchical clustering combined with Spearman correlation is the most appropriate approach. Finally, several LSTM models built using clustering results were compared. The main contribution of this work is a technique that can improve the performance of time series models that combine information from similar time series and weather data.

Competencias investigativas en los planes de estudio de Ciencias de la Información: Estudio comparativo entre Argentina, Brasil, Colombia, España, México y Paraguay

Emilce Sena-Correa, Felipe Miguel Villalba-Benítez, María Aurora Cuevas-Cerveró, María Antonia Ovalle-Perandonés, Mariana Cáceres Ruiz-Díaz

<https://ojs.edicic.org/index.php/revistaedicic/article/view/256>

Revista EDICIC

Resumen

Las competencias investigativas desempeñan un papel fundamental en la formación académica, especialmente en la educación superior, ya que implican la adquisición de conocimientos, habilidades y actitudes necesarias para llevar a cabo actividades de investigación de alta calidad. El objetivo de este estudio es determinar el alcance de las competencias investigativas en los planes de estudio de Ciencias de la Información en los países bajo análisis. Se realizó un estudio cualitativo de alcance descriptivo que involucró a seis universidades que ofrecen programas en el campo de Ciencias de la Información en Argentina, Colombia, Brasil, España, México y Paraguay. Se examinaron los planes de estudio y las asignaturas relacionadas con la investigación científica utilizando una matriz para analizar el alcance de las competencias investigativas estudiadas. Los resultados revelan que las competencias de investigación están incorporadas en los planes de estudio de los programas de Ciencias de la Información analizados, aunque varían en alcance y grado de cumplimiento. Además, se identificaron áreas de debilidad o limitación en la formación en competencias de investigación. Se observan similitudes y diferencias entre las universidades estudiadas, y estas discrepancias se atribuyen a factores como el contexto histórico, político, social y cultural; el nivel y tipo de financiamiento; el grado y calidad de la colaboración entre la academia y la sociedad; el perfil y la experiencia del cuerpo docente; y el diseño curricular y metodológico.

Detection of variable genotypes in common human papillomavirus-associated invasive penile squamous cell carcinomas: a study of 177 human papillomavirus-positive cases

Diego F. Sanchez, María José Fernández-Nestosa, Laia Alemany, Sofía Cañete-Portillo, Belén Lloveras, Omar Clavero, Ingrid Rodríguez, Wim Quint, Nubia Muñoz, Silvia de Sanjosé, Francisco Xavier Bosch, Antonio L. Cubilla, the HPV VVAP Study Group

DOI: <https://doi.org/10.1016/j.humpath.2023.07.001>

<https://www.sciencedirect.com/science/article/abs/pii/S0046817723001466>

Human Pathology

Summary

Human papillomavirus (HPV) is detected in 30–50% of invasive penile carcinomas, and it is frequently associated with basaloid and warty morphological features. Based on this heterogeneity and different clinical behaviors, we hypothesized a variation in their HPV genotypic composition. To test this, we evaluated 177 HPV-positive cases: basaloid (114), warty-basaloid (28), and warty (condylomatous) (35) invasive carcinomas. HPV DNA detection and genotyping was performed using the SPF-10/DEIA/LiPA25 system. Nineteen HPV genotypes were detected. High-risk HPVs predominated (96%), and low-risk HPVs were rarely present. Most common genotype was HPV16 followed by HPVs 33 and 35. According to the genotypes identified, 93% of the cases would be covered with current vaccination programs. There was a significant variation in the distribution of HPV16 and non-HPV16 genotypes according to histological subtype. HPV16 was significantly frequent in basaloid (87%) and was less frequent in warty carcinomas (61%). This molecular difference, along with their distinctive macro-microscopic and prognostic features, makes basaloid and warty carcinomas unique. The gradual decreasing frequency of HPV16 demonstrated in basaloid, warty-basaloid, and warty carcinomas suggest that the basaloid cell, present in those types in decreasing proportions, may be responsible for the differences.

Evaluation of the acute toxicity by *Artemia salina* of hydroxyapatite nanoparticles obtained via sol-gel in an aqueous medium without using additives

Magna Monteiro, Lucas Medina, Pablo Casanova, Magdalena Espinola, Aline Machado, Alexandre A. Ribeiro, Alexia Riquet, Thaiz Batista Azevedo Rangel Miguel, Emilio de Castro Miguel, Ricardo E.F. Quevedo Nogueira

DOI: <https://doi.org/10.1016/j.ceramint.2023.09.181>

<https://www.sciencedirect.com/science/article/abs/pii/S0272884223028080?dgcid=author>

Ceramics International

Abstract

Hydroxyapatite (Hap) is one of the most important calcium phosphate bioceramics applied to bone tissue regeneration. Synthesizing Hap nanoparticles from easily accessible and low-cost alternative sources of calcium precursors remains a challenge, as well as defining an ideal and reproducible synthesis route without using additives to control the pH of the reaction and entirely performed at room temperature. This study proposes a route for the synthesis of hydroxyapatite by the sol-gel method without the addition of additives for pH control, carried out at room temperature. The Hap samples were characterized by FTIR, XRD, SEM, and BET. The synthesized Hap presented a spherical morphology without the formation of unwanted phases or residues. Samples calcined at 600 and 750 °C resulted in stoichiometric hydroxyapatite with 100% purity and average particle sizes of 24 and 53 nm, respectively. On the other hand, the samples calcined at 900 and 1050 °C presented a specific content of β -calcium phosphate and average particle sizes of 118 and 732 nm, respectively. Acute toxicity was evaluated by *Artemia salina* nauplii instar I and II for 24 and 48 h of exposure. The tests were conducted on 10, 100, and 1000 ppm of Hap dissolutions. The highest death rate and more significant morphological alterations were observed in *A. salina* nauplii instar II, exposed to Hap at a concentration of 1000 ppm for 48 h.

Feature selection: a perspective on inter-attribute cooperation

Gustavo Sosa-Cabrera, Santiago Gómez-Guerrero, Miguel García-Torres & Christian E. Schaerer

<https://link.springer.com/article/10.1007/s41060-023-00439-z>

International Journal of Data Science and Analytics

Abstract

High-dimensional datasets depict a challenge for learning tasks in data mining and machine learning. Feature selection is an effective technique in dealing with dimensionality reduction. It is often an essential data processing step prior to applying a learning algorithm. Over the decades, filter feature selection methods have evolved from simple univariate relevance ranking algorithms to more sophisticated relevance-redundancy trade-offs and to multivariate dependencies-based approaches in recent years. This tendency to capture multivariate dependence aims at obtaining unique information about the class from the intercooperation among features. This paper presents a comprehensive survey of the state-of-the-art work on filter feature selection methods assisted by feature intercooperation, and summarizes the contributions of different approaches found in the literature. Furthermore, current issues and challenges are introduced to identify promising future research and development.

Impact of Usability Mechanisms: A Family of Experiments on Efficiency, Effectiveness and User Satisfaction

Juan M. Ferreira; Francy D. Rodríguez; Adrián Santos; Oscar Dieste; Silvia T. Acuña; Natalia Juristo

DOI: 10.1109/TSE.2022.3149586

<https://ieeexplore.ieee.org/document/9707667>

IEEE Transactions on Software Engineering

Abstract:

Context : The usability software quality characteristic aims to improve system user performance. In a previous study, we found evidence of the impact of a set of usability features from the viewpoint of users in terms of efficiency, effectiveness and satisfaction. However, the impact level appears to depend on the usability feature and suggest priorities with respect to their implementation depending on how they promote user performance. **Objectives :** We use a family of three experiments to increase the precision and generalization of the results in the baseline experiment and provide findings regarding the impact on user performance of the Abort Operation, Progress Feedback and Preferences usability mechanisms. **Method :** We conduct two replications of the baseline experiment in academic settings. We analyse the data of 366 experimental subjects and apply aggregation (meta-analysis) procedures. **Results :** We find that the Abort Operation and Preferences usability mechanisms appear to improve system usability a great deal with respect to efficiency, effectiveness and user satisfaction. **Conclusions :** We find that the family of experiments further corroborates the results of the baseline experiment. Most of the results are statistically significant, and, because of the large number of experimental subjects, the evidence that we gathered in the replications is sufficient to outweigh other experiments.

Intergenerational sex and early sexual debut are associated with HIV infection among transgender women in Paraguay

Zoilo Morel, Gloria Aguilar, Tania Samudio, Gladys López, Carlos Miguel Ríos-González, Liliana Giménez, Christian Schaerer, Santiago Gómez, Teresita Báez

DOI:

<https://onlinelibrary.wiley.com/doi/abs/10.1111/hiv.13496>

HIV Medicine

Abstract

Introduction

HIV prevalence among transgender women is high worldwide. The objectives of the present study were to estimate the current prevalence of HIV and identify factors associated with high HIV burden among transgender women in Paraguay.

Methods

Transgender women aged ≥ 15 years in four regions of Paraguay were recruited by Starfish sampling between February and March 2021.

Results

In total, 322 transgender women were included. Mean age was 31 years (range 15–67), and 102 had positive HIV test results (31.7%, 95% confidence interval [CI] 26.6–37.1). In multivariable analysis, factors associated with HIV infection were age at first intercourse ≤ 17 years (adjusted odds ratio [aOR] 5.47; 95% CI 1.05–28.42), >10 years difference in age with the last sexual partner (aOR 1.60; 95% CI 1.04–2.46), substance use (mostly cocaine) (aOR 3.00; 95% CI 1.47–6.12), higher risk perception (aOR 3.08; 95% CI 1.53–6.17), not testing for HIV (aOR 1.23; 95% CI 1.09–1.39), and accessed by a peer educator (aOR 3.86; 95% CI 1.77–8.38).

Conclusions

Sexual debut as a minor and a large age difference with sexual partners are associated with high burden of HIV among transgender women in Paraguay. Our study corroborates the finding of cocaine use during sex as a risk factor for HIV. Prevention programmes must address structural and social vulnerabilities to stem the tragically high burden of HIV among transgender women.

Medición de la pobreza energética con enfoque multidimensional: revisión sistemática de la literatura

Karen Fernández, Laine Lezcano, Arturo González

DOI: <https://doi.org/10.5354/0718-8358.2023.70574>

<https://revistainvi.uchile.cl/index.php/INVI/article/view/70574>

Revista Invi

Resumen

La pobreza energética es un fenómeno económico y social relacionado con variables energéticas; estas pueden ser de naturaleza unidimensional y multidimensional. El presente estudio proporciona una revisión sistemática de la literatura sobre la pobreza energética a fin de conocer las principales definiciones, métricas, indicadores, restricciones, ventajas y desventajas del enfoque multidimensional. Se presentó una metodología consistente en una sucesión de pasos bien definidos donde se plantean preguntas de investigación que fueron respondidas mediante la identificación, selección, extracción de datos y clasificación de documentos bibliográficos de manera sistematizada, abordando la pobreza energética multidimensional en el periodo 2005-2023. Los principales hallazgos indican que a nivel mundial los estudios sobre pobreza energética se concentran mayormente en Europa, al igual que la colaboración en redacción científica. Sin embargo, se identificaron estudios sobre la pobreza energética y aplicaciones de esta, en los últimos años, en América Latina y el Caribe, en especial con el enfoque multidimensional. Así pues, tanto las conceptualizaciones como las métricas de la pobreza energética multidimensional son diversas, heterogéneas y con una notable falta de consenso sobre las mismas.

Penile Intraepithelial Neoplasia: Distribution of subtypes, HPV genotypes and p16INK4a in 84 international cases

María José Fernández-Nestosa, Omar Clavero, Diego F. Sánchez, Giovanna A. Giannico, Antonella Lobatti, Sofía Cañete-Portillo, Elsa F. Velázquez, Laia Alemany, Nubia Muñoz, Sylvia de San José, F. Xavier Bosch, Antonio L. Cubilla

DOI: <https://doi.org/10.1016/j.humpath.2022.11.006>

<https://www.sciencedirect.com/science/article/abs/pii/S0046817722002635>

Human Patology

Summary

There are few pathologic or molecular studies of penile precancerous lesions, and the majority refers to lesions associated with invasive carcinomas. Penile Intraepithelial Neoplasia (PeIN) is classified in two morphologically and distinctive molecular groups, non-HPV and HPV-related with special subtypes. The primary purpose of this international series was to classify PeIN morphologically, detect HPV genotypes and determine their distribution according to PeIN subtypes. A secondary aim was to evaluate the p16INK4a immunostaining as a possible HPV surrogate for high-risk HPV infection in penile precancerous lesions. Samples consisted of 84 PeIN cases, part of a retrospective cross-sectional analysis of 1095 penile carcinomas designed to estimate the HPV DNA prevalence in penile cancers using PCR and p16INK4a immunostaining. Penile Intraepithelial Neoplasia (PeIN) was classified in HPV-related (basaloid, warty-basaloid, warty, hybrid, and mixed subtypes) and non-HPV-related (differentiated), the former being the most frequent. PeIN subtypes were differentiated (non-HPV-related) and basaloid, warty-basaloid, warty, hybrid and mixed (HPV-related). Basaloid PeIN was the most commonly diagnosed subtype, and HPV16 was the most frequent HPV genotype detected. Warty-basaloid and warty PeIN showed a more heterogeneous genotypic composition. Most HPV genotypes were high-risk but low-risk HPV genotypes were also present in a few cases (4%). A single HPV genotype was detected in 82% of HPV positive cases. In contrast, multiple genotypes were detected in the remaining 18% of cases. The findings in this study support the paradigm that penile in situ neoplasia, like its invasive counterparts, is HPV dependent or independent and has distinctive morphological subtypes readily identified in routine practice. Considering that HPV16 is clearly the predominant type, and that the three available vaccines have HPV16, all of them will be suitable for vaccination programs; the price of the vaccines will be probably the main determinant to choose the vaccine.

Penile squamous cell carcinoma exclusive to the shaft, with a proposal for a novel staging system

Burak Tekin, Ruifeng Guo, John C. Cheville, Sofia Canete-Portillo, Diego F. Sanchez, María José Fernandez-Nestosa, Surendra Dasari, Santosh Menon, Loren Herrera-Hernandez, Rafael E. Jimenez, Lori A. Erickson, Antonio L. Cubilla, Sounak Gupta

DOI: <https://doi.org/10.1016/j.humpath.2022.12.012>

<https://www.sciencedirect.com/science/article/abs/pii/S0046817722002908?via%3Dihub>

Human Pathology

Summary

Penile squamous cell carcinomas (SCC) originating in the shaft are rare. pT1/pT2 categories in the American Joint Committee on Cancer (AJCC) staging manual (8th edition) are poorly defined for SCCs arising in the dorsal shaft as anatomic structures differ between the glans and dorsal shaft (corpus spongiosum vs dartos/Buck's fascia, respectively). We reviewed six penile SCC cases exclusive to the shaft, an unusual presentation, identified amongst 120 patients treated with penectomy. We propose a novel pT staging system for dorsal shaft tumors tailored to its anatomic landmarks, where tumors extending to Buck's fascia are considered pT2 instead of pT1. The mean age at penectomy, average duration of follow-up, and mean depth of invasion were 64 years, 45 months, and 9.8 mm, respectively. Four cases were moderately differentiated, HPV-negative SCCs of the usual type and two cases were HPV-positive basaloid and warty-basaloid carcinomas. Three cases had nodal or distant metastasis at the time of penectomy, and histologic assessment in these cases showed invasion into the Buck's fascia or deeper. According to the current AJCC system, only one of these three cases would be staged as \geq pT2. In contrast, all three metastatic tumors would be staged as \geq pT2 in the proposed model. At last follow-up, one patient died of disease-related complications. Based on this limited series, the proposed staging model appears to suggest better patient stratification for pT1/pT2 stages. This model incorporates Buck's fascia, which has been postulated as a pathway of tumor infiltration. Additional studies are needed to validate this model.

Productividad científica de investigadores de la Universidad Nacional de Asunción (UNA): comprobación del modelo de Lotka

Emilce Sena Correa, María Luisa Lascurain, Mariana Cáceres Ruiz Díaz,
Johana Raquel Pineda Alvarenga

DOI: <https://doi.org/10.22201/iibi.24488321xe.2023.96.58793>
<http://rev-ib.unam.mx/ib/index.php/ib/article/view/58793>

Investigación Bibliotecológica: Archivonomía, Bibliotecología e Información

Resumen

Este trabajo plantea la comprobación del modelo sobre productividad de los autores propuesto por Lotka. En su forma generalizada, para los investigadores de la Universidad Nacional de Asunción que publicaron entre los años 2015 y 2020 en revistas paraguayas recogidas en SciELO particularmente en las áreas de Ciencias Médicas y de la Salud, Ciencias Sociales, Ciencias Veterinarias y Agrícolas. Se recuperaron un total de 627 documentos incluidos en 15 títulos de revista. En las cuatro áreas de estudio se comprueba el ajuste de la producción de los autores al postulado de Lotka con una importante proporción de autores esporádicos. El análisis demuestra la posibilidad de comprobación del modelo en distintas áreas científicas en un periodo inferior a los 10 años.

RGB pixel n-grams: A texture descriptor

Fátima Belén Paiva Pavón, María Cristina Orué Gil, José Luis Vázquez Noguera, Helena Gómez-Adorno, Valentín Calzada-Ledesma

DOI: <https://doi.org/10.1016/j.image.2023.117028>

<https://www.sciencedirect.com/science/article/abs/pii/S0923596523001108>

Signal Processing: Image Communication

Abstract

This article proposes the “RGB Pixel N-grams” descriptor, which uses a sequence of pixels to represent RGB color texture images. We conducted classification experiments with three different classifiers and five color texture image databases to evaluate the descriptor’s performance, using accuracy as the evaluation metric. These databases include various textures from different surfaces, sometimes under different lighting, scale, or rotation conditions. The proposed descriptor proved to be robust and competitive compared to other state-of-the-art descriptors, as it has better accuracy in classification results in most databases and classifiers.

Routing, modulation level, and spectrum assignment in elastic optical networks. A route-permutation based genetic algorithms

Melisa M. Rosa Villamayor-Paredes, Luis Víctor Maidana-Benítez, José Colbes, Diego P. Pinto-Roa

DOI: <https://doi.org/10.1016/j.osn.2022.100710>

<https://www.sciencedirect.com/science/article/abs/pii/S1573427722000467?via%3Dihub>

Optical Switching and Networking

Abstract

The routing, modulation level, and spectrum allocation (RMLSA) problem is crucial for efficient elastic optical networks. This problem has been approached by optimal-and-non-scalable and sub-optimal-and-scalable solutions. In the second approach, we can distinguish the routing-based and permutation-based meta-heuristics. These approaches explore a sub-set of the RMLSA solutions, and consequently, the calculation of high-quality solutions can be limited.

This work proposes an RMLSA solution that considers the routing and request permutation simultaneously to explore a larger portion of the set of RMLSA solutions than state-of-the-art meta-heuristics. The proposed RMLSA solution is based on a genetic algorithm (GA) whose chromosome structure encodes routing and permutation genes.

Performance analysis of the proposed route-permutation-based GA (RPGA) has been compared to the state-of-the-art based on integer linear programming (ILP), route-based GA (RGA), and permutation-based GA (PGA) in offline and online traffic scenarios. Offline traffic simulations show that RPGA is promising since it obtains similar results to ILP. RGA gets worst as the traffic load increases compared to PGA and RPGA approaches. RGA, PGA, and RPGA achieve the same performance in all dynamic scenarios concerning blocking and entropy measures, given the set of requests is small.

Routing, Modulation Level, and Spectrum Assignment in Elastic Optical Networks—A Serial Stage Approach with Multiple Sub-Sets of Requests Based on Integer Linear Programming

Luis Víctor Maidana Benítez, Melisa María Rosa Villamayor Paredes, José Colbes, César F. Bogado-Martínez, Benjamin Barán and Diego P. Pinto-Roa

DOI: <https://doi.org/10.3390/mca28030067>

<https://www.mdpi.com/2297-8747/28/3/67>

Mathematical and Computational Applications

Abstract

This paper addresses serialized approaches of the routing, modulation level, and spectrum assignment (RMLSA) problem in elastic optical networks, using multiple sequential sub-sets of requests, under Integer Linear Programming (ILP). The literature has reported two-stage serial optimization methods referred to as RML+SA, which retain computational efficiency when the problem grows, compared to the classical one-stage RMLSA optimization approach. However, there still remain numerous issues in terms of the spectrum used that can be improved when compared to the RMLSA solution. Consequently, this paper proposes RML+SA solutions considering multiple sequential sub-sets of requests, split traffic flow, as well as path-oriented and link-oriented routing models. Simulation results on different test scenarios determine that: (a) the multiple sequential sub-sets of request-based models improve computation time without worsening the spectrum usage when compared to just one set of requests optimization approaches, (b) divisible traffic flow approaches show promise in cases where the number of request sub-sets is low compared to the non-divisible counterpart, and (c) path-oriented routing succeeds in improving the used spectrum by increasing the number of candidate routes compared to link-oriented routing.

Simulation of the Emergency Department Management during the Pandemic

Ramona Galeano, Dolores Rexachs, Alvaro Wong, Eva Bruballa, Cynthia Villalba, Diego Galeano, Emilio Luque

https://www.ariajournals.org/systems_and_measurements/tocv16n12.html

https://www.ariajournals.org/systems_and_measurements/sysmea_v16_n12_2023_paged.pdf

IARIA - International Journal on Advances in Systems and Measurements

Abstract

The COVID-19 pandemic has caused disasters worldwide, overwhelming public health systems and generating actions such as movement restrictions and containment orders. It has strained public health systems and exposed the healthcare needs and gaps for marginalized and vulnerable populations. Modeling and simulation can help make a physical or logical representation of a system to generate data and determine decisions or predict a given system or problem. In this paper, we present an adaptation of our previous work on a simulation of an agent-based model to simulate an emergency department for a different hospital in a pandemic situation; we compare some of the results we obtained from the simulations with reality to help the management of the emergency department. Index Terms—simulation; agent-based model; CO

SIR-SI model with a Gaussian transmission rate: Understanding the dynamics of dengue outbreaks in Lima, Peru

Max Carlos Ramírez-Soto, Juan Vicente Bogado Machuca, Diego H. Stalder, Denisse Champin, Maria G. Martinez-Fernández, Christian E. Schaerer

DOI: <https://doi.org/10.1371/journal.pone.0284263>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284263>

Plos One

Abstract

Introduction

Dengue is transmitted by the *Aedes aegypti* mosquito as a vector, and a recent outbreak was reported in several districts of Lima, Peru. We conducted a modeling study to explain the transmission dynamics of dengue in three of these districts according to the demographics and climatology.

Methodology

We used the weekly distribution of dengue cases in the Comas, Lurigancho, and Puente Piedra districts, as well as the temperature data to investigate the transmission dynamics. We used maximum likelihood minimization and the human susceptible-infected-recovered and vector susceptible-infected (SIR-SI) model with a Gaussian function for the infectious rate to consider external non-modeled variables.

Results/principal findings

We found that the adjusted SIR-SI model with the Gaussian transmission rate (for modelling the exogenous variables) captured the behavior of the dengue outbreak in the selected districts. The model explained that the transmission behavior had a strong dependence on the weather, cultural, and demographic variables while other variables determined the start of the outbreak.

Conclusion/significance

The experimental results showed good agreement with the data and model results when a Bayesian-Gaussian transmission rate was employed. The effect of weather was also observed, and a strong qualitative relationship was obtained between the transmission rate and computed effective reproduction number R_t .

Triggering strategy for defragmentation process in Elastic Optical Networks using Machine Learning techniques

Enrique Dávalos, José-Luis Enciso, Nicolás Silva, Juan Pinto-Ríos, Ariel Leiva

DOI: <https://doi.org/10.1016/j.icte.2023.01.008>

<https://www.sciencedirect.com/science/article/pii/S2405959523000085?via%3Dihub>

ICT Express

Abstract

Bandwidth fragmentation is a critical problem for Elastic Optical Networks (EON), and spectrum defragmentation is the most important strategy to mitigate this phenomenon. In this work we propose a Machine Learning (ML) based method for estimating the Blocking Rate, which, when exceeding a threshold, triggers a defragmentation process. This is done in order to achieve better results in terms of the number of blocking demands and the number of re-routed connections. The performance of the proposed method was compared with two other known strategies: fixed-time (FT) defragmentation, and triggering based on one fragmentation metric (BFR). Simulation results were evaluated using two multi-objective metrics. Experimental results show that the proposed method is more efficient than the other two, being the best method in 85.7% of comparisons using the Pareto Coverage metric, and obtaining 47.4% of non-dominated solutions in the Pareto Front.

Validación de un método analítico para la determinación de arsénico total en muestras de suelo por espectrofotometría de absorción atómica con generación de hidruros

Saori Nakagoe, José Chamorro Olivares, Lilian García, Fátima Yubero, Magna Monteiro, Laura Mereles, Diana Diez-Pérez-Núñez

DOI: <https://doi.org/10.26461/25.07>

<https://ojs.latu.org.uy/index.php/INNOTECC/article/view/635>

INNOTECC

RESUMEN

En Paraguay, la investigación sobre la contaminación por arsénico (As) es aún incipiente. El objetivo del presente estudio fue validar un método analítico para la determinación de arsénico total en muestras de suelo por espectrofotometría de absorción atómica con generación de hidruros (EAA-GH). Para la validación se colectó una muestra blanco de un área de nula actividad antropogénica y, para su aplicación, diez muestras de la cuenca del río Tebicuary. El sistema de muestreo fue combinado por cuadrícula. Las muestras fueron secadas, tamizadas, homogeneizadas y digeridas mediante digestión asistida por microondas. La determinación se realizó por EAA-GH. Se evaluaron parámetros de desempeño analítico como selectividad, linealidad, sensibilidad, exactitud, LOD, LOQ, robustez, incertidumbre y aplicabilidad. El método aplicado fue selectivo para As total y cumplió con los criterios de aceptación; linealidad 0,2 a 12 $\mu\text{g}\cdot\text{L}^{-1}$ ($r > 0,99$), sensibilidad ($m = 0,0395 \pm 0,005$), exactitud y precisión ($\%R > 95 \%$), repetibilidad ($CV = 4,26 \%$), reproducibilidad ($CV = 4,52 \%$), LOD ($0,11 \text{ mg}\cdot\text{kg}^{-1}$) y LOQ ($0,21 \text{ mg}\cdot\text{kg}^{-1}$). El método fue robusto ante variaciones de pH y tamaño de las partículas. De diez muestras analizadas, una tuvo concentración de As total superior a $20 \text{ mg}\cdot\text{kg}^{-1}$.

Trabajos completos y resúmenes

A Common Dam? Exploring Scenarios for the Revision of Annex C of ITAIPU

Eduardo Ortigoza; Victorio Oxilia; Salustiano Vega

DOI:10.1109/CHILECON60335.2023.10418612

<https://ieeexplore.ieee.org/document/10418612>

IEEE Xplore

Abstract:

This article presents a comprehensive literature review of existing methodologies for exploring the future and their potential application in the energy sector. It is found that methodologies related to future studies have diversified, allowing the integration of information about complex environments through the opinions of various stakeholders. The most well-known methodologies are foresight and future scenarios, which can be applied in various decision-making cases, including international negotiations. Specifically, the future negotiation between Paraguay and Brazil in 2023 is addressed, involving the binational hydroelectric power plant ITAIPU, jointly owned by both countries. The aim is to construct feasible scenarios after the review of ITAIPU's Annex C. A scenario tool is applied to prepare for eventualities, providing flexibility in decision-making. Three possible future scenarios for tariffs after the ITAIPU review are developed, based on the analysis of alternatives for the Cost of Electric Service (CSE) of ITAIPU. This tool can be used for the ITAIPU Annex C review.

A Hybrid Approach for Many-Objective Feature Selection in Intrusion Detection on Windows Operating Systems

J. Benítez Francisco; P. Pinto-Roa Diego; García-Torres Miguel; B. D. Parameshachari

DOI: 10.1109/CHILECON60335.2023.10418638

<https://ieeexplore.ieee.org/document/10418638>

IEEE Xplore

Abstract:

The exponential increase in devices connected to the Internet has rendered them vulnerable to various types of cyberattacks, disrupting their proper functioning. As a result, it is crucial to have reliable Intrusion Detection Systems (IDS) that can identify malicious activities on the network. However, the unpredictable nature of network behavior and the large volume of data to be audited pose significant challenges. This work aims to address these challenges by eliminating redundant data features, identifying a subset of relevant and representative features that enhance the anomaly detection performance of an IDS using many-objective optimization algorithms. In this work, we have analyzed the recent TON IoT dataset, which collects monitoring data on devices using Windows and Linux operating systems. The NSGA-II, NSGA-III, RVEA, and MOEA/D were used as many-objective feature selection algorithms. Our computational simulations identified good subsets of features that showed better classification performance and accuracy in comparison to the complete set of features. Notably, the results obtained using the NSGA-II stood out from the others.

An Adaptive strategy for avoiding stagnation on restarting GMRES

Juan C. Cabral and Christian E. Schaerer

https://eventos.fgv.br/sites/eventos.fgv.br/files/arquivos/u1252/book_of_abstracts_laciam2023.pdf

Proceedings of the Latin American Congress on Industrial and Applied Mathematics

The Restarted Generalized Minimal Residual, denoted as GMRES(m), is normally used for the solution of large, sparse, and nonsymmetric linear systems, which is often the most time-consuming part of numerical simulation in science and engineering. In practice, it has the drawback of eventually presenting at certain re-starting cycles a stagnation or a slowdown rate of convergence. In this work, we are going to discuss strategies for avoiding stagnation and how a combination of them can exploit better their individual properties. The combination is implemented as a switching controller that changes the structure of the GMRES(m) when the stagnation is detected. The switching controller chooses conveniently from several techniques, how to augment the Krylov subspace for enriching it. Moreover, the controller varies the restarting parameter to modify the dimension of the Krylov subspace is needed. This strategy makes the adaptive switching controller competitive from the point of view of avoiding the stagnation and acceleration of the convergence respect to the number of iterations and the computational time. We are going to present computational experiments show the advantages and the main issues raised from the perspective of the adaptive switching controller. For instance, when to perform the switching, what information is more important at each stage and when to modify the restart parameter

An Analytic Hierarchy Process-Based Multicriteria Model for Component Selection in a Computational Numerical Control (CNC) Machine

Juan Muñoz; Cristian Lugo; Arturo González; Ever Quiñonez; Gerardo Gómez

DOI: 10.1109/CHILECON60335.2023.10418772

<https://ieeexplore.ieee.org/document/10418772>

IEEE Xplore

Abstract:

The modernization process of a CNC machine entails multifaceted and critical component selection. This study proposes a multicriteria model based on the Analytic Hierarchy Process (AHP) to address this challenge. It focuses on the selection of CNC software and MCU, considering factors such as quality, vendor support, and technical capability. The CNC machine EP2006 was taken as a case study due to issues related to PCAM software. AHP identified GRBLHAL as the best alternative for CNC software and Teensy 4.1 or T41U5XBB for the MCU. This robust approach takes into account technological evolution, ensuring that the machine remains up-to-date and competitive in an ever-changing environment.

Análisis de la movilidad ferroviaria para el transporte óptimo de cargas en la república del Paraguay

Eder Garayo, Diana Valdéz Barboza, Félix Fernández

<https://www.xixeriac.com.br/artigos-apresentacoes>

C3.01_2270

Apresentações e trabalhos técnicos

Resumen

Paraguay es uno de los mayores productores de energía hidroeléctrica a nivel mundial y a pesar de esto, aún hoy, existe una enorme brecha entre la producción y el consumo de energía eléctrica en el país. La matriz energética de producción según el Balance Energético Nacional 2021 está conformada por un 35% de hidroenergía, 39% de biomasa y 26% de hidrocarburos (enteramente importado). Mientras que la demanda de energía está conformada en un 41% por biomasa, 41% de hidrocarburos y 18% de electricidad. En ese sentido, se observa que la principal fuente de energía producida en el país es la menos utilizada, dejando entrever que existe un desequilibrio entre la producción y el consumo de energía. En la actualidad, la fuente de energía para abastecer el sector transporte es totalmente importada (derivados del petróleo), donde el diésel es la fuente de energía mayormente empleada para el transporte de cargas. En este contexto, se ha identificado la necesidad de buscar alternativas para reducir el consumo de hidrocarburos y aumentar el consumo de energía eléctrica. Como una alternativa a esta necesidad, en este trabajo se evalúa la sustitución de tecnologías y fuentes energéticas para el transporte de carga, es decir, reemplazar tractocamiones por trenes eléctricos. Para esto, se busca identificar las variables conductoras del sector transporte de cargas, para explicar su evolución a futuro, al mismo tiempo de identificar los orígenes y destinos de cargas, al igual que el trayecto actual que recorren y un potencial trayecto ferroviario óptimo de acuerdo a distancias costos y tiempos.

Análisis temporal de Precipitación de la Cuenca Bajo y Medio Para guay de la Cuenca del Plata 2001-2020 y su relación con el fenómeno El Niño/Oscilación del Sur (ENSO)

Rosana Villalba, Anabella Ferral, Julián Baez, Jorge Kurita, Giuliana Beltramone, Juan Carlos Bertoni

<https://www.rpic.com.ar/inicio>

Actas de la XX Reunión de Trabajo en Procesamiento de la Información y Control

Abstract

In this work, a time-dependent analysis is presented to identify climatic patterns that affect precipitation behavior in the lower and middle Paraguay River basin, corresponding to the territory of Paraguay. For this purpose, satellite precipitation images were used for the period from 2001 to 2020, available on the GIOVANNI - NASA platform. The results of the exploratory analysis of classical statistics allowed the identification of data distribution, probability density, and monthly, seasonal, and annual statistical measures. It was observed that the monthly average precipitation of the time series reaches a maximum in August 2015 (312.4 mm) and a minimum in August 2004 (6.5 mm). It was determined that December is the month with the highest monthly average precipitation in the series, while August has the lowest precipitation. On the other hand, stochastic models were applied to identify and evaluate the possibility of generating precipitation forecasts using the autoregressive ARIMA model, with unsatisfactory results because the series does not meet the necessary assumptions for the implementation of these models. A Fourier analysis was performed to detect periods of high and low flow, clearly identifying characteristic or dominant frequencies related to cycles of 1, 4, 5, 20, 10, and 0.5 years. The application of this technique allowed relating the occurrence of anomalies in the flows to hydroclimatic cycles during the two phases of the El Niño/Southern Oscillation (ENSO) phenomenon that occur in tropical South America, including Paraguay, among other countries). The space image analysis identified the accumulation of the monthly average precipitation over 20 years, alternating between areas of Low Chaco with low precipitation (47 mm) and others with higher (332 mm) towards the east and center of the basin. Finally, Voronoi (Thiessen) interpolation was performed using monthly average precipitation data from the stations and the Isoyetas map, allowing visualization of precipitation patterns in the studied area.

Análisis temporal del caudal del río Paraguay en la localidad de Asunción desde 1931-2020 y su relación con el fenómeno del Niño/Oscilación del Sur (ENSO)

Villalba, Rossana, Ferral, Anabella, Baéz, Julian , Kurita, Jorge , Bertoni, Juan Carlos

<https://conagua.ina.gob.ar/archivos/Libro-resumenes-CONAGUA2023.pdf>

XXVII edición del Congreso Nacional del Agua CONAGUA 2023: trabajos presentados al CONAGUA 2023

RESUMEN

En este trabajo se presenta un análisis temporal para identificar patrones climáticos que inciden en el comportamiento del caudal del Río Paraguay en la estación meteorológica de la ciudad de Asunción. Para ello se emplearon datos de nivel diario para el período 1931 hasta 2020 medidos por la Administración Nacional de Navegación y Puertos (ANNP) y proporcionados por la Dirección Nacional de Aeronáutica Civil (DINAC) de la Dirección de Meteorología e Hidrología de Paraguay. Los resultados del análisis exploratorio de estadística clásica del nivel promedio de caudal permitieron identificar la distribución de los datos y la densidad de probabilidad y los estadísticos mensuales, estacionales y anuales. Se observó que el promedio mensual de caudal de la serie de tiempo, presenta un máximo en el mes de junio en el año 2020 igual a 10.6 m³/s en el año 2020 del mes de octubre y un mínimo en octubre en el año 1983 igual a 511.0 m³/s. Se determinó que el mes de mayor caudal promedio de la serie es junio mientras que el de menor caudal es octubre. Por otro lado, se aplicaron modelos estocásticos para identificar y evaluar la posibilidad de generar pronósticos de caudal con el modelo autoregresivo ARIMA con resultados poco satisfactorios, debido a que la serie no cumple con los supuestos necesarios para la implementación de estos modelos. Por último, se efectuó un análisis de Fourier para detectar períodos de alto y bajo caudal y se lograron identificar claramente frecuencias características o dominantes relacionadas a ciclos de 1, 30, 45, 90, 18, 22, 11, 8, 4.5, 3, 2 y 0.5 años. La aplicación de esta técnica permitió relacionar la ocurrencia de anomalías en los caudales, con ciclos hidroclicmáticas durante las dos fases del fenómeno El Niño/Oscilación del Sur (ENSO) que se presentan en el sur de América tropical incluyendo Paraguay, entre otras.

Analysis of International Economic Integration based on a Computational Mathematical Model of Economic Complexity — Study Case: MERCOSUR

Arturo González; Sanny González; Gabriel Pereira; Christian von Lüken; Gerardo Blanco

DOI: <https://ieeexplore.ieee.org/document/10346106>
<https://ieeexplore.ieee.org/document/10346106/authors#authors>

IEEE Xplore

Abstract:

International Economic Integration entails collaborative efforts among nations to overcome barriers and achieve shared benefits. The development of analytical models is crucial for comprehending the interaction of countries as a collective entity. In South America, MERCOSUR stands out, comprising Argentina, Brazil, Paraguay, and Uruguay. In this study, Economic Complexity metrics were applied to analyze productive capacities within MERCOSUR. The results underscore integration's significance by forming economic blocs, capabilities are expanded, enriching diversity and the scope of production. Economic complexity serves as a pivotal tool for assessing interdependence and enhancing countries' global positioning. In summary, this work highlights how economic integration, exemplified by MERCOSUR, enhances productive capacity, propelling development, and competitiveness in an interconnected world. Leveraging a novel computational mathematical model, this study offers insights into the complex dynamics of international economic integration, shedding light on strategies to foster growth and collaboration in a rapidly evolving global landscape.

Analysis of Multidimensional Energy Poverty in the Carmen Soler Community - Limpio, Republic of Paraguay

Laine Lezcano; Karen Fernández; Arturo González

DOI: 10.1109/CHILECON60335.2023.10418708

<https://ieeexplore.ieee.org/document/10418708>

IEEE Xplore

Abstract:

In this study, we address the significant issue of Energy Poverty (EP) in the context of the Republic of Paraguay, focusing on the Carmen Soler community in Limpio city. EP, a pivotal facet of poverty, intersects with multifaceted dimensions of development, demanding a comprehensive approach. Our objective is to construct a Multidimensional Energy Poverty Index (MEPI) for Carmen Soler, utilizing secondary data collected in 2018. This index enables the assessment of energy deprivations within households, offering insight into their multidimensional energy poverty status. Our mixed-method approach combines exploratory and descriptive methodologies to analyze the situation, revealing that while incidence rates are low, intensity levels are notably high. The MEPI score, around 8,633%, emphasizes the urban context's significance despite its modest value. This research contributes to a broader understanding of Energy Poverty in Paraguay and recommends further national-level studies and policy discussions to address its implications comprehensively.

Comparative Analysis of Statistical and Recurrent Neural Network Models for Short-Term River Level Forecasting in the Paraguay River

Gustavo A. Amarilla S; Diego H. Stalder; Max Pasten; Diego P. Pinto-Roa

DOI:

<https://ieeexplore.ieee.org/document/10409420>

IEEE Xplore

Abstract:

The accurate short-term forecast of river levels is crucial in mitigating flood and drought risks and supporting the ecosystem, transportation, and national production. However, hydrological models face significant challenges due to seasonal variations in river levels influenced by rainfall patterns and land use changes. In this context, this study applies statistical and deep learning models to time series data to predict water levels in the Paraguay River, at the port of Asunción. This work studies the performance of Autoregressive Integrated Moving Average and three recurrent-based deep learning approaches - Recurrent Neural Network, Long Short Term Memory, and Gated Recurrent Unit models-to determine which one is most suitable for predicting water levels. The experimental results indicate the superiority of recurrent-based models, e.g., Long Short Term Memory and Gated Recurrent Unit, over the traditional Autoregressive Integrated Moving Average statistical model, especially when incorporating other station levels as past covariates and forecasting with various horizons ranging from 7, 14, 21, and 28 days. The recurrent-based deep learning models achieved lower Root Mean Squared Error values of 16.7 cm, 33.8 cm, 49.36 cm, and 60.9 cm for the respective forecasting horizons. These findings emphasize the critical importance of including additional station levels as past covariates to enhance the accuracy and reliability of the forecasting models.

Descubrimiento de patrones relevantes del Dengue mediante la Programación Lógica Inductiva y Twitter

Carlos Alberto Benítez Galván, Tania Mabel Leguizamón Ovelar, Gustavo Sosa-Cabrera, and María E. García-Díaz

<https://libros.unlp.edu.ar/index.php/unlp/catalog/view/2435/6866/11366-1>

**Libro de Actas: XXIX Congreso Argentino de Ciencias de la Computación
- CACIC 2023**

Resumen

El dengue es una infección vírica transmitida por la picadura de las hembras infectadas de mosquitos del género *Aedes Aegypti*. Es una enfermedad infecciosa transmitida por mosquitos, una de las principales causas de enfermedad y muerte en las regiones tropicales y subtropicales, incluido Paraguay. El dengue, en nuestro país, ya es considerada una enfermedad endémica, es un problema cotidiano de salud pública desde el año 2009, en cuyo año la epidemia se instaló sobre territorios endémicos con circulación simultánea afectando a un gran número de la población y trasladando susceptibilidad a población de niños y adolescentes. En este artículo analizamos cómo se refleja la epidemia de dengue en Twitter, el cual, es un canal de redes sociales único, en el sentido de que los usuarios discuten y hablan sobre los temas más diversos, incluidas sus condiciones de salud. Se analizaron los datos pertenecientes a un período de tiempo sobre el fenómeno que nos ocupa, teniendo en cuenta que, en la era digital, las redes sociales son un instrumento clave para informar a la población sobre cualquier emergencia sanitaria y utilizar ese mismo conocimiento para medir el grado en que la misma puede utilizarse en aras de la vigilancia.

Design of an agricultural network and rural schools: a case of Caazapá - Paraguay

Jorge Recalde, Jorge Vera, Lluís Miquel Plà-Aragonès, María Margarita López

<https://www.euro-online.org/conf/admin/tmp/program-ifors2023.pdf>

IFORS 2023 Technical Program August 1, 2023

According to UNESCO (2023), children and youth between the ages of 6 and 18 worldwide are still out of school; the causes can be complex - corruption, poverty, hunger, inefficient planning, and lack of public policies. Nations have discussed the issue, drawing sustainable objectives regarding the right to education, and the goals they wish to achieve by 2030. In this way, the Programs of School Feeding (PAE) have been created as support tools in public policies. The PAE tendency, at the Latin American and rural levels, has been to seek social protection to meet children's food requirements, as an accompaniment to attending schools and, on the other hand, to promote family farming. This project aims to support decision-making regarding the logistics network design linking the rural schools attached to the PAE with the farms of small local farmers who serve as food providers. To this end, we use as a case study the situation of rural schools and small agricultural producers in Caazapá City, located in Paraguay. In this region of the country, about 82% of the population lives in rural areas; the conditions lend themselves to the research project development, due to data availability. We expect to have a relatively high number of variables and constraints, and a mathematical programming model is formulated to address the problem. For a representative mathematical model, restrictions of sustainable agricultural planning must be addressed, such as crop rotation and crop selection, as well as meeting the demand for school lunches. Including only one primary objective is pertinent for the moment: minimizing costs in distributing and generating food rations for schools. Secondarily, a social objective is proposed: the maximization of benefits for small farmers. As the work is in progress, future work will merge the two objectives, treat the problem as a biobjective, and include uncertainty in some relevant parameters.

Development of Evaluation and Quality Control Protocols for Mammography

César Yegros, Luciano Benjamín Recalde Carballo and Eladio Quintana

<https://globalce.org/index.php/GlobalCE/issue/view/20/21>

5th ICEHTMC 2023 Proceedings

Mammography is a medical diagnostic study performed by taking a radiographic image directly on the breasts, at low doses of radiation, with specialized ionizing radiation-emitting equipment called a Mammograph. It's the main one for the early detection of diseases of breast origin, which is why it's essential to guarantee the operability and correct functioning of the equipment that performs this study; particularly in low-income countries, such as Paraguay, where at the state level there is 1 mammographer for every 50,000 women, which implies low-quality control of radiation emissions, low access to this health system, and in special to preventive medical check-ups. To guarantee this safety in the mammographic area, it's necessary to establish verification programs and quality controls. To carry it out, this project evaluates its operation and the quality of its ray emission, through controls of physical parameters in its radiation generators, through the measurement of its main parameters and the elaboration of a checklist based on the technical standards established by the local regulatory authority and international standard (IAEA); and the implementation of these techniques and quality protocols for mammographers, in different imaging services, in order to evaluate the control program and the meters to guarantee radiological safety and dose levels for operators, technical service personnel, and patients. The project is based on the experimental study, through the development, verification and testing with equipment that measures physical parameters (dose, dose rate, KVp, HVL) for mammographers, through the adaptation and implementation of the international standard IAEA-TECDOC- 1517, for mammography quality control and advice from the local Radiological Regulatory Authority (ARRN). The measurement equipment used was the black RTI PIRANHA® and an own design for measurement of pressure, height and position, for the benefit of users of this equipment in public health in Paraguay. Verifications and controls were carried out on mammographers with the instruments acquired and designed, in public and private institutions in Asunción and the Central Department. 62.5% of them have their parameters within the tolerance ranges. 37.5% worked, but with values above expectations. Its calibration was suggested. It was demonstrated that it is possible to obtain information on the situational status of the mammographs, verify the quality of the image, the dose rate to determine the level of radiation emitted by the equipment and guarantee

the radiological protection of technical personnel and users, as well as the scopes of dose adjustments and dose rate, if necessary. With these data it's possible to foresee solutions to avoid unnecessary stops of operation, all with the aim of guaranteeing radiological safety and facilitating decision-makers with the tasks of planning, justifying the renewal or maintenance of mammographs, in a country with scarce and deficient infrastructure and biomedical equipment.

Electric Energy Charge Biclustering A Genetic Algorithms Approach

Josué Trepowski; P. Pinto-Roa Diego; García-Torres Miguel; Federico Divina

DOI: 10.1109/CHILECON60335.2023.10418621

<https://ieeexplore.ieee.org/document/10418621>

IEEE Xplore

Abstract:

The increased usage of Electric Vehicles (EV) due to the transition from fossil fuels to clean energy sources presents the challenge of integrating EV charging into the electrical grid, leading to the analysis of charging patterns for decision-making. This document proposes an evolutionary biclustering algorithm which main objective is to find EV charging patterns in a time series. The algorithm has been tested with real-life data. Our numerical simulation results proved that our algorithm is able to identify concurrent peak usage in different regions in big time intervals. This new technique can be used to avoid creation of new voltage peak and energy loss while integrating EV charge infrastructure into the current electrical grid.

Enhanced medical images through multi-scale mathematical morphology by reconstruction

Isidro Ramón Gaona, Julio César Mello-Román, José Luis Vázquez Noguera, Horacio Legal-Ayala, Julieta Méndez, Sebastián Grillo, Silvia Vázquez Noguera,

DOI: 10.23919/CISTI58278.2023.10211680

<https://ieeexplore.ieee.org/document/10211680>

IEEE Xplore

Abstract:

Medical images are indispensable tools for several medical tasks, by allowing a much more accurate diagnosis to help in decision making. For this reason it is essential to have good quality medical images. However, sometimes they show degradations such as poor contrast or imperfections in details. In this article we present an algorithm that improves the details of medical images, preserves the average brightness, preserves the structural similarity and corrects the problem of poor contrast. This algorithm improves medical images using the top-hat transform by reconstruction, which extracts brightness and darkness features on multiple scales. These features are used to enhance the medical image. The algorithm was tested with medical images from two public databases. Experimental results show that the proposed algorithm improves contrast, introduces little noise, preserves natural brightness, detail and similarity to the original medical image.

Epymodel: A User-Friendly Web Application for Visualising COVID-19 Projections for Paraguay Including Under-Reporting and Vaccination

José Luis Vázquez Noguera, Hyun Ho Shin, Carlos Sauer Ayala, Sebastián Grillo, Pastor Pérez-Estigarribia, Ricardo Torales, Silvia Vázquez Noguera & Carlos Gaona

DOI: https://doi.org/10.1007/978-3-031-36357-3_5
https://link.springer.com/chapter/10.1007/978-3-031-36357-3_5#citeas

Advances in Computing. CCC 2022. Communications in Computer and Information Science, vol 1775. Springer 2023

Abstract

Most health software fails due to the lack of efficient use. Moreover, the appearance of COVID-19 has generated the need for a user-friendly system that allows us to visualise possible scenarios of contagion, hospitalised patients and deaths. Previous work addressed the mathematical modelling of the spread dynamics and its impact in the public health system with time-dependent transmissibility and proportions using a moving time-window strategy. In this work, we extend the mathematical model to include an estimate of under-reported COVID-19 cases and the immunisation impact from vaccination campaigns. The model parameters are estimated using a Bayesian approach with data from Paraguay and are compared to those obtained in a previous work. The comparisons show that the proposed model can better explain the different circumstances observed from Paraguay since June 2021, when the under-reporting and vaccinations effects become essential. Some scenarios are drawn based on the historical transmissibility and are assessed using the observed data. A web application called Epymodel was developed to show both the historical values of the parameters and variables of the proposed model, as well as the projections of the different scenarios. Finally, a usability test of the web application is performed. Users showed a high level of satisfaction in the use of Epymodel.

Estadística turística: la experiencia del Turismo de Reuniones de Paraguay

Nilsa Ramona Sosa de Cabrera

https://congresolatina.net/wp-content/uploads/2024/03/Libro-de-Actas-Latina-2023_paginado_final.pdf

Libro de actas del XV Congreso Internacional Latina de Comunicación Social 2023

El turismo es un elemento de importancia en la actividad económica en la mayoría de los países. Específicamente, el turismo de reuniones representa una alternativa para romper la estacionalidad, prolongando la estadía y aumentando el gasto promedio con relación al turismo convencional. De ahí que los resultados expuestos en los anuarios estadísticos del turismo de reuniones en Paraguay, que se vienen realizando en forma sistemática en los últimos años a través de la sinergia entre la comunidad académica, el sector público y el sector empresarial, ha permitido la implementación y continuidad del Observatorio Económico de Turismo de Reuniones del Paraguay, con la firme intención de proveer datos fidedignos y veraces mediante la aplicación de métodos científicos. El objeto del presente trabajo consistió en medir el comportamiento del turismo de reuniones en Paraguay; además de identificar el posicionamiento del país en relación al turismo de reuniones en el mundo y Latinoamérica, mediante un estudio coordinado por el Asunción Convention & Visitors Bureau y la Secretaria Nacional de Turismo, siendo ejecutado por la Facultad Politécnica de la Universidad Nacional de Asunción. La metodología utilizada incluyó la aplicación de encuestas a participantes y organizadores relacionados con el turismo de reuniones: totalizando 1989 el número de encuestas aplicadas, que cumplieron con el perfil y los criterios internacionales, como ser repetición del evento, cantidad de participantes, rotación de sedes, entre otros para ser escogidos como parte de la muestra. En ese contexto, involucró la participación de un equipo multidisciplinario de estudiantes y docentes, quienes a través del relevamiento de datos usando técnicas cuantitativas y cualitativas apoyadas en las TIC, según las recomendaciones de la Organización Mundial del Turismo, propició la creación de un calendario de eventos que sirvió de base para las siguientes etapas del trabajo. Los resultados obtenidos hacen referencia a las características de las tres grandes agrupaciones identificadas del turismo de reuniones: Congresos y Convenciones; Ferias y Exposiciones; y Eventos deportivos Internacionales. Donde destacan los indicadores monetarios y no monetarios de cada una según su distribución temporal, así como, los tipos de reuniones y distribución geográfica. Asimismo, el análisis según su temática, duración, cantidad de asistentes, tipos de sede y el estudio de la demanda según la caracterización

de los turistas locales, nacionales y extranjeros, además del gasto turístico promedio e inversión en la organización de los eventos. Se concluye que seguir las recomendaciones internacionales de la Organización Mundial de Turismo para estadísticas, posibilita la comparación del contexto nacional con relación a la región y el resto del mundo. Permite en definitiva a través del monitoreo permanente evidenciar y cuantificar la duración de la estadía, el gasto promedio, y la intención de retorno de los turistas, así como también la inversión en aquellos rubros vinculados a la organización de los eventos del turismo de reuniones. Además, permite la toma de decisiones estratégicas y eficaces en el sector público e impulsar la inversión del sector privado. En ese sentido, la socialización de la información obtenida favorece la comprensión del turismo en la economía nacional.

Estudio de los transformadores de corrientes ópticos y propuesta de implementación en líneas de transmisión del sistema eléctrico de potencia de Paraguay

Pedro Aníbal Sosa Cardozo, Félix Fernando Fernández Balbuena, Luis María Delgado Ferreira

<https://www.xixeriac.com.br/artigos-apresentacoes>

B3.20_1600

Apresentações e trabalhos técnicos

Resumen

La corriente eléctrica es posible medir de forma no convencional, es decir, por una serie de equipamientos e instrumentos que utilizan otros principios físicos y no propiedades electromagnéticas. Uno de estos principios consiste en la utilización de las propiedades de polarización de la luz y el descubrimiento de la interacción de los campos magnéticos con la onda luminosa, que posibilitaron el desarrollo de métodos para realizar mediciones de forma menos riesgosa y sin la necesidad obtención directa de muestras o aperturas de circuitos eléctricos. Con los avances tecnológicos en la electrónica digital y las fibras ópticas se desarrollaron equipamientos confiables y sofisticados para las necesidades dentro de una subestación eléctrica, como ser el transformador de corriente óptico. Considerando los daños, tanto para el medio ambiente, así como para el patrimonio de la empresa concesionaria, que derivan de los eventos de explosiones de transformadores en subestaciones eléctricas y la dificultad de predecir los comportamientos instantáneos y a largo plazo de los transformadores de corriente con aceite dieléctrico, en alta tensión, sumado a los costos de mantenimientos y la cantidad de subestaciones antiguas en el Sistema Eléctrico de Potencia de Paraguay, se estudió y analizó al equipamiento capaz de realizar las mismas funciones de mediciones, reduciendo los riesgos y mantenimientos. Los transformadores de corriente ópticos, basados en Efecto Faraday, son una alternativa que disminuiría los problemas relacionados al uso de aceite dieléctrico que se tienen en los transformadores de corriente convencionales (electromagnéticos), y que son totalmente compatibles con las subestaciones eléctricas digitales gracias a que su utilización se basa en normas, como la IEC 61850 y acorde a los desafíos de ingeniería de diseño actuales. Estas exigencias están relacionadas a los costos, la seguridad operacional y el cuidado del medio ambiente (con el uso y manejo de aceite dieléctrico o SF6) más las propias exigencias del sector eléctrico (continuidad del servicio, confiabilidad) y la necesidad de instalaciones o expansiones de subestaciones eléctricas en zonas urbanas. Para exponer

mejor el caso de estudio se ha realizado un análisis de FODA y económico basado en un diseño de ingeniería, para una línea de transmisión en 220kV actualmente en operación dentro del sistema interconectado. Basada en la propuesta y estudio de caso se concluye que el transformador de corriente óptico es una opción válida y con factibilidad económica positiva y se recomienda proponer su utilización en forma de prototipo para exponer sus ventajas debido a que serán utilizados de forma masiva en la región en los próximos años.

Exploring the Electric Vehicle Supply Chain Opportunities for South America's Gran Chaco: A Systematic Review

Jennifer Gómez; Jessica Paredes; Eduardo Ortigoza; Victorio Oxilia

DOI: 10.1109/CHILECON60335.2023.10418712

<https://ieeexplore.ieee.org/document/10418712>

IEEE Xplore

Abstract:

In the context of the increasing global interest in sustainable transportation solutions, this research investigates South America's potential role within the electric vehicles (EVs) supply chain. The objective of this study is to conduct a comprehensive literature review to identify opportunities for South American involvement in various stages of the EV supply chain, with the aim of creating conducive scenarios for future research endeavors. The bibliometric analysis reveals limited scientific output in the region concerning the EV supply chain, with Brazil emerging as the most active contributor since 2010. However, recent developments show heightened interest from Chile, Colombia, Mexico and Peru. This research underscores the region's engagement in lithium extraction, crucial for EV batteries, but points out the lack of progress in other stages of the chain at the industrial level. Studies suggesting the feasibility of component production in Brazil through its economic relationship with Argentina, along with the proposed Bolivia-Paraguay integration to produce lithium-ion batteries and EVs, point out how regional collaboration can drive advances in other stages of the chain, also highlighting the importance of investment in research and the effective use of the region's resources. It raises the possibility that the region can play an important role in the EV industry if it seizes opportunities in a joint quest towards sustainable mobility.

Food Packaging Film Preparation: From Conventional to Biodegradable and Green Fabrication †

Omayra B. Ferreiro and Magna Monteiro

†Presented at the 1st International Conference of the Red CYTED ENVABIO100 “Obtaining 100% Natural Biodegradable Films for the Food Industry”, San Lorenzo, Paraguay, 14–16 November 2022.

DOI: <https://doi.org/10.3390/blsf2023028011>

[Food Packaging Film Preparation: From Conventional to Biodegradable and Green Fabrication](#)

Biography and Life Science Forum 2023

(This article belongs to the Proceedings of The 1st International Conference of the Red CYTED ENVABIO100 “Obtaining 100% Natural Biodegradable Films for the Food Industry”)

Abstract

It is undeniable that suitable packaging will extend the shelf life of the food. The packaging industry has had to renew and innovate in a world where consumers are increasingly environmentally conscious in order to deal with the impact of the production of petroleum-derived plastics and the management of the waste generated by them. In this way, the use of biopolymers has been proposed, mainly those produced from renewable sources and with biodegradability and/or compostability properties. However, these types of materials are more expensive and do not have the same performance as petroleum-derived materials. Besides, the technologies for film preparation are not adapted for these materials. Therefore, new technologies must be studied and implemented to make the packaging industry a sustainable industry. Recently, non-solvent phase inversion (NIPS) and electrospinning techniques, which are widely used for membrane fabrication, have been proposed for the fabrication of films for food packaging applications from biopolymers and green solvents.

Histological anatomical levels of penile shaft. A histochemical evaluation of 15 cases

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DOI: <https://doi.org/10.1093/ajcp/aqad150.104>
https://academic.oup.com/ajcp/article/160/Supplement_1/S46/7455447

ASCP ABSTRACTS

Abstract

Introduction/Objective

Penile carcinomas (PeCa) arising in the skin of the shaft are rare. Staging systems for PeCa are based on tumor invasion of anatomical levels designed for tumors arising in the glans and foreskin but not for those primary of the shaft. There is scant information about anatomical levels in the shaft. The objective of this study was to evaluate and describe anatomical levels of the shaft with emphasis of the fascias, using histochemical stains.

Methods/Case Report

Sections of penile mid shaft from 15 penectomies with PeCa from 2000-2015 were evaluated. H&E, trichromic and orcein stains were performed to evaluate and describe anatomical levels of the shaft.

Results (if a Case Study enter NA)

Skin: Epidermis: 7-15 cell thick, thin keratin, granulosis, basal pigmentation. Papillary dermis: Loose connective tissue, capillaries, nerve fibers pilo-sebaceous structures. Absence of elastic fibers. Reticular dermis. prominent elastic fibers layer parallel to epidermis merging with dartos. Dartos (superficial fascia): Poorly delineated, merging with reticular layer with no separating space, composed of thin smooth muscle bundles. Deep fascia (Busck's fascia): All tissues between dartos and tunica albuginea. Fibro-elastic, encases vessels, nerves and fibro adipose tissues. Closely attached to the albuginea. Tunica albuginea: Dense mostly fibrous tissue with few elastic fibers encasing corpora cavernosa. Corpus cavernosum: Thick-walled inter-anastomosed vessels. Smaller nutritional vessels, nerves and adipose tissue. No elastic fibers present.

Conclusion

There are 5 distinct anatomical layers in the shaft. Reticular dermis and dartos should be considered as one layer given the poor delineation between them. This knowledge is necessary for staging and prognosis of the rare PeCa arising in the shaft.

Identificación de fases cristalinas en biomateriales naturales y compostables por difracción de rayos-X.

Omayra Ferreira

https://c154d6e6-231f-4d66-b79a-771f09482b5f.filesusr.com/ugd/dc6445_7826fccc8c924ab1a08fcfd87b9f9ad.pdf

1ra Conferencia Internacional sobre Cristalografía y Crecimiento de Cristales de Paraguay (1ra CIC-Py). Resúmenes y contenidos

Resumen

Los biopolímeros naturales son macromoléculas que pueden ser sinterizadas a partir de microorganismos u obtenidas de fuentes animales o plantas. Entre ellos, se destacan la celulosa y el almidón, debido a que son obtenidos de fuentes renovables y a sus características de biocompatibilidad y biodegradabilidad. La celulosa es el homopolímero más abundante de la Tierra, presente en todas las plantas y consiste en dos unidades de D-anhidroglucosa unidas entre ellas a través de enlaces glicósidos $\beta(1\rightarrow4)$. Mientras que el almidón es un polisacárido que consiste en amilosa (un polímero lineal) y amilopectina (un polímero ramificado). La identificación de las fases cristalinas de este tipo de materiales ha despertado interés debido a las características que presentan la nanocelulosa y el almidón. A pesar de poseer, en general, una baja cristalinidad, las características de las estructuras cristalinas de estos materiales viene siendo ampliamente estudiadas y reportadas debido a que los procesos utilizados para el aislamiento y el procesamiento de estos materiales puede tener una gran influencia en sus propiedades y aplicaciones finales. Por lo que, serán presentados aspectos importantes de la estructura cristalina de estos materiales para la identificación de las fases presentes.

International Economic Integration from the Perspective of Economic Complexity and Economic Fitness: A Methodological Proposal

Arturo González , Sanny González , Gabriel Pereira , Gerardo Blanco and Christian von Lücken

DOI:

<https://www.scitepress.org/PublicationsDetail.aspx?ID=zzYoH9Fe5Uw=&t=1>
[SciTePress - Publication Details](#)

Proceedings of the 8th International Conference on Complexity, Future Information Systems and Risk

Abstract:

International Economic Integration can be described as a process in which a group of countries seeks mutual benefits through mechanisms such as the elimination and/or reduction of trade, social, and political barriers between others. From an economic point of view, the importance of the integration of countries is fundamental for their development simply because most of them are part of some system of international economic integration. In this work, the issue of economic integration will not be discussed in depth but instead will oversee proposing some well-known metrics in the field of economic development that could be very useful as analysis and decision-making tools in the process of regional economic integration. In this sense, this work proposes using concepts and metrics of Economic Complexity and Economic Fitness to identify combined productive capacities between countries that are part of an economic block, whether real or fictitious. The problem in understanding how economically integrate the countries is to identify the combined productive capacities that would exist if two or more countries that make up an economic block are considered as a single country. Experimental analyzes were carried out for a fictitious case, where a world with 10 countries and 15 products is presented; in addition, 3 economic blocks were defined, which were analyzed applying economic complexity and economic fitness metrics. The results obtained reflect the great importance of economic integration since, by establishing economic blocks, it is possible to capture more productive capacities by improving both the diversity of the economic block and the ubiquity of the products produced in it by addressing the productive capacities of the member countries.

Investment Analysis of the Transmission System of the Paraguayan National Interconnected System at 500 kV, Considering Reliability Criteria and Marketing Strategies

Santiago Argüello; Sonia López; Gabriel Baum; Félix Fernández

DOI: 10.1109/CHILECON60335.2023.10418766

<https://ieeexplore.ieee.org/document/10418766>

IEEE Xplore

Abstract:

Marking the opportunity to renegotiate Annex C of Itaipu Treaty for 2023 as a milestone for Paraguay, various ideas emerge for the country's development. One of them is the commercialization of energy to neighboring countries. To achieve this, it is almost logical to make investments in the Transmission System, which plays a fundamental role for this purpose. In this context, this work analyzes the variants related to the execution of works at the 500 kV level provided for in the ANDE Master Plan, considering the hypothesis that in said renegotiation the terms of purchase and sale of energy are changed. The evaluation was carried out considering 54 energy marketing strategies and reliability criteria. For the marketing analysis, income from energy transfer, the assumption of energy sales and changes in terms in the Treaty were considered. Likewise, for the reliability analysis, the simple contingency criterion was applied. The results reveal that, by advancing the execution time of some works, the economic performance of the SIN can be improved by up to 2.57%, compared to what was planned by ANDE. Furthermore, from a reliability point of view, an increase in the security of electricity supply has been observed. Therefore, considering the proposed approach, the ANDE Master Plan can be optimized, in order to have greater flexibility for the 500 kV works and greater robustness for the SIN, in order to be able to comply with future energy transaction commitments and obtain greater economic benefits.

Microcrystals and Microfibers of Cellulose from *Acrocomia aculeata* (Arecaceae) Characterization †

Shirley Duarte, Magna Monteiro, Porfirio Andrés Campuzano, Natalia Giménez and María Cristina Penayo

DOI: <https://doi.org/10.3390/blsf2023028008>
<https://www.mdpi.com/2673-9976/28/1/8>

† Presented at the 1st International Conference of the Red CYTED ENVABIO100 “Obtaining 100% Natural Biodegradable Films for the Food Industry”, San Lorenzo, Paraguay, 14–16 November 2022.

Biology Life Science Forum 2023

(This article belongs to the Proceedings of The 1st International Conference of the Red CYTED ENVABIO100 “Obtaining 100% Natural Biodegradable Films for the Food Industry”)

Abstract

In the context of the so-called lignocellulose bio-refinery, the coconut shell (S) and pulp (P) of *Acrocomia aculeata* (Arecaceae) are interesting agro-industrial wastes that can be used as feedstock for the production of high value-added products. The aim of this work was to evaluate these lignocellulosic residues S and P, to obtain the microcrystal (MCC) and microfiber (MFC) of cellulose, and to characterize them to propose possible applications. First, cellulose content in the raw materials was determined, being 39.69% and 45.42% for both (S and P) respectively, respectively. Then, the purification of residues was carried out via alkaline and bleaching treatments. Next, in order to obtain MCC and MFC from the purified cellulose, a chemical treatment with HCl (for MCC) and a mechanical treatment with a blender (for MFC) were performed. The size and morphology were observed via MEB, and properties were characterized using Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), and differential thermogravimetric analysis (DTG).

Mimetic Operator Discretization 1D: Exploration of classical iterative methods and preconditioners

Gustavo E. Espínola, Juan C. Cabral, Christian E. Schaerer

<https://proceedings.sbmac.org.br/sbmac/article/view/4411>

Proceeding Series of the Brazilian Society of Computational and Applied Mathematics

Resumo

This work performs experiments for the numerical resolution of the one-dimensional Poisson equation with Robin boundary conditions, using the second-order mimetic discretization method, based on the 1D Castillo-Grone mimetic operator [1]. Consider the following equation on a uniform grid, $\nabla^2 u(x) = f(x)$ on $[0, 1]$ (1) subject to Robin boundary conditions $\alpha f(0) - \beta f'(0) = -1$; $\alpha f(1) + \beta f'(1) = 0$, where $\lambda^2 e^{\lambda x} - \lambda e^{-\lambda} - 1$ $f(x) =$, $\alpha = -e$, $\beta =$, $\lambda = -1$. $e^{\lambda x} - 1$ λ [...]

Modelado y simulación de un servicio de urgencias hospitalarias en presencia de pandemia: la covid-19 como estudio de caso

Ramona Elizabeth Galeano

<https://giidea.correounivalle.edu.co/seminarios-pasados/vi-seminario-giidea#h.k7khgg51v66h>

VI Seminario Internacional en avances de investigación y electrónica aplicada

Resumen:

Una pandemia es cuando una enfermedad contagiosa se expande a una gran cantidad de personas y a más de un continente. Causando saturación en los servicios de urgencias de los países, afectando muchas áreas, en especial la economía de los países como el caso del COVID-19. El modelado y simulación provee un método más certero y efectivo para probar nuevas técnicas sin poner en peligro a personas reales. Disponemos de un simulador que ha sido desarrollado como parte de un trabajo de investigación previo del grupo de investigación de Computación de alto rendimiento para aplicaciones eficientes y simulación (HPC4EAS), de la Universidad Autónoma de Barcelona (UAB), el uso del simulador ofrece la posibilidad de visualizar el comportamiento del modelo con diferentes parámetros. En esta investigación proponemos un modelo que permita modelizar el funcionamiento de los servicios de urgencias para diseñar un simulador que ayuden a la planificación y gestión en situaciones de pandemia. La simulación puede ser utilizado como un componente importante de soporte de decisiones para ayudar a los administradores de los hospitales con el objetivo de lograr un mejor ciclo de atención al paciente.

Multicast Routing, Modulation Level and Spectrum Assignment in Elastic Optical Networks — A Genetic Algorithm-Based Approach

Carlos A. Vera y Aragón Villamayor; Jonathan E. Funes; Maria E. Vazquez; Carlos Mendez; Diego P. Pinto-Roa

DOI: 10.1109/CLEI60451.2023.10346187

<https://ieeexplore.ieee.org/document/10346187>

IEEE Xplore

Abstract:

The problem of multicast routing, modulation level, and spectrum assignment is essential for the efficient performance of elastic optical networks. This problem seeks to compute light forests with the least optical network resources to satisfy multicast requests. The proposed strategies in the literature addressed this problem with exact or heuristic techniques, which are suitable when the number of requests is low. Developing scalable and efficient strategies is critical when the problem is complex, therefore, this study proposes a metaheuristic approach based on genetic algorithms. Given a set of multicast requests and a network topology, the proposed approach seeks to compute a set of light forests that minimizes (1) the number of blocked requests, (2) the maximum used frequency slot, and (3) the number of used transponders. Numerical simulations were performed to study the proposed algorithm performance under different static traffic loads and network topologies. The experimental results show that the proposed algorithm is promising for obtaining competitive solutions in reasonable computational time compared to the competitive heuristic approaches of state-of-the-art.

Multiclass Diabetic Retinopathy Classification of Eye Fundus Images Small Datasets Performance Improvement – A Neuroevolution Approach

José Luis Vázquez Noguera; Julio César Mello-Román; Diego P. Pinto-Roa; Santiago Gomez; Jordan Ayala; Diego Aquino-Brítez; Pedro Esteban Gardel-Sotomayor; Miguel García-Torres; Jacques Facon; Veronica E. Castillo Benítez; Ingrid Castro Matto; Pastor Pérez-Estigarribia

DOI: 10.1109/CLEI60451.2023.10346184

<https://ieeexplore.ieee.org/document/10346184>

IEEE *Xplore*

Abstract:

Diabetic retinopathy is an eye complication of a widespread disease named diabetes mellitus. The most widely used method for diagnosing diabetic retinopathy is the analysis of retinal fundus images obtained by retinography. Deep Learning-based methods have shown promising results as a diagnostic tool for diabetic retinopathy, achieving, in some cases, performance close to the human inspection of images. However, the performance of these methods relies heavily on fine-tuning the algorithm hyperparameters and big data sets. In this work, we propose training a Deep Learning network with evolutionary algorithms to classify three stages of Diabetic Retinopathy: i) no sign of diabetic retinopathy, ii) Non-proliferative diabetic retinopathy, and iii) proliferative diabetic retinopathy. We propose a neuroevolution methodology for selecting the most efficient Deep Learning model. The results of the neuroevolution methodology were improved by including Simulated Annealing strategies, Population Reinitialization, and ensembles. With high accuracy, sensitivity, specificity, and kappa index rates of 0.889, 0.889, 0.951, and 0.822, respectively, in the best case found, the experiments show that our neuroevolution methodology for selecting the Deep Learning model hyperparameters is a competitive alternative for training deep neural networks to classify three stages of diabetic retinopathy even with a small data set.

On adaptative GMRES(m) in the PETSc package

Eduardo Gómez, Lucas Vega, Verónica Domiguez, Juan Carlos Cabral,
Christian E. Schaerer

<https://proceedings.sbmac.org.br/sbmac/article/view/4351>

**Proceeding Series of the Brazilian Society of Computational and Applied
Mathematics**

Resumo

The Restarted Generalized Minimal Residual method (GMRES(m)) is a standard method for solving non-symmetric indefinite large linear systems of equations of the form $Ax = b$ [1, 2]. It has the limitation that if the restating parameter m is not adequately chosen can present either a slow convergence or stagnation [3]. This problem has been faced in several previous works [4–6]. However, to be useful for solving practical engineering and simulation problems, it is necessary to have the method in a computationally appropriate platform, allowing the simultaneous implementation in parallel and distributed architectures, and the implementation of several preconditioners. This work introduces a PETSc (Portable, Extensible Toolkit for Scientific Computation) routine that enforces the adaptation in the restarted parameter of the restarted-GMRES method of the solver in the PETSc. [...]

Operation Sequence Design for Image Segmentation Based on Multi-Objective Evolutionary Algorithms

Diego P. Pinto-Roa; Julio César Mello-Román; José Luis Vázquez Noguera; Ramón Quintana; Fredy Roa; Pedro Esteban Gardel-Sotomayor

DOI: 10.1109/CLEI60451.2023.10346166

<https://ieeexplore.ieee.org/document/10346166>

IEEE Xplore

Abstract:

Image segmentation is one of the first steps in most image processing procedures. The segmentation aims to obtain a more meaningful or simplified image representation by grouping pixels with common characteristics, which allows regions or features of interest to be uniquely identified. The result of the segmentation has a significant impact on the subsequent steps. Segmentation is part of several superior applications such as artificial vision, medical, topographic, and astronomical image analysis. No single or universal segmentation process gets optimal performance for all image types. Hence, determining a function that fits specific image types or applications becomes a detailed, complex, and not trivial task requiring much time and effort. In this paper, we propose using Multi-Objective Evolutionary Algorithms (MOEAs) as a training tool that combines operations that represent the techniques and strategies commonly used for generating image segmentation. As a result, sequences of operations are suitable for specific applications or image types. The objective functions used to guide the evolutionary process are sensitivity maximization (TPR) and specificity maximization (TNR), the basic components of ROC analysis. Sensitivity and specificity are commonly used as classification metrics to evaluate the quality of a proposed segmentation compared to an ideal segmentation. We used sensitivity and specificity as objective functions rather than accuracy because, as stated in [1], the dependence on prevalence makes accuracy less effective than a simultaneous consideration of sensitivity and specificity. Experiments were conducted on multiple images that share common characteristics obtained from image databases, specifically: i) benign and malignant melanoma images, ii) ophthalmoscopic retinal images, and iii) binary cell form images, where the segmentation generated by the proposed algorithm was compared with ideal segmentation. The results are quite promising and show t...

Optimal Location of Preventive Health Service Centers for the Temporary Care of Older Adults - A Case Study in the City of Itá-Paraguay

Ramón Domínguez Chaparro; Diana P. Espínola Galeano; Alexis M. Ruiz-Jara; Diego P. Pinto-Roa

DOI: 10.1109/CHILECON60335.2023.10418745

<https://ieeexplore.ieee.org/document/10418745>

IEEE Xplore

Abstract:

The efficient management of limited resources for public administration translates into more excellent coverage of medical care and prevention in comprehensive, quality care for older people. As this segment of the population continues to grow over the years, optimizing locations would have a significant impact on reducing the maximum distance between potential facilities and beneficiary assignments to meet the most critical possible demand, all within the limitations of budget resources, attention span, and staff efficiency in the context of public health focused on healthy aging. In Paraguay, medical care for the elderly population does not have sufficient coverage to include the necessary comprehensive health services. This work focuses on identifying optimal locations for temporary health services centers in the city of Itá and determining the distribution of demand, the allocation of medical personnel, and the coverage period. A mathematical model was designed based on the Set Coverage Problem (SCP) and the P-Center model, where it is determined that acquiring a mobile health center and temporarily establishing itself in selected neighborhoods is more feasible than building a new healthcare center. For the aforementioned mobile service coverage to be efficient, the designed model showed that the Aveiro, Ka'aguasu, Peguajho, and Tape Tuja neighborhoods of the city of Itá are the optimal locations for the mobile center to travel. Likewise, determine that the total cost of the initial investment to operate the mobile center would represent only 9.6% of the annual budget allocated to the city's district hospital. In this way, the hospital would have a gradually decompressed demand with potential beneficiaries, representing, in principle, 23.4% of the patients who constantly search for medical attention.

Optimizing security post placement in a municipal park through deterministic mathematical programming and coverage approach

Fabrizio Recalde, Jorge Recalde, María Margarita López

<https://www.euro-online.org/conf/admin/tmp/program-ifors2023.pdf>

IFORS 2023 Technical Program August 1, 2023

This work addresses the problem of security and surveillance management in public places, specifically in the Botanical and Zoological Garden of Asunción (JBZA), managed by the Municipality of Asunción in Paraguay. We propose a mathematical location model to support the surveillance and security system of JBZA park, specifically the maximum coverage location problem (MCLP); this model locates service centers optimally to maximize specific values important for users. In this case, it is desired to cover the recreational and sports areas of the park by locating mobile security posts within designated zones. Criteria have been established to zone the area and determine the need for coverage in each zone. We calculate the potential demand of each zone and define a mathematical model to approximate the covered demand. The zoning of the Botanical and Zoological Garden of Asunción was based on three criteria: visible divisions, specific sites designated by the administration, and characteristics of the flora; this process resulted in the identification of 28 zones covering the recreational and sports areas of the park. The proposed methodology maximizes the demand covered by the security posts, taking into account the perceived potential risk for security. Additionally, we approximate the covered demand, considering the limited availability of information for specific model parameters. The methodology is valid as a first approach to the system, allowing for the optimization of resource use, and can be adapted to support the management of the surveillance and security system in other public places. The proposed solution has economic and social benefits, achieving cost reduction and increasing perceived security by citizens. The proposed solution manages to cover 100% of the 28 zones in the study area, ensuring the safety and protection of around 493 people. Furthermore, the specific coverage requirements for each zone are met. We recommend implementing the proposed coverage plan in the Botanical and Zoological Garden of Asunción as an effective tool for improving the security and surveillance system in recreational and sports areas, providing a safe and protected environment for visitors and users of the park.

Paradoxical Detection of High-Risk HPV Genotypes in Condylomas and Low-Risk HPV Genotypes in Penile Intraepithelial Neoplasia (PeIN)

María José Fernandez-Nestosa, Diego F Sanchez, Sofia Canete-Portillo, Antonio Cubilla

[https://www.laboratoryinvestigation.org/article/S0023-6837\(23\)00033-8/pdf](https://www.laboratoryinvestigation.org/article/S0023-6837(23)00033-8/pdf)

ABSTRACTS (690-853) GENITOURINARY PATHOLOGY (INCLUDING RENAL TUMORS)

Background: High-risk HPV is considered a major etiological co-factor in penile carcinomas. About 30 to 40% of invasive carcinomas and 80 to 90% of Penile Intraepithelial Neoplasias (PeIN) are associated with high-risk genotypes of HPV. The relationship of genital condylomas and carcinoma is not well established because the majority of condylomas are associated with low-risk HPVs, not considered carcinogenic

Design: Cases were selected from the files of the Instituto de Patología e Investigación. Laser Capture Microdissection (LCM)- PCR and p16 immunostaining were performed at the DDL laboratory in the Netherlands. Study cases were selected from a group of 191 lesions. Condylomas were classified as acuminatum and flat, each further subclassified in typical (common condyloma) or atypical. In the former no atypical cells were identified. In the latter atypical cells were present in the lower third of epithelial thickness

Results: The majority of the lesions were from the foreskin of older patients. High-risk HPV genotypes (HPV16, 39) were identified in 14 condylomata (5 patients) as shown in Table 1. Morphological features varied from typical condylomata acuminata (3 cases), atypical condylomata acuminata (3 cases), mixed atypical flat condylomata (5 cases). Most cases were p16 positive. Lowrisk HPV genotypes (HPV87, 84, 11, 44) were detected in 5 warty and basaloid PeINs from 3 patients. Most cases were p16 negative

Conclusions: Unexpectedly, high-risk HPV genotypes were present in a set of condylomas, especially those with moderate atypia, and low-risk HPV genotypes in high-grade variants of PeIN. The findings suggest that more studies are needed to elucidate the role of condylomas in the pathogenesis of HPV driven penile carcinomas

Preparation and characterization of nanohydroxyapatite paste for additive manufacturing

Alexandre Antunes Ribeiro, Aline Luiza Machado Carlos, Andreza Menezes Lima, Lais de Souza Alves, Antonio José do Nascimento Dias, Luiz Fernando Vieira, Valéria Gonçalves Costa, Roseli Marins Balestra, Magna Monteiro

<https://www.sbpmat.org.br/21encontro/>

Proceedings of the XXI B-MRS Meeting Maceió, AL 2023

Hydroxyapatite, a calcium phosphate-based ceramic found in bone tissue, is one of the most used ceramics to produce feed materials for 3D printing. Due to its excellent biocompatibility and biodegradability properties, it can be used in many areas, such as biomaterials and environmental applications [1]. Hydroxyapatite nanoparticles were synthesized by the sol-gel route using the sonicator technique [2]. Nano-Hydroxyapatite (nanoHAp) pastes were prepared using Poly(Vinyl Alcohol) – PVA and Poly(ethylene glycol) – PEG as organic binders. Firstly, the PVA:PEG, with a proportion of 7:3, was solubilized in distilled water under heating and vigorous stirring. The nanoHAp powder was added to the polymer-based solution at 70, 80 and 90%wt using an Ultra Turrax homogenizer for 10 min. The flowability of the pastes was evaluated by extruding tests [3] using syringes with needles of 0.84 mm in diameter at printing speeds of 5 and 120 mm/min. The microstructure and chemical composition of the nanoHAp powder and paste samples, before and after sintering at 1070 °C for 120 min, were evaluated by SEM/EDS and XRD analysis. The results showed that the synthesized nanoHAp powder is composed of agglomerates and particles with an average size of 1.3 ± 0.95 microns and 21.0 ± 4.9 nm, respectively. The paste with 80%wt of nanoHAp exhibited the best flow characteristic for additive manufacturing.

Prioritization of Transmission Projects in Power System Planning

Edgar Cuevas Fatecha; Rodrigo Rodriguez Miranda; Diana Valdéz Barboza;
Oscar Torres Larroza

DOI: 10.1109/CHILECON60335.2023.10418680

<https://ieeexplore.ieee.org/document/10418680>

IEEE Xplore

Abstract:

Planning the expansion of electric power systems, particularly the transmission system, represents a dynamic and continuous process that requires constant adaptation to the changes that the systems experiment in their environment, whether they are economic, social or technical. Considering that the economic factor is one of the most conditioning aspects in any expansion plan, together with the dynamics of the electricity markets, it is evident that planners face the growing challenge of optimizing the available financial resources, so that any investment decision made in the electricity system is carried out after seeking the maximum possible benefits in technical, social, environmental and even political aspects. In Paraguay, the National Electricity Administration, through its Transmission Master Plan (PMT) for the period 2021-2030, has presented a strategic set of projected works in the 220 and 500kV transmission corridors, mainly with the objective of accompanying the marked growth in demand in recent years. In this paper, a methodology for the analysis and prioritization of transmission works is proposed, applied to a set of nine selected works of the PMT, based on the use of probabilistic indexes applied to the evaluation of the impact of these expansion projects on the reliability of the system during N-1 contingencies. The methodology is applied to equivalent models of the Paraguayan National Interconnected System and focuses on the impact on reliability at the end of the mentioned period, specifically for the years 2029 and 2030, in order to compare the impact on reliability of the works under study. Then, a prioritization tool is applied according to certain criteria, in order to finally determine the priority works of the set of works analyzed. In this way, the methodology presented becomes a useful tool when deciding on investments among a set of transmission works.

Priorización de obras de transmisión en la planificación de sistemas eléctricos

Edgar Cuevas Fatecha, Rodrigo Rodriguez Miranda, Diana Valdéz Barboza

<https://www.xixeriac.com.br/artigos-apresentacoes>

C1.20_2309

Apresentações e trabalhos técnicos

Resumen

La planificación de la expansión de sistemas eléctricos y particularmente del sistema de transmisión, es un proceso dinámico y continuo, que posee el requerimiento de adaptarse constantemente a los cambios propios que experimentan los sistemas en su entorno, sean estos económicos, sociales y técnicos. Considerando que el factor económico es uno de los componentes más condicionantes en todo plan de expansión en conjunto con dinámica de los mercados eléctricos, se hace evidente que los planificadores se enfrentan al creciente desafío de optimizar los recursos financieros disponibles, de tal manera que en toda decisión de inversión realizada en el sistema eléctrico sea realizada luego de buscar lo máximos beneficios posibles en aspectos técnicos, sociales, ambientales e inclusive políticos. En Paraguay, la Administración Nacional de Electricidad, a través de su Plan Maestro de Transmisión (PMT) para el periodo 2021-2030, ha presentado un conjunto estratégico de obras proyectadas en los corredores de transmisión en 220 y 500 kV principalmente, con el objetivo de acompañar el marcado crecimiento de la demanda de los últimos años. En el presente trabajo, se plantea una metodología de análisis y priorización de obras de transmisión, aplicado a un conjunto de nueve obras seleccionadas del PMT de P, a partir de la utilización de índices probabilísticos aplicados a la evaluación del impacto de estos proyectos de expansión sobre la confiabilidad del sistema, durante contingencias del tipo N-1. La aplicación es realizada a modelos equivalentes del Sistema Interconectado Nacional Paraguayo y se centra en el impacto sobre la confiabilidad que se tendría al final del periodo mencionado, específicamente para los años 2029 y 2030, con el fin de comparar el impacto en la confiabilidad de las obras en estudio. Luego, se aplica una herramienta de priorización de obras de acuerdo a determinados criterios, para finalmente determinar las obras prioritarias del conjunto de obras analizado. De esta forma, la metodología presentada se convierte en una herramienta útil al momento de decisión de inversiones de entre un conjunto de obras en transmisión, o en el segmento que sea aplicada.

Routing and Spectrum Assignment in Elastic Optical Networks through a Hybrid Approach based on K-Shortest Paths and Q-Learning

Ivan I. Ríos-Villalba; Santiago Arce; Luis Ayala Albertini; Diego P. Pinto-Roa

DOI: 10.1109/LA-CCI58595.2023.10409393

<https://ieeexplore.ieee.org/document/10409393>

IEEE Xplore

Abstract:

Reinforcement learning techniques have been successfully applied to the routing and spectrum assignment problem in elastic optical networks. These techniques offer a promising approach by enabling agents to make sequential decisions based on network conditions and traffic demands. However, the literature reported that heuristics are more efficient than reinforcement learning approaches in low-traffic scenarios. Consequently, this paper explores the advantages of combining the strengths of both approaches to achieve an efficient algorithm in all loading scenarios. This study explores the performances of Q-learning for medium and high traffic loads and the K-shortest path algorithm for low traffic loads. The proposed hybrid approach leads to improved resource utilization, latency reduction, and overall network performance under dynamic traffic load. Numerical simulations were performed on a real network topology in which the proposed hybrid approach was studied against the state-of-the-art algorithms. The results indicate that the proposed approach shows promise in achieving better or equal performance at all traffic loads compared to non-hybrid approaches.

Secure Academic Certificates Using Blockchainbased Technology

Laura Benítez; Juan Acuña; José Luis Vázquez Noguera; Lilian Riveros; Adrian Almiron; Diego Duarte

DOI: 10.23919/CISTI58278.2023.10211436
<https://ieeexplore.ieee.org/document/10211436>

IEEE Xplore

Abstract:

Technology is part of everyday life in any academic center. Manual tasks are replaced by automations that facilitate processing and save time and resources. However, the legitimacy of the data contained in digital documents is at risk due to the ease with which it can be adulterated. This paper proposes to automate the task of issuing customized digital academic certificates for educational institutions, without neglecting security. This process is supported by a mechanism that guarantees the immutability of the data through a prototype that uses Blockchain-based technology. To this end, tests were carried out to guarantee the unalterability characteristic of this technology and thus ensure that the information contained in the documents is not easily modified. The system also underwent a set of functional tests, which helped to determine that the system is in an optimal state to be used.

Small-scale farms food security and profitability promotion in developing countries: a case study from Paraguay

Jorge Vera, María Margarita López, Lluís Miquel Plà-Aragonès, Jorge Recalde

<https://www.euro-online.org/conf/admin/tmp/program-ifors2023.pdf>

IFORS 2023 Technical Program August 1, 2023

Peasant farmers play a predominant role in reaching food security; they represent 80% of worldwide establishments producing food. They are more affected by food insecurity, however, due to their high dependence on natural resources, their unsustainability, and the unprofitability of their operations. The self-consumption of crops leads to the uprooting of communities and inadequate diets with low-cost foods - highly energetic and poor in nutrients. Furthermore, in developing countries, small-scale farms' operations and work culture have limitations differentiating their decision-making process from large-scale farmers. Modeling the peasant operations is complex, given the many social and nutritional requirements to consider. Also, a system like this will present many alternatives to farmers regarding the use of their land and distribution of crops. Relying only on intuition and limited data will lead to suboptimal and poor-performing solutions. In this context, this research addresses, through a Mixed Integer Linear Programming model (MILP), the profitability and food security of peasant farmers, considering their strategic and tactical decisions. The first relates to supply purchasing, crop production, rotation strategies, and gathering center allocations. The second one comprises crop allocation, harvest, postharvest programming, and workforce planning. A base case study and three scenarios were developed for the Department of Caazapá, Paraguay, where peasants are assisted by the Local Agencies for Technical Assistance (ALAT), from the Ministry of Agriculture and Livestock (MAG). They produce 51 different vegetables and fruits, but 80% of the land is assigned to traditional crops (sesame, cassava, corn, and beans). Even more, 70% of production, is for self-consumption with low-profit expectations. The three axes of sustainability were also considered when carrying out the work. In economic terms, the results are obtained at the lowest possible cost by maximizing the total profitability for five years, considering the sale of products to external demand, and generating income for the farm. In the environmental area, crop rotation and obtaining a mix of products are considered, to not degrade the soil of producers in the long term. Finally, in the social aspect, the model satisfies a percentage of families' nutritional requirements with safe products, available on a timely basis.

Solving the angular velocity of the physical pendulum motion by some numerical methods

Salustiano Vega; Eduardo Ortigoza; Fátima Servián; Osvaldo Vega; Heriberto González; José Velásquez; Cristian Martínez

DOI: 10.1109/ICECCME57830.2023.10252336

<https://ieeexplore.ieee.org/document/10252336>

IEEE Xplore

Abstract:

The study of the pendulum problem lies at the intersection of mathematics and physics, with a focus on its representation through differential equations. However, finding analytical solutions using conventional techniques is often challenging. Typically, the analysis is confined to the simplest case of small oscillation amplitudes, where harmonic motion can be accurately described using less complex techniques. Yet, when dealing with large oscillations, the complexity increases, necessitating the use of numerical methods to approximate the solutions of the nonlinear differential equations involved. In this research, we aim to numerically solve for the angular velocity of a damped oscillating rigid pendulum rotating on a pivot under the influence of a uniform gravitational force in the vertical direction. We will propose initial conditions for the differential equation governing the pendulum's motion and implement classical numerical algorithms, including first-order methods like Euler and Euler Backward, second-order methods such as Runge-Kutta and Adams-Bashforth, and third- and fourth-order methods like Adams-Moulton, Trapezium, and Runge-Kutta. To evaluate the performance of these numerical algorithms, we will compare their results with the solutions obtained using the ODE45 solver from the MATLAB software, known for solving ordinary differential equations. The objective is to identify the most efficient algorithm for accurately solving this mathematical model.

Transmission Expansion Planning Challenges in the Paraguayan Electrical Power System

Fernando Cáceres Rodríguez; Javier Manuel Ibáñez Troche; Richard Ríos; Diana Valdéz Barboza; Rodolfo Reta

DOI: 10.1109/CHILECON60335.2023.10418756

<https://ieeexplore.ieee.org/document/10418756>

IEEE Xplore

Abstract:

In an electrical system, the transmission system is particularly a fundamental infrastructure as it plays an important role for the accessibility and development of the electrical market. In the present work, an optimal planning of the transmission expansion to the Paraguayan electrical system was carried out, minimizing the operation and investment costs. A reduced equivalent system of the Paraguayan electrical system at 500 kV was elaborated, in which certain candidate works of the Transmission Master Plan of the Paraguayan Electrical Market Administrator were analyzed, applying mathematical optimization methods, having represented the network by a DC model. The mixed integer nonlinear programming problem is solved by programming in GAMS. As a result, it was determined from a set of candidate circuits, which are necessary to build for a given time horizon, so that the operating restrictions are satisfied and the operation and investment costs together are the minimum to supply the future demand. It is demonstrated that the results provide valid technical support for the selection of 500 kV works to be prioritized, and that there are works that can be reconsidered as they do not provide a reduction in operating costs or in terms of energy not supplied. In addition, for the particular case studied, it was observed that a minimum investment can mean large reductions in the operating cost of the system

Virtual Multicast Tree Embedding and Protection Over Elastic Optical Networks Based on Genetic Algorithms

Rossana Gabriela Marín Báez; Deysi Leguizamán Correa; José Colbes; Diego P. Pinto-Roa

DOI: 10.1109/CLEI60451.2023.10346199

<https://ieeexplore.ieee.org/document/10346199>

IEEE *Xplore*

Abstract:

Elastic optical network survivability is essential for a viable multicast service implementation. In turn, multicast tree over virtual network embedding has become a vital service for multicast traffic. The study of multicast protection techniques in virtual network embedding and elastic optical networks has received significant attention. However, multicast protection is incipient when virtual network embedding uses elastic optical networks as the substrate layer. Consequently, this work approaches virtual multicast tree embedding over elastic optical networks and protection against single optical link failures, which we call the virtual optical multicast tree embedding and protection problem. This study proposes a genetic algorithmbased approach that works with different multicast protection schemes: dedicated dual-tree, shared dual-tree, dedicated subgraph, and shared sub-graph. Given a network topology, a set of virtual optical multicast requests, and a multicast protection scheme, the proposed approach seeks to calculate a solution that minimizes the total spectrum used, the number of blocked requests, and the number of unprotected incrustrated requests. Numerical simulations on different network topologies and traffic loads were performed to analyze the impact of the protection schemes. The results show that the shared subgraph achieves better results regarding the total spectrum used and blocking. If the traffic requires dedicated protection, the dedicated subgraph scheme is more efficient than the dual-tree.

Web System for The Rehabilitation of Cognitive Functions in Patients With Traumatic Brain Injury

Mirta Moran, César Yegros and Eladio Quintana

[11th-14th JULY, 2023 Gran Canaria \(SPAIN\)](#)

IWBIO 2023 PROGRAM & ABSTRACTS INFORMATION

[7473]

The Traumatic Brain Injury (TBI) is brain damage that occurs suddenly due to a blow to the head or an element that passes through it. Traumatic Brain trauma constitutes one of the main causes of disability in the young population, previously healed, especially as a result of road accidents mainly motorcycle accidents. The physical and cognitive alterations caused by traumatic brain trauma limit the performance in the work, academic and social activities of the affected person. The cognitive sequelae interfere with the daily activities of the individual directly affecting their quality of life and that of their environment; Therefore, neuropsychological intervention is necessary through a cognitive rehabilitation program. The Basic Health Indicators 2019 of the Ministry of Public Health and Social Welfare show that the health regions with the highest mortality rate due to Land Transportation Accidents are: President Hayes, Amambay, Concepción and Cordillera. Considering the incidence data of land transport accidents, it is necessary to provide post-TBI patients with a care service in the area of neuropsychology, especially for patients residing in the countryside. The main objective of the project is to develop a system based on Information and Communication Technologies (ICTs) that can be implemented in the platform of the National Telemedicine System of the MSP and BS to facilitate the process of rehabilitation of cognitive functions after Traumatic Brain Injury (TBI)

Datos estadísticos

Producción científica de estudiantes de postgrado y grado por grupos de investigación

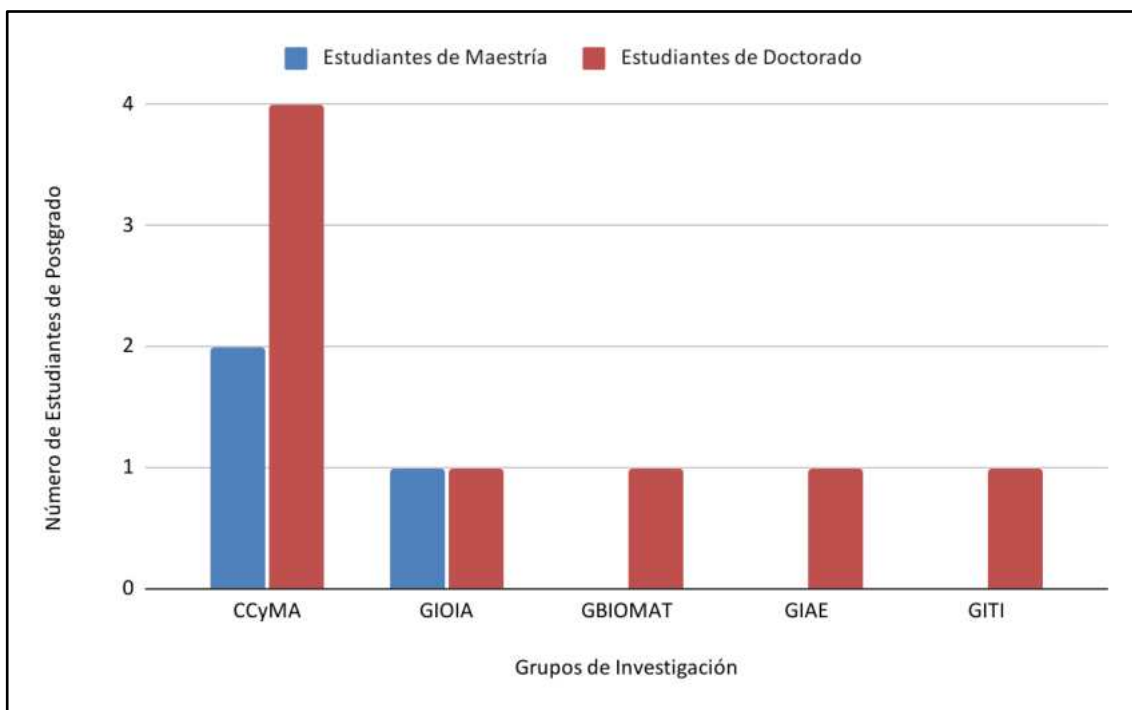


Gráfico 1. Número de estudiantes de postgrado por grupos de investigación¹

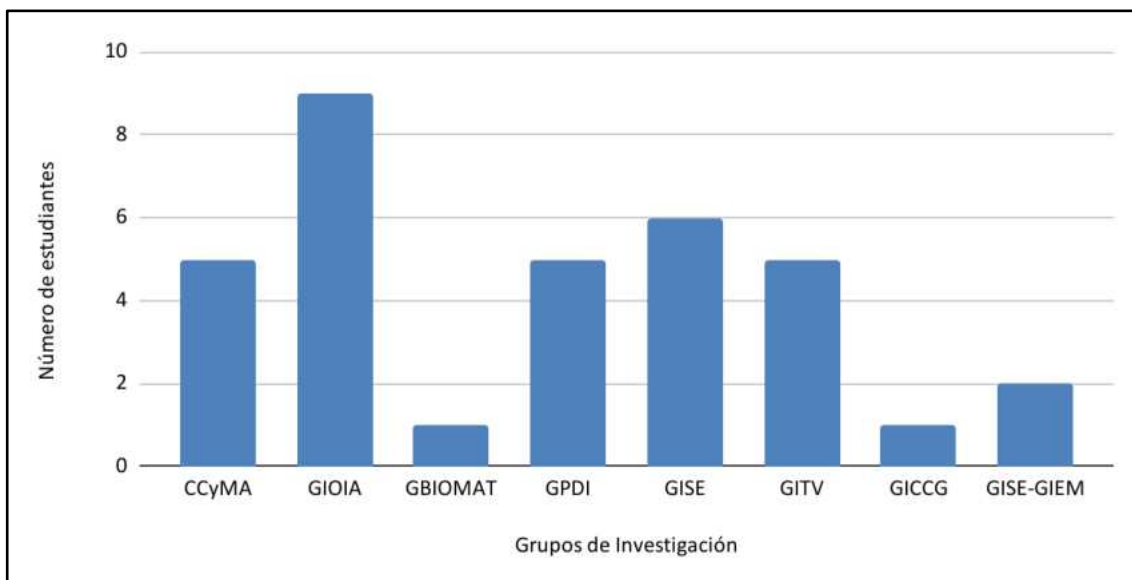


Gráfico 2. Número de estudiantes de grado por grupos de investigación²

¹ Grupos de Investigación (GI): GBIOMAT: GI en Biomateriales, CCyMa: GI en Ciencias de la Computación y Matemática Aplicada, GIOIA: GI en Operaciones e Inteligencia Artificial, GPDI: GI en Procesamiento Digital de Imágenes, GIEM: GI en Electrónica y Mecatrónica, GISE: GI en Sistemas Energéticos, GITI: GI en Tecnología de la Información, GITV: GI en Tecnologías Verdes, GIAE: Grupo en Formación Aeronáutico y Espacial, GICCG: GI en Formación en Ciencias del Cambio Global.

² Idem

Producción científica de estudiantes postgrado y grado por grupos de investigación

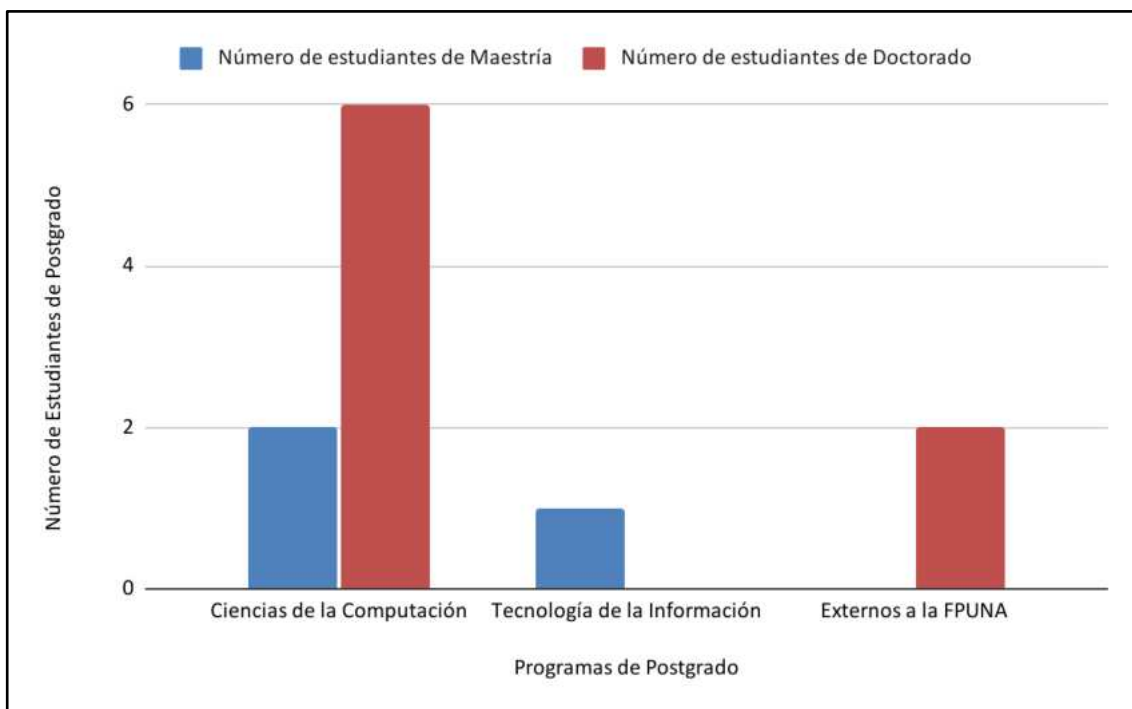


Gráfico 3. Número de estudiantes de postgrado por programas

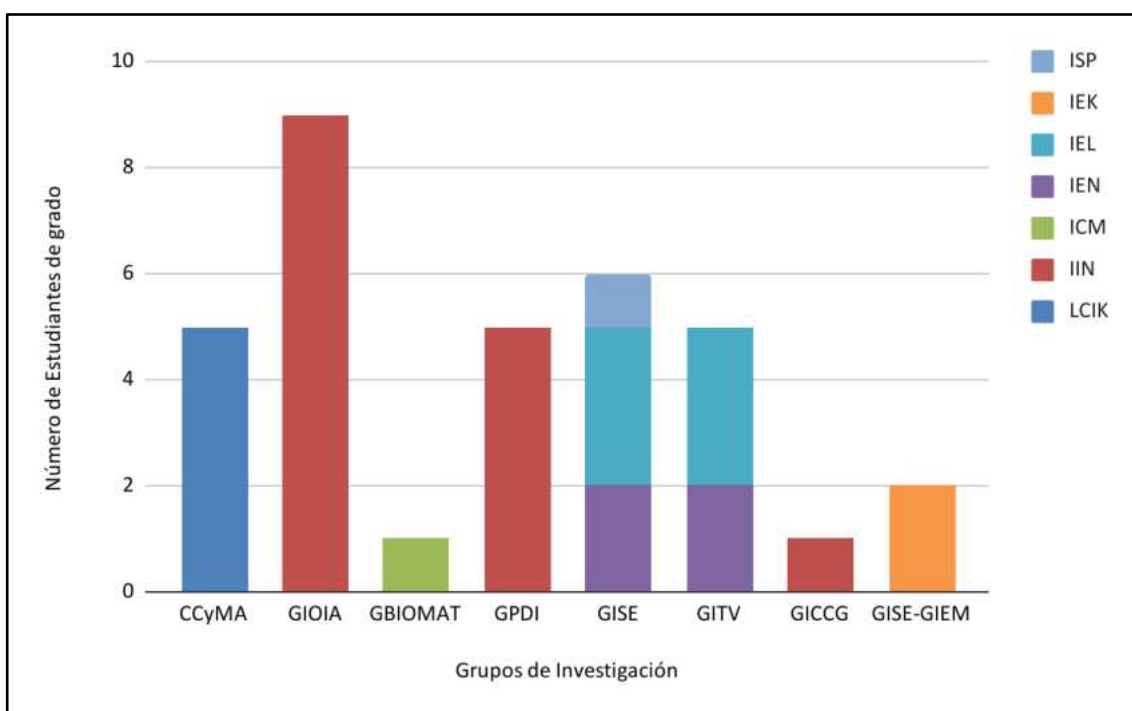


Gráfico 4. Número de estudiantes de grado por carreras³ y por grupos de investigación

³ Carreras de grado: ICM Ingeniería en Ciencias de los materiales, IEK Ingeniería en Electrónica, IEL Ingeniería en Electricidad, IEN Ingeniería en Energía, IIN Ingeniería en Informática, ISP Ingeniería en Sistemas de Producción, LCiK Licenciatura en Informática, ICM Ingeniería en Ciencias de los materiales, IEK Ingeniería en Electrónica, IEL Ingeniería en Electricidad, IEN Ingeniería en Energía, IIN Ingeniería en Informática, ISP Ingeniería en Sistemas de Producción, LCiK Licenciatura en Informática.

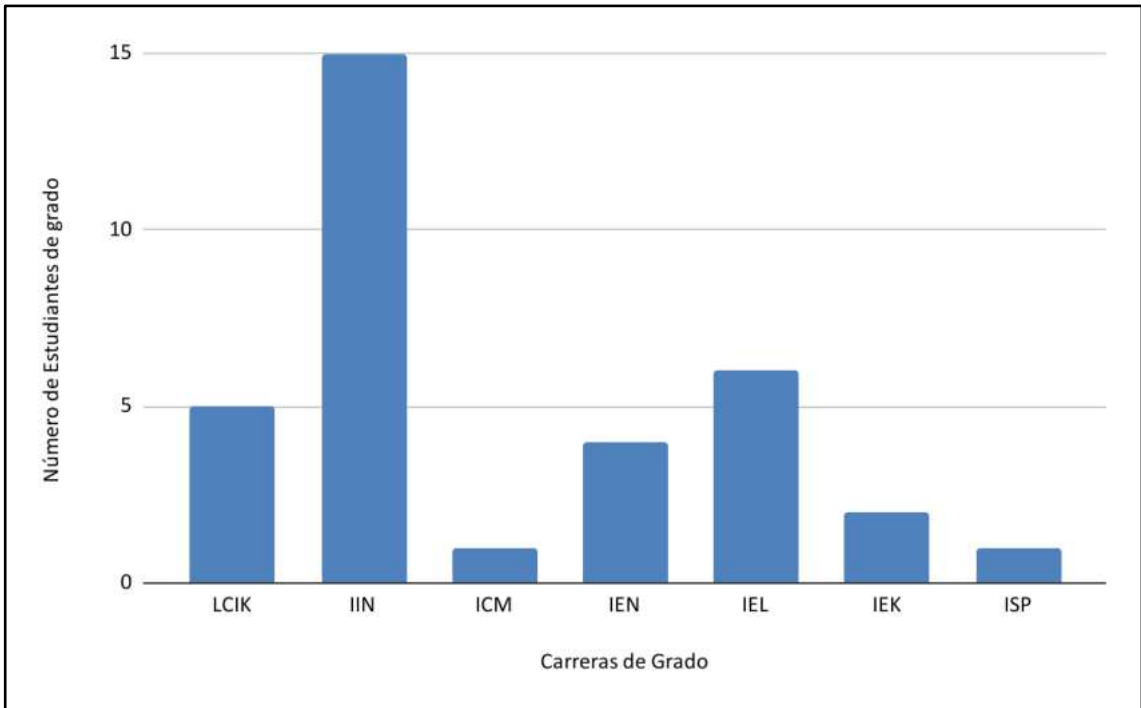


Gráfico 5. Número de estudiantes de grado por carreras

Grupos de investigación de la Facultad Politécnica de la UNA (GI)

GIAO	GI en Algoritmo y Optimización
Gbi	GI en Bioinformática
GBIOMAT	GI en Bio y Materiales
GICI	GI en en Ciencias de la Información
CC&MA	GI en Computación Científica y Matemática Aplicada
GIEM	GI en Electrónica y Mecatrónica
GIIB	GI en Ingeniería Biomédica
GIOIA	GI en Operaciones e Inteligencia Artificial
GPDI	GI en Procesamiento digital de imágenes
GISE	GI en Sistemas Energéticos
GITI	GI en Tecnología de la Información
GITV	GI en Tecnologías verdes
GITOC	GI en Teoría de la Computación

Grupos de investigación en formación de la Facultad Politécnica de la UNA (GIF)

GIF Astronomía	GIF en Ciencias del Cambio Global	GIF Turismo, Hotelería y Gastronomía
GIF Aeronáutico y Espacial	GIF en Tecnología Aplicada y Educación	GIF en Ensayos de Materiales Metálicos
GIF en Sistemas Digitales	GIF en Control y Automatización industrial	

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mayo, 2024

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