UNIVERSIDAD NACIONAL DE ASUNCIÓN
FACULTAD POLITÉCNICA
DIRECCIÓN DE INVESTIGACIÓN

VOLUMEN 3
JUNIO, 2025

PRODUCCIÓN CIENTÍFICA DE LA FP-UNA 2024

ABSTRACT BOOK

CAMPUS DE LA UNA
SAN LORENZO, PARAGUAY

PRODUCCIÓN CIENTÍFICA DE LA FP-UNA 2024

Abstract Book

Volumen 3

UNIVERSIDAD NACIONAL DE ASUNCIÓN
FACULTAD POLITÉCNICA
DIRECCIÓN DE INVESTIGACIÓN
Campus de la UNA, San Lorenzo
Junio 2025

UNIVERSIDAD NACIONAL DE ASUNCIÓN
Facultad Politécnica
Silvia Teresa Leiva León – Decana
Claudio Nil Barúa Acosta – Vicedecano

DIRECCIÓN DE INVESTIGACIÓN
Diego Pinto Roa, Director

PRODUCCIÓN TÉCNICA

COORDINACIÓN
Diego Pinto Roa

PRODUCCIÓN Y EDICIÓN
María Elena Torres

COLABORACIÓN
Johana Pineda - Análisis estadístico
Ida Romero - Recolección de datos
Christian Cáceres - Lectura y verificación

DISEÑO Y DIAGRAMACIÓN
Claudia Maldonado

PUBLICACIÓN FP-UNA
Aprobada por Resolución de la Decana de la Facultad Politécnica N° 0772/2025

Dirección de Investigación
Km. 11 – Campus de la UNA, San Lorenzo – Paraguay
investigacion@pol.una.py
https://www.pol.una.py/investigacion/
junio, 2025

CONTENIDO

	Páginas
Presentación	1
Artículos publicados en revistas científicas	2
Trabajos completos y resúmenes	27
Capítulos de libros	70
Datos estadísticos	75
Índice de autores con adscripción FP-UNA	79

PRESENTACIÓN

El 2024 ha sido un año de grandes logros para la Facultad Politécnica de la UNA (FP-UNA) ya que, entre las 22 distinciones obtenidas, destacamos el logro del reconocimiento de la Facultad como “Institución de Investigación Consolidada” (CVIN01-37). Esta categorización se realizó con base en el Curriculum Vitae Institucional (CVI), una plataforma que contiene documentos y evidencias sobre la trayectoria científica y académica institucional, que fueron analizados y comprobados por el Consejo Nacional de Ciencia y Tecnología (CONACYT) para otorgar esa calificación.

Además, se ha logrado la categorización, por parte de CONACYT, de 7 grupos de investigación de la Facultad, a saber:
1 como grupo “Consolidado”: Grupo de Investigación en Computación Científica y Matemática Aplicada (CCyMA).
3 “en Desarrollo”: Grupo de Investigación en Ciencias de la Información (GICI), Grupo de Investigación en Algoritmo y Optimización (GIAO), Grupo de Investigación en Biomateriales (GBIOMAT).
3 “en Formación”: Grupo de Investigación en Sistemas Energéticos (GISE), Grupo de Investigación en Bioinformática (GBI) y el Grupo de Investigación en Procesamiento Digital de Imágenes (GPDI).

A todo esto, se suma la Mención de Honor del Premio Nacional de Ciencias del Paraguay 2024, otorgado al trabajo denominado: “Vigilar y Castigar en juegos de bienes públicos panópticos”, de la investigadora Rocío Botta, del CCyMA.

Por último, se agrega que, 3 docentes investigadores de esta Facultad obtuvieron el grado de “Senior Member” en la IEEE, Instituto de Ingeniería Eléctrica y Electrónica (por sus siglas en inglés): Dr. Horacio Legal (GPDI), Dr. Enrique Dávalos (GIAO) y el Dr. Diego Pinto (Grupo de Investigación de Operaciones e Inteligencia Artificial - GIOIA y director de la Dirección de Investigación de la FP-UNA).

En esta tercera entrega de “Producción científica de la FP-UNA”, además del contenido del año anterior, se incluyen capítulos de libros.

También, en la edición de este año, se suman dos nuevos Grupos de Investigación en Formación (GIF), cuyos registros provisorios se aprobaron en 2024. Así, actualmente se cuenta con 10 GIFs.

Este libro se encuentra disponible y para su descarga para todos aquellos que deseen conocer la producción científica de la FP-UNA durante 2024. Además de responder a la transparencia mediante la presentación de trabajos, se busca contribuir, de alguna manera, con los avances en ciencia y tecnología en nuestro país.

Artículos publicados en revistas científicas

Analysis of the Behavior of a Gas-generating System under runaway conditions in a Closed Vessel

Grati, A. and Castier, M. and Véchot, L. N.

DOI: https://doi.org/10.1016/j.psep.2024.09.048
https://www.sciencedirect.com/science/article/pii/S0957582024011881

Process Safety and Environmental Protection

Abstract

In the event of a runaway reaction, emergency relief systems (ERS) act as the last line of defense against the vessel explosion. To date, ERS design for scenarios involving the runaway of chemical mixtures that generate gaseous reaction products remains very challenging as it requires the prediction of the gas generation rate under runaway conditions at large scale. Current methodologies for the assessment of the gas generation rate are based on pseudo-adiabatic calorimetric experiments at laboratory scale in which the temperature and pressure profiles resulting from the runaway are used to assess the gas generation rate using the ideal gas law. The gas generation rate needs to be further corrected for the thermal inertia (φ-factor), of the calorimetric cell used (φ>1) to predict large scale behavior (φ≈1). The work described in this paper focuses on evaluating the capability of this approach to accurately assess the gas generation rate. It uses a dynamic simulator tool based on rigorous thermodynamics to calculate the temperature, pressure, and the composition of each component in a closed vessel containing a gas generating reactive mixture (decomposition of 20 % w/w di-tert butyl peroxide in toluene) under runaway conditions over a range of initial vessel fill levels. The results were analyzed to develop a better understanding of the phenomena that govern the thermal behavior of the mixture, the overall pressurization of the vessel, rate of generation of the gaseous products and its distribution in the liquid and vapor phase of the vessel as the runaway reaction occurs. The simulated pressure, temperature and phase composition data rigorously calculated by the simulator were used to assess and highlight the limitations of using the temperature and pressure in a closed vessel and the ideal gas law to evaluate the gas generation rate. The simulations were also used to evaluate the validity of φ-factor correction methods currently available in the literature.

Bioprospection of Bacterial Strains from Chromite Process Industry Residues from Mexico for Potential Remediation

Paola Abigail Martínez-Aldape, Mario Enrique Sandoval-Vergara, Reyna Edith Padilla-Hernández, César Augusto Caretta, Julio César Valerdi-Negreros, Pablo Casanova, Magna Maria Monteiro, Claire Gassie, Marisol Goñi-Urriza, Elcia Margareth Souza Brito and Remy Guyoneaud

DOI: https://doi.org/10.3390/applmicrobiol4020046
https://www.mdpi.com/2673-8007/4/2/46

Applied Microbiology

Abstract

Industrial residues with high concentrations of hexavalent chromium [Cr(VI)], characterized by an alkaline pH (between 9 and 13) and high salinity (around 100 psu), were used as a source for extremophilic chromium-resistant and -reducing microorganisms. An investigation of biodiversity through MiSeq showed the presence of 20 bacterial classes, with Bacilli (47%), Negativicutes (15%), Bacteriodia (8%), Gammaproteobacteria (7%) and Clostridia (5%) being the most abundant. The bioprospection allowed the cultivation of 87 heterotrophic bacterial colonies and 17 bacterial isolates at the end of the isolation, and screening procedures were obtained. The isolates were related to Cellulosimicrobium aquatile, C. funkei, Acinetobacter radioresistens, Staphylococcus equorum, S. epidermis, Brachybacterium paraconglometratum, Glutamicibacter creatinolyticus, Pseudomonas songnenensis, Microbacterium algeriense and Pantoea eucalypti, most of them being resistant to Cr(VI). Resistances of up to 400 mg.L−1mg.L−1 of chromate were obtained for four related strains (QReMLB55A, QRePRA55, QReMLB33A and QReMLB44C). The C. aquatile strain QReMLB55A and the P. songnenensis strain ReMLB33A were exposed to K2Cr2O7K2Cr2O7 (200mg.L−1mg.L−1) under optimal conditions, diminishing 94% and 24% of the Cr(VI) in 6 days, respectively. These strains exhibited a high potential for chromium remediation biotechnologies.

Bone scan images dataset for study of bone metastases in adult breast cancer patients at IICS-UNA, Paraguay

Carolina Elizabeth Villegas-Colmán, Julio César Mello-Román, José Luis Vázquez Noguera, Horacio Legal-Ayala, Pastor Pérez Estigarribia, Benicio Grossling-Vallejos, Ronald Rivas, María Gloria Pedrozo, Cynthia Duarte, Graciela Giménez, Andrés Uldera, Marina Arnal, Nicole Barreto, Teresa Rojas

https://doi.org/10.1016/j.dib.2024.111191Get rights and content
https://www.sciencedirect.com/science/article/pii/S2352340924011533?via%3Dihub

Data in Brief

Abstract

This article presents 582 bone scan images from 291 adult patients who attended the Nuclear Medicine Service at the Instituto de Investigaciones en Ciencias de la Salud (IICS) of the Universidad Nacional de Asunción (UNA), Paraguay, between 2020 and 2024. The images were acquired using trimodal SPECT-CT-PET equipment, model AnyScan SCP, and the MEDISO brand. Approximately 20 mCi of technetium-99m methylene diphosphonate (99mTc-MDP) was administered to each patient, producing whole-body planar images in anterior and posterior projections of the axial and appendicular skeleton with a resolution of 256 × 1024 pixels. The images were labeled according to the final diagnosis by a nuclear physician, covering conditions ranging from joint lesions to bone metastases. This dataset will be helpful for researchers working on bone scan image analysis using artificial intelligence techniques to classify bone metastases.

Classical density functional theory consistent with the SAFT-VR Mie equation of state: Development of functionals and application to confined fluids

A. de Freitas Gonçalves, R. J. Amancio, M. Castier, and L. F. M. Franco

DOI: https://pubs.acs.org/doi/10.1021/acs.jced.4c00020

Journal of Chemical & Engineering Data

Abstract

Classical density functional theory has provided a robust and consistent framework to thermodynamically describe systems with local density variations. The development of functionals that are consistent with homogeneous equations of state allows us to investigate inhomogeneous systems applying the same models used for homogeneous ones. Particularly for adsorption, this is extremely desirable since one ought to apply a consistent modeling for both bulk and adsorbed phases. In this work, new functionals for the Helmholtz energy are proposed by combining the Statistical Associating Fluid Theory for potentials of variable range of Mie type (SAFT-VR Mie) with the weighted density approximation (WDA) formalism of classical density functional theory. As a result, the SAFT-VR Mie equation of state is extended to inhomogeneous fluids and is applied in the prediction of density profiles of linear alkanes adsorbed in carbon slit pores. The density profiles of the adsorbed phases are compared to the results of molecular simulations performed with the Monte Carlo method in the grand-canonical ensemble. An example involving capillary condensation and hysteresis is also investigated. Despite the intrinsic differences between molecular simulation and the analytical model with regard to the representation of the molecular structure, a qualitative agreement and, to some extent, quantitative agreement are obtained.

Classical density functional theory of confined fluids: From getting started to modern applications

V. M. Sermoud, A. F. Gonçalves, A. G. Barreto Jr., L. F. M. Franco, F. W. Tavares, and M. Castier

DOI: http://dx.doi.org/10.1016/j.fluid.2024.114177

Fluid Phase Equilibria

Abstract

The application of classical density functional theory (cDFT) to model confined fluids is an outstanding example of directly using fundamental scientific knowledge, such as Statistical Mechanics, to calculate both structural fluid information and macroscopic physical properties needed for process design. One of the goals of this work is to provide materials that allow the reader to become familiar with cDFT. To do that, we present the fundamentals of cDFT and provide sample computational codes that apply its concepts to simple cases. A second goal is to present some of the modern applications of cDFT and related techniques, such as the multicomponent potential theory of adsorption and the development of specialized equations of state for confined fluids, as well as to review publicly available cDFT computer libraries. Overall, there has been a remarkable number of successful applications, ranging from ideal gases confined in 1D geometries to fluids modeled by modern equations of state in 3D porous solids. At the same time, some challenges remain. For example, most implementations are based on grand-potential formulations, which are not always the most convenient for process design. Further, additional results of heat of adsorption predictions would be useful because of their importance in equipment design. Another intriguing alternative could be integrating information from quantum DFT software simulations as input for classical DFT simulations.

Dataset of Raman spectroscopy responses for over-the-counter drugs in Paraguay, including acetylsalicylic acid, paracetamol, and ibuprofen

Juan Ramón Ruiz Rodas, Francisco Ferreira, Gustavo I. Rivas-Martínez, Fabio Luiz Melquiades, Julio César Mello-Román, Alex Matos Da Silva Costa, Sonia Amarilla, Fernando Mendez, Edher Z. Herrera

DOI: https://doi.org/10.1016/j.dib.2024.110844
https://www.sciencedirect.com/science/article/pii/S2352340924008084?via%3Dihub

Data in Brief

Abstract

This dataset includes spectra obtained through Raman spectroscopy of acetylsalicylic acid, paracetamol, and ibuprofen commercialized in San Lorenzo, Central Department of Paraguay. The pharmaceuticals were randomly purchased from pharmacies, official sales points, and street vendors, simulating purchases for self-consumption. These drugs were selected due to their high demand and consumption by the population, aiming to document and facilitate the identification of adulterations or alterations in their original structures caused by poor storage conditions. Additionally, this database will support multivariate studies for clustering using various techniques, both supervised and unsupervised, and will allow for signal processing and spectroscopic data handling.

Density gradients in aqueous salt solutions: A challenging calculation for electrolyte equations of state

Iván Cubilla, Marcos Cáceres, Christian E. Schaerer, Marcelo Castier

DOI: https://doi.org/10.1016/j.fluid.2024.114327
https://www.sciencedirect.com/science/article/abs/pii/S0378381224003029

Fluid Phase Equilibria

Abstract

In clinical laboratories around the world, isopycnic separations are routinely used to separate biological materials based on density differences. One of the techniques to form a density gradient for such separations is to centrifuge an aqueous salt solution. The high angular speeds, salt concentration and pressure can reach high values, creating challenging conditions for the modeling of centrifugation equilibrium. This paper addresses this problem and presents a formulation and a solution procedure for determining the thermodynamic equilibrium of electrolyte solutions during centrifugation. This is accomplished by a nested-loop algorithm; the outer loop iterates on the liquid volume; the inner loop minimizes the Helmholtz function at the given temperature and component amounts, for the current volume value. The Helmholtz function is evaluated as the summation of an intrinsic contribution given by the eSAFT-VR Mie equation of state, an external contribution of the centrifugal field, and induced electrostatic contribution associated with the possible displacement of charged species in the system. In general, qualitative agreement between the experimental and calculated density profiles was observed in the three systems studied.

Discipline and punishment in panoptical public goods games

Rocío Botta, Gerardo Blanco & Christian E. Schaerer

DOI: https://doi.org/10.1038/s41598-024-57842-0
https://www.nature.com/articles/s41598-024-57842-0

Scientific Reports

Abstract

In Public Goods Games (PGG), the temptation to free-ride on others' contributions poses a significant threat to the sustainability of cooperative societies. Therefore, societies strive to mitigate this through incentive systems, employing rewards and punishments to foster cooperative behavior. Thus, peer punishment, in which cooperators sanction defectors, as well as pool punishment, where a centralized punishment institution executes the punishment, is deeply analyzed in previous works. Although the literature indicates that these methods may enhance cooperation on social dilemmas under particular contexts, there are still open questions, for instance, the structural connection between graduated punishment and the monitoring of public goods games. Our investigation proposes a compulsory PGG framework under Panoptical surveillance. Inspired by Foucault's theories on disciplinary mechanisms and biopower, we present a novel mathematical model that scrutinizes the balance between the severity and scope of punishment to catalyze cooperative behavior. By integrating perspectives from evolutionary game theory and Foucault's theories of power and discipline, this research uncovers the theoretical foundations of mathematical frameworks involved in punishment and discipline structures. We show that well-calibrated punishment and discipline schemes, leveraging the panoptical effect for universal oversight, can effectively mitigate the free-rider dilemma, fostering enhanced cooperation. This interdisciplinary approach not only elucidates the dynamics of cooperation in societal constructs but also underscores the importance of integrating diverse methodologies to address the complexities of fostering cooperative evolution.

Effect Investigation of Ammonium Bicarbonate and Polyethylene Wax as Pore-Forming Agents on the Physicochemical Properties of Macroporous Biphasic Calcium Phosphate Bioceramics Processed by Space-Holder Technique

Alexandre Antunes Ribeiro, Omayra Beatriz Ferreiro Balbuena, Andreza Menezes Lima, Lais de Souza Alves, Magna Maria Monteiro, Marize Varella de Oliveira, Luiz Carlos Pereira

DOI: https://doi.org/10.1590/1980-5373-MR-2024-0270
https://www.scielo.br/j/mr/a/RtDtjqds6Lx4CWc4DLXtqPG/?lang=en

Materials Research

Abstract

The effect of ammonium bicarbonate (AB) and polyethylene wax (PW) on the physicochemical properties of macroporous biphasic calcium phosphate bioceramics (BCPs) processed by space-holder technique was investigated. BCP powder was mixed with AB and PW and, then, uniaxially cold-pressed at 300 MPa. AB and PW were eliminated by heat treatment at 170°C for 2 hours or 550°C for 4 hours, respectively. Subsequently, the samples were air-sintered at 1070ºC for 2 hours. The results revealed that AB is more attractive than PW due to its lower degradation temperature, which has avoided the formation of undesirable phases. In addition, it favored an adequate consolidation of the particles with the formation of sintering necks that provided a better mechanical resistance to handling. The samples with AB also presented the formation of uniformly distributed macro and microporosity in great extension, which is shown by literature as a fundamental combination to stimulate cells/scaffold interaction.

Electrophoretic Mobility Assay to Separate Supercoiled, Catenated, and Knotted DNA Molecules

Jorge Cebrián, Victor Martínez, Pablo Hernández, Dora B. Krimer, María-Luisa Martínez-Robles, Jorge B. Schvartzman, María José Fernández-Nestosa

DOI: 10.21769/BioProtoc.4983
https://bio-protocol.org/en/bpdetail?id=4983&type=0

Bio-protocol

Abstract

Two-dimensional (2D) agarose gel electrophoresis is the method of choice to analyze DNA topology. The possibility to use E. coli strains with different genetic backgrounds in combination with nicking enzymes and different concentrations of norfloxacin improves the resolution of 2D gels to study the electrophoretic behavior of three different families of DNA topoisomers: supercoiled DNA molecules, post-replicative catenanes, and knotted DNA molecules. Here, we describe the materials and procedures required to optimize their separation by 2D gels. Understanding the differences in their electrophoretic behavior can help explain some important physical characteristics of these different types of DNA topoisomers.

Energy-and-Blocking-Aware Routing and Device Assignment in Software-Defined Networking—A MILP and Genetic Algorithm Approach

Gerardo J. Riveros-Rojas, Pedro P. Céspedes-Sánchez, Diego P. Pinto-Roa and Horacio Legal-Ayala

DOI: https://doi.org/10.3390/mca29020018
https://www.mdpi.com/2297-8747/29/2/18

Mathematical and Computational Applications

Abstract

Internet energy consumption has increased rapidly, and energy conservation has become a significant issue that requires focused research efforts. The most promising solution is to identify the minimum power subsets within the network and shut down unnecessary network devices and links to satisfy traffic loads. Due to their distributed network control, implementing a centralized and coordinated strategy in traditional networks is challenging. Software-Defined Networking (SDN) is an emerging technology with dynamic, manageable, cost-effective, and adaptable solutions. SDN decouples network control and forwarding functions, allowing network control to be directly programmable, centralizing control with a global network view to manage power states. Nevertheless, it is crucial to develop efficient algorithms that leverage the centralized control of SDN to achieve maximum energy savings and consider peak traffic times. Traffic demand usually cannot be satisfied, even when all network devices are active. This work jointly addresses the routing of traffic flows and the assignment of SDN devices to these flows, called the Routing and Device Assignment (RDA) problem. It simultaneously seeks to minimize the network's energy consumption and blocked traffic flows. For this approach, we develop an exact solution based on Mixed-Integer Linear Programming (MILP) as well as a metaheuristic based on a Genetic Algorithm (GA) that seeks to optimize both criteria by routing flows efficiently and suspending devices not used by the flows. Conducted simulations on traffic environment scenarios show up to 34% savings in overall energy consumption for the MILP and 33% savings achieved by the GA. These values are better than those obtained using competitive state-of-the-art strategies.

Feature selection: a perspective on inter-attribute cooperation

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

DOI: https://doi.org/10.1007/s41060-023-00439-z
https://link.springer.com/article/10.1007/s41060-023-00439-z#citeas

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.

General assessment of electricity access in the Republic of Paraguay based on secondary data sources, Geographic Information Systems, and Energy Poverty

Arturo González, Patricia Benítez, Daniel Ríos-Festner, Laine Lezcano, Karen Fernández, Sonia López, Félix Fernández, Federico Bogado, Víctor Paravicini, Verónica R. Prado

DOI: https://doi.org/10.1016/j.enpol.2024.114175
https://www.sciencedirect.com/science/article/abs/pii/S0301421524001952?via%3Dihub

Energy Policy

Abstract

In addition of having abundant hydropower resources, Paraguay accounts more than 99,5% electrification rate. However, there is little information regarding potential consumption units yet to be connected to the power grid. In this paper, we adopt a methodology to assess electricity access in Paraguay by means of secondary data sources, Geographic Information Systems (GIS) and Energy Poverty (EP). Results show 15,116 potential points without the reach of the electricity system, mostly in rural areas and political departments facing social and economic challenges. Indeed, from the perspective of EP, a correlation has been found between these political departments and the Human Development Index (HDI). By doing so, this paper seeks to provide tools to policymakers and planners for enhancing the approach of electrification and its relationship with development. Despite that all the electricity comes from renewable sources, it still ranks third within the consumption matrix in Paraguay. Thus, results and the discussion could prove relevant in terms of the energy transition and the provision of universal clean electricity access.

Impact of the Population Pyramid on the Emergency Department / Impacto de la Pirámide Poblacional en el Servicio de Urgencias Hospitalaria

Ramona Galeano, Alvaro Wong, Dolores Rexachs, Remo Suppi, Eva Bruballa, Francisco Epelde and Emilio Luque

https://journal.info.unlp.edu.ar/JCST/article/view/3501/1969

Journal of Computer Science & Technology

Abstract

A country's population pyramid can affect the quality and demand for emergency departments (ED) in several ways. EDs may need specialized resources and equipment to meet the population's needs. In this research, we present an analysis of scenarios through agent-based modeling and simulation. We analyzed the population pyramids of Spain, Argentina, and Paraguay to provide insight into how demographic structure impacts the length of stay (LoS) and the need for medical and nursing staff. This can help policymakers and health managers better plan health resources and services in each country. We verified the evolution of the parameters, length of stay (LoS), and the occupation of doctors and nurses depending on different scenarios, such as the age of the patients and the number of patients arriving, and how it can lead to saturation of the ED. Through several scenarios analyzed using simulations of the age pyramids of Spain, Argentina, and Paraguay, we conclude that the age pyramid of patients treated in ED affects the demand for services, the need for specialized care regarding human and material resources, and waiting time. Implementing measures to manage demand and optimize available resources is essential to ensure adequate patient care.

Resumen

La pirámide poblacional de un país puede afectar la calidad y la demanda de los servicios de urgencias hospitalarias de varias maneras. En esta investigación, presentamos un análisis de escenarios mediante modelado y simulación basados en agents. Analizamos las pirámides poblacionales de España, Argentina y Paraguay para proporcionar información sobre cómo la estructura demográfica impacta la duración de la estancia (LoS) y la necesidad de personal médico y de enfermería. Esto puede ayudar a los responsables y a los gestores sanitarios a planificar los recursos y servicios sanitarios. Verificamos la evolución de los parámetros, la duración de la estancia (LoS) y la ocupación de médicos y enfermeras en función de diferentes escenarios, como la edad de los pacientes y el número de pacientes, y cómo puede conducir a la saturación de los servicios de urgencias hospitalarias. A través de varios escenarios analizados

mediante simulaciones de las pirámides de edad de España, Argentina y Paraguay, concluimos que la pirámide de edad de los pacientes en urgencias afecta a la demanda de servicios, la necesidad de atención especializada, y el tiempo de espera. Implementar medidas para gestionar la demanda y optimizar los recursos es esencial para garantizar una atención adecuada al paciente.

Impact of turbidity, temperature, and total nitrogen on cyanobacterial blooms in Lake Ypacaraí (Paraguay)

Claudia Raquel Ávalos, Gabriela Sosa, Gustavo René Brozón, Mabel Díaz-Cubilla, Andrea Alejandra Arrúa, Andreas Ries, Gilberto Antonio Benítez Rodas

DOI: https://doi.org/10.1016/j.cscee.2024.101027Get rights and content
https://www.sciencedirect.com/science/article/pii/S2666016424004213?via%3Dihub

Case Studies in Chemical and Environmental Engineering

Abstract

Lake Ypacaraí faces a severe pollution problem, resulting in frequent cyanobacterial blooms. This study focused on identifying the physicochemical parameters positively correlated with these blooms during the 2015–2016. Six sampling points were selected in the lake, and measurements were taken for cyanobacteria and six physicochemical parameters: transparency, turbidity, water temperature, pH, total Kjeldahl nitrogen (TKN), and total phosphorus (TP). Nine species of cyanobacteria were identified, Microcystis aeruginosa being the most frequent and dense. The maximum concentrations of TKN (3.51 mg L−1) and TP (1.04 mg L−1) indicated an advanced state of eutrophication in the lake. Canonical multivariate analysis revealed that TKN and temperature significantly positively correlated with M. aeruginosa blooms. These results suggest that water quality management in the lake must focus on reducing nitrogen load to mitigate cyanobacterial blooms and support the ecosystem's recovery.

Improvement Strategies for Visualizing Solution Sets in Many-Objective Optimization Problems

Christian von Lücken, Uriel Pereira, Enrique Javier Dávalos, Fabio López-Pires

DOI: 10.1109/ACCESS.2024.3467997
https://ieeexplore.ieee.org/document/10693436

IEEE Access

Abstract:

In real-world multi-objective optimization, dealing with many objectives and a large number of solutions is a common challenge that complicates data visualization and analysis. This study aims to simplify decision-making by analyzing tools to better explore Pareto optimal solutions in many-objective scenarios, integrating clustering, filtering, and ranking with existing graphics techniques. The dynamic combination of these tools should reduce complexity and highlight significant patterns in the data set, allowing decision-makers to tailor the visualization to their specific needs and preferences. Central to the approach presented in this work is the innovative application of shape-based clustering to organize the solution set and the use of this clustering to define distinct types of filters. Additionally, ranking methods originally proposed to enhance search in many-objective evolutionary algorithms are used here to identify the best solutions based on predefined criteria in combination with other techniques. The efficacy of the proposed integrated approach was evaluated using an application developed with this aim and considering a five-objective problem as a case study. The analysis suggests that using these combined strategies aids interactive visual exploration, effectively reducing solution volume and improving data understanding, potentially facilitating decision-making tasks.

Multi-objective Evolutionary Algorithms based Operation Sequence Design for Image Segmentation

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

DOI: https://doi.org/10.19153/cleiej.27.4.4
https://clei.org/cleiej/index.php/cleiej/article/view/654

Clei Electronic Journal

Abstract

Image segmentation is a fundamental process in image processing, aiming to transform the image into a more comprehensible or simplified representation. This process groups pixels under common characteristics, facilitating the unique identification of regions or elements of interest. The quality of segmentation is crucial as it significantly influences the subsequent stages of image processing. Image segmentation plays a vital role in various advanced applications, including computer vision and the analysis of medical, topographical, and astronomical images. Given that there is no universal segmentation method guaranteeing optimal performance for all cases, selecting an appropriate technique for a specific type of image or application represents a complex and demanding challenge. In this work, we propose the use of Multi-Objective Evolutionary Algorithms (MOEAs) as a training tool that integrates operations representative of the usual techniques and strategies in image segmentation. This allows for the generation of operation sequences adapted to specific applications or types of images. The objective functions used to guide the evolutionary process are the maximization of sensitivity (TPR) and specificity (TNR), fundamental components of ROC analysis. Experiments were conducted with multiple images sharing common characteristics from image databases, specifically: i) benign and malignant melanoma images, ii) ophthalmoscopic retinal images, and iii) binary cell form images. We compared the segmentation generated by our proposed algorithm with the ideal segmentation. The results are quite promising and demonstrate the feasibility of using MOEAs to generate sequences of segmentation operations valid for specific applications.

Novel risk loci for COVID-19 hospitalization among admixed American populations

Silvia Diz-de Almeida, Raquel Cruz, Andre D Luchessi, José M Lorenzo-Salazar, Miguel López de Heredia, Inés Quintela, Rafaela González-Montelongo, Vivian Nogueira Silbiger, Marta Sevilla Porras, Jair Antonio Tenorio Castaño, Julian Nevado, Jose María Aguado, Carlos Aguilar, Sergio Aguilera-Albesa, Virginia Almadana, Berta Almoguera, Nuria Alvarez, Álvaro Andreu-Bernabeu, Eunate Arana-Arri, Celso Arango, María J Arranz, Maria-Jesus Artiga, Raúl C Baptista-Rosas, María Barreda- Sánchez, Moncef Belhassen-Garcia, Joao F Bezerra, Marcos AC Bezerra, Lucía Boix-Palop, María Brion, Ramón Brugada, Matilde Bustos, Enrique J Calderón, Cristina Carbonell, Luis Castano, Jose E Castelao, Rosa Conde-Vicente, M Lourdes Cordero-Lorenzana, Jose L Cortes-Sanchez, Marta Corton, M Teresa Darnaude, Alba De Martino-Rodríguez, Victor del Campo-Pérez, Aranzazu Diaz de Bustamante, Elena Domínguez-Garrido, Rocío Eirós, María Carmen Fariñas, María J Fernández-Nestosa (et al.)

DOI: https://doi.org/10.7554/eLife.93666.3
https://elifesciences.org/articles/93666

eLife

Abstract

The genetic basis of severe COVID-19 has been thoroughly studied, and many genetic risk factors shared between populations have been identified. However, reduced sample sizes from non-European groups have limited the discovery of population-specific common risk loci. In this second study nested in the SCOURGE consortium, we conducted a genome-wide association study (GWAS) for COVID-19 hospitalization in admixed Americans, comprising a total of 4702 hospitalized cases recruited by SCOURGE and seven other participating studies in the COVID-19 Host Genetic Initiative. We identified four genome-wide significant associations, two of which constitute novel loci and were first discovered in Latin American populations (BAZ2B and DDIAS). A trans-ethnic meta-analysis revealed another novel cross-population risk locus in CREBBP. Finally, we assessed the performance of a cross-ancestry polygenic risk score in the SCOURGE admixed American cohort. This study constitutes the largest GWAS for COVID-19 hospitalization in admixed Latin Americans conducted to date. This allowed to reveal novel risk loci and emphasize the need of considering the diversity of populations in genomic research.

Optimal Control of Fractional Punishment in Optional Public Goods Game

J. Grau, R. Botta, and C. E. Schaerer

DOI: 10.5540/tcam.2024.025.e01737
https://tcam.sbmac.org.br/tema/article/view/1737/1619

Trends in Computational and Applied Mathematics

Abstract

Punishment is probably the most frequently used mechanism to increase cooperation in Public Goods Games (PGG); however, it is expensive. To address this problem, this paper introduces an optimal control problem that uses fractional punishment to promote cooperation. We present a series of computational experiments illustrating the effects of single and combined terms of the optimization cost function. In the findings, the optimal controller outperforms the use of constant fractional punishment and gives an insight into the period and size of the penalization to be implemented with respect to the defection in the game.

Role of Supercoiling and Topoisomerases in DNA Knotting

Jorge Cebrián, María-Luisa Martínez-Robles, Victor Martínez, Pablo Hernández, Dora B. Krimer, Jorge B. Schvartzman and María-José Fernández-Nestosa

DOI: https://doi.org/10.3390/dna4020010
https://www.mdpi.com/2673-8856/4/2/10

DNA

Abstract

DNA knots are deleterious for living cells if not removed. Several theoretical and simulation approaches address the question of how topoisomerases select the intermolecular passages that preferentially lead to unknotting rather than to the knotting of randomly fluctuating DNA molecules, but the formation of knots in vivo remains poorly understood. DNA knots form in vivo in non-replicating and replicating molecules, and supercoiling as well as intertwining are thought to play a crucial role in both the formation and resolution of DNA knots by topoisomerase IV. To confirm this idea, we used two-dimensional agarose gel electrophoresis run with different concentrations of chloroquine to demonstrate that non-replicating pBR322 plasmids grown in a topoisomerase I-defective E. coli strain (RS2λ) were more negatively supercoiled than in a wild-type strain (W3110) and, concurrently, showed significantly fewer knots. In this way, using wild-type and E. coli mutant strains, we confirmed that one of the biological functions of DNA supercoiling is to reduce the formation of DNA knots.

Simulating the effect of rainwater harvesting on flood mitigation: the case of Asunción, Paraguay

A. Thiessen-Anttila, M. Castier, and P. de Barros Barreto

DOI: https://doi.org/10.1007/s11069-024-06961-y
https://link.springer.com/article/10.1007/s11069-024-06961-y

Natural Hazards

Abstract

This work uses computer simulations to assess the effect of rainwater harvesting on the mitigation of flash floods in Asunción, Paraguay, where local rainfalls frequently cause damages, disruptions, and personal harm. Minute-by-minute rainfall data available for the year 2017 were used to select the storms for this study. Terrain, hydrographic, land cover, buildings information, and street maps were retrieved from various freely available sources. One of the hydrographic basins in the municipality of Asunción was chosen for analysis. Terrain and buildings data were merged so that the simulations predict how the built structures divert water flow. An effective rainfall equation was derived to account for the collective effect of thousands of rainwater harvesting systems (RWHS), which were assumed to be installed under different scenarios. The HEC-RAS software (Hydrologic Engineering Center River Analysis System, U.S. Army Corps of Engineers) was used. Three specific locations within the simulated basin were selected for a detailed study. Two peak flow rates were observed in most scenarios: the first of them is the immediate outcome of the rainfall and the second results from the downhill water flow. According to the simulations, the RWHS delay the largest peak flow rate by a few minutes (from 3 to 21 min, depending on the case), which might guide the possible deployment of early warning systems. In a scenario of RWHS with large tanks, installed on every roof – taken as the upper limit of what could be accomplished – reductions of up to 52.2% and 73.3% in the first and second peak flow rate, respectively, were calculated under a heavy rainfall. Under a moderate rainfall, these values were 45.5% and 78.1%. If it is considered that only 50% of the roof area is connected to RWHS, with smaller storage tanks, the peak flow rate reductions are of up to 17.7% (first peak) and 17.8% (second peak) under a heavy rainfall. Under a moderate rainfall, the corresponding values were 23.1% and 40.3%. The overall conclusion is that the effect of RWHS on flood mitigation, as measured by the peak flow rate, is highly dependent on the rain intensity, location, and RWHS features. A limitation of this study is its focus on a single water basin within Asunción's metropolitan region. However, applying the established methodology to all water basins in a region of

interest should provide information to support the decision-making process of policy makers at local and national levels.

Thyroid scan image dataset for the study of thyroid pathologies in adult patients

Benicio Grossling-Vallejos, Carolina E. Villegas Colmán, Ronald Rivas, María Gloria Pedrozo, Graciela Giménez, Teresa Rojas, Marina Arnal, Nicole Barreto, Cynthia Duarte, Andrés Uldera, Julio César Mello-Román, José Luis Vázquez Noguera, Horacio Legal-Ayala, Edith Falcon de Legal

DOI: https://doi.org/10.1016/j.dib.2024.111134
https://www.sciencedirect.com/science/article/pii/S2352340924010965?via%3Dihub

Data in Brief

Abstract

This article presents a dataset containing 641 images of Thyroid Gammagraphies studies corresponding to 235 patients over 18 years of age that were acquired in the period from 2016 to 2024 at the Nuclear Medicine Service of the Instituto de Investigaciones en Ciencias de la Salud of the Universidad Nacional de Asunción (IICS - UNA), Paraguay. First, the Thyroid Gammagraphies images were acquired according to the acquisition protocol described in this article. The thyroid scintigraphies images were acquired using trimodal SPECT-CT-PET equipment, model AnyScan SCP, MEDISO brand. The images were classified by the professionals of the Nuclear Medicine Service according to the diagnoses made by the nuclear physicians. They were grouped into toxic adenoma, diffuse goiter, multinodular goiter, nodular goiter, absent thyroid gland (total thyroidectomy), preserved thyroid gland, deformed thyroid gland, right hemithyroidectomy, autonomous nodule, hyperuptake nodule, hypouptake nodule, remnant after total thyroidectomy, iatrogenically blocked thyroid, De Quervain's subacute thyroiditis, and combined cases of diffuse or multinodular goiter with subacute thyroiditis. The generated dataset will be helpful for nuclear physicians and researchers working on classification algorithms for thyroid pathologies.

Trabajos completos y resúmenes

A linear potential reconstruction technique based on Raviart-Thomas basis functions for cell-centered finite volume approximations to the Darcy problem

Jhabriel Varela, Christian E. Schaerer, Eirik Keilegavlen

DOI: https://doi.org/10.5540/03.2025.011.01.0332
https://proceedings.sbmac.org.br/sbmac/article/view/4483

Proceeding Series of the Brazilian Society of Computational and Applied Mathematics

Resumo

We propose a technique to recover linear potentials from the solution obtained from cell-centered finite volume approximations to the scalar elliptic problem, i.e., the cell-centered potentials and the normal fluxes on the edges. The technique employs lowest-order Raviart-Thomas basis functions to compute a local potential gradient, which is then used to obtain nodal potentials and from there a global energy-conforming potential. Numerical convergence tests in two dimensions show that the gradient of the reconstructed potential converges at O(h), outperforming reconstructions obtained via averaging of cell-centered values and producing similar results compared to a quadratic reconstruction technique.

A numerical investigation on iterative methods for the two-dimensional Poisson equation discretized with high-order mimetic operators

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

https://proceedings.sbmac.org.br/sbmac/article/view/4723

Proceeding Series of the Brazilian Society of Computational and Applied Mathematics

Resumo

Mimetic operators are of increasing interest to the scientific computing community due to their ability to preserve many important properties of the continuous problem (e.g., conservation laws) while maintaining the same order of accuracy on the boundary as in the interior points. This mathematical framework results in locally dense and potentially ill-conditioned linear systems that are challenging to solve. This issue can partially be addressed using adequate iterative solvers, which is the focus of this work. Using the two-dimensional Poisson equation and mimetic operators of order $k \in \{2, 4\}$, we compare the computational times and number of iterations obtained with different Krylov-subspace-based iterative methods used for the resolution of the linear systems.

Algorithms for Routing and Spectrum Allocation in Elastic Optical Networks. A Taxonomy

César F. Bogado-Martínez, Diego P. Pinto-Roa, Benjamín Barán

DOI: 10.1109/ACCESS.2024.3472651
https://ieeexplore.ieee.org/abstract/document/10704675

IEEE Access

Abstract

Elastic Optical Networks (EONs) increase the transport capacity of standard optical networks, and have been proposed as a short-term solution to satisfy the dynamic demands of service quality requirements. To this end, the development of algorithms to better facilitate Routing and Spectrum Allocation (RSA) is envisaged to have a critical impact on the performance of EON. Given the abundance of RSA algorithms, this study presents the unique challenge of organizing and classifying them meaningfully to understand and select the most suitable approach for the corresponding niche service quality requirements. This study proposes a novel taxonomy structure for grouping RSA algorithms based on the following criteria: (1) resource assignment policies, (2) flexibility type, (3) traffic type, (4) optimization approaches, (5) number of objective functions, and (6) problem separability. Finally, the contributions of this study are twofold: it presents a state-of-the-art taxonomy framework that organizes existing published works based on a set of predetermined criteria, and explores research opportunities involving RSA algorithms to realize the full potential of EONs in telecommunications.

Analysis of renewable electricity generation alternatives to supply an isolated locality – Los Tres Gigantes Reserve, Bahía Negra, Paraguayan Chaco

Félix Fernández; Guadalupe Ramirez; Antonella Prado; Enrique Buzarquis; Ricardo Careaga; Manuel García

DOI: 10.1109/ICA-ACCA62622.2024.10766787
https://ieeexplore.ieee.org/document/10766787

IEEE Xplore

Abstract

Isolated microgrids are essential stand-alone systems for addressing energy needs in remote areas. This research work applies a methodology for analyzing generation alternatives for a particular isolated area, which seeks to improve the current conventional generation alternative based on fossil fuels. Los Tres Gigantes Biological Station, located in the city of Bahia Negra in the Department of Alto Paraguay, in the Paraguayan Chaco, is presented as a case study. The methodology covers a stage of data collection, study of the Station's load curve, analysis of energy resources available in the area and their feasibility of use, sizing of electricity generation alternatives considering technical, financial and environmental criteria. The objective of this work is to propose current alternatives for electricity generation for Los Tres Gigantes Station, evaluating various renewable generation options, such as photovoltaic solar energy with different variants of energy storage, wind generation and biogas generation. For the study of biogas production, the Technology Readiness Levels (TRL) model has been used, in order to evaluate its viability, in which the aquatic species Eichhornia Crassipes (biomass) has been considered as the primary source, which exists in abundance in the zone. On the other hand, the HOMER Pro and PVSyst software have been used for simulations of solar, biogas and fossil fuel generation alternatives (this alternative for the comparison of energy and economic savings), according to the aforementioned criteria. The results obtained are positive and demonstrate the advantages and disadvantages of each of the generation alternatives proposed as a solution for the isolated area, considering the energy resources available in this area of Paraguay, the Chaco.

Approaching aerospace engineering in Paraguayan high schools through ground station nodes development and LoRa uplink to the Argentinian picosatellite MDQubeSat-2

Federico Gaona, Luis Miranda, Ever Quiñonez, Juan Ramos, Diego Galeano, Carlos Britos, Adolfo Jara

https://cienciaytecnologia.salta.gob.ar/iaa24/abstracts-preliminary-papers/

International Academy of Astronautics Latin American Conference on Small Satellite Technologies and Applications

Abstract

This paper describes the experience gained from implementing a project involving 16–18-year-old students in the field of space education. The project's goal was to create ground station nodes that could work with the MDQubeSat-2 picosatellite using LoRa for sensor data uplinks. It was a collaborative effort between the Paraguay Space Agency (AEP), the Polytechnic Faculty of the National University of Asunción (FP-UNA), the two high schools involved, and the Argentine company Innova Space, owner of the satellite.
The AEP is an institution dependent on the Paraguayan government; it is relatively new and is still growing. It is supported mainly by international collaboration for the application of postgraduate programs in the space sector, laboratory equipment, and project development. The collaboration with Innova Space represents for the AEP a first experience with the foreign private sector for the implementation of a technical space-related project. Using project-based learning to introduce space sciences to high schools has been set in order to fulfill one of the AEP's strategic objectives.
The project's phases were: (1) node implementation by FP-UNA and AEP in compliance with the guidelines and standards set by Innova Space. (2) Training and workshops on environmental testing, space and ground segments, and space systems engineering with students and instructors from high schools. (3) Node implementation and laboratory testing carried out by students and instructors from both schools, with the assistance of engineers and specialists from all institutions involved. Finally, (4) a public event to uplink to the satellite. The node implementation between the AEP and the FP-UNA and the synergy with the remote company were the most significant results of this work. Thirty packets were sent via LoRa in three months. With their first space project and introduction to comprehensive STEAM education, high school students gained an elementary knowledge of space systems engineering. The node was implemented utilizing COTS and low-cost components and its own sensors with 3D-printed cases. The AEP was presented to the Paraguayan people and the global community via the

experience of a real space project published in a mass dissemination event. Finally, pre-university students were inspired to pursue a career in aerospace engineering.

Comparación de métodos Zero-shot Proxy en la Búsqueda de Arquitecturas de Redes Neuronales basada en Algoritmos Genéticos y aplicados en la Clasificación de Imágenes

Eduardo Centurión Funes, José D. Colbes Sanabria y Diego P. Pinto-Roa

https://sedici.unlp.edu.ar/handle/10915/177185

53 Jornadas Argentinas de Informática e Investigación Operativa (JAIIO)

Resumen

La Búsqueda de Arquitecturas de Redes neuronales (NAS, Neural Architecture Search) es una línea de investigación fundamental para aplicaciones de Redes Neuronales Convolucionales (CNN, Convolutional Neural Network) de alto rendimiento. Normalmente, los métodos NAS propuestos en la literatura requieren un alto costo computacional para calcular la solución CNN óptima dentro de los problemas de clasificación de imágenes. Por lo tanto, una línea de investigación emergente propone estimadores de rendimiento llamados métodos Zero-Shot Proxy. Las métodos Zero-Shot Proxy reducen el costo de evaluación dentro de la búsqueda de la arquitectura óptima, reemplazando parcial o completamente el entrenamiento y evaluación. Claramente, estos métodos ayudan a reducir el costo computacional, sin embargo, es necesario examinar su impacto en NAS. Este trabajo estudia el efecto de métodos Zero-Shot Proxy del estado del arte – Gradient norm, SNIP, Synflow, GraSP, Fisher information, y Jacobian covariant– como guías estratégicas en un Algoritmo Genético. La simulación experimental en la base de datos CIFAR10 indica el buen rendimiento de los métodos considerados, siendo el Jacobian covariant el más preciso

Comparative study of activated carbon and oxide graphene for fluid purifiers

M. E. González, E. Herrera, F. G. Benitez

https://drive.google.com/file/d/1pueWZ_Hv3mV-kSPWV2Wf0Mb5Er68fGL1/view

Livro de resumos 5o Congresso de Engenharias e Ciências Aplicadas das Três Fronteiras

Introduction

Activated carbon (AC) and graphene oxide (GO) are materials of great interest due to their exceptional physical and chemical properties. AC, known for its porous structure and large surface area, is used in gas purification, water treatment, and energy storage devices like supercapacitors. Its high adsorption capacity, low cost, and electrical conductivity make it ideal for these applications [Reza et al. 2020; Supiyeva et al. 2023]. Various precursors, including fossil fuels and agricultural waste, can synthesize AC, with coconut shells from Acrocomia aculeata showing promise [Duarte et al., 2017]. GO offers high electrical conductivity, mechanical flexibility, and chemical functionalization. It is used in devices such as sensors, transistors, and energy storage systems, enhancing efficiency and lifespan [Jara et al., 2020; Jiříčková et al., 2022; Wu et al., 2023]. GO is also effective in gas separation, water purification, and removal of contaminants [Anegbe et al., 2024; Jiříčková et al., 2022], and has potential in construction and high temperature materials. Comparing the properties of AC and GO is key for optimizing their use in sustainable technologies. In this study, we conduct a preliminary structural analysis of these carbonaceous materials for their potential application in fluid purifiers, with a particular focus on their role in energy-related fields.

Creating a Matlab Program for the Automated Calculation of Operational Costs for Electrical Bus Fleet

David Arturo Díaz Barúa, Fernando David Díaz Ruiz Díaz, Eduardo Ortigoza, Victorio Oxilia

DOI: 10.1109/ICA-ACCA62622.2024.10766749
https://ieeexplore.ieee.org/document/10766749

2024 IEEE International Conference on Automation/XXVI Congress of the Chilean Association of Automatic Control (ICA-ACCA)

Abstract

This article describes the development of a program in Matlab® to automate the calculations of operating costs of fleets of electric buses as a study prior to the replacement of a fleet of diesel buses. The program estimates the electrical consumption of buses on specific itineraries and optimizes load management, allowing compliance with the regular operating program with the lowest possible operating cost. This is achieved through the adaptation and processing of real data provided by a diesel bus company. A program was developed in Fico Xpress™ that uses ANDE's tariff schedule to reduce power and energy contracting costs. The itinerary measurements made with GPS, previous data processing and physical modeling of an electric bus in Simulink® make it possible to predict the energy consumption of the bus and determine the operational feasibility in the study itinerary for a typical week of operation. Before converting a fleet from diesel buses to electric, it is crucial to know this information to predict whether the specific bus model meets the necessary technical requirements. Furthermore, since it is an automated program, it is enough to alter some input parameters to analyze the performance of various bus models or itineraries and determine the minimum operating cost for each configuration.

Desarrollo de un sistema de reconocimiento del habla en guaraní. Evaluación de variantes del modelo Whisper y técnicas de mejora de datos

Santiago Rubén Acevedo Zarza, Mateo Andrés Fidabel Gill, Christian Daniel von Lücken Martínez, Diego Pedro Pinto Roa

https://revistas.unlp.edu.ar/JAIIO/article/view/17912

ASAID - Simposio Argentino de Inteligencia Artificial y Ciencias de Datos. 53 JAIIO, Jornadas Argentinas de Informática

Resumen

El idioma guaraní es uno de los lenguajes autóctonos más hablados de América del Sur, y es utilizado por la mayoría de la población del Paraguay. Sin embargo, se encuentra poco representado en conjuntos de datos utilizados para el entrenamiento de modelos multilenguaje, por lo que existen pocas herramientas lingüísticas basadas en deep learning que sean compatibles con el guaraní. Este proyecto tiene como objetivo desarrollar un sistema de reconocimiento capaz de transcribir voz en guaraní y ponerlo a disposición del público. El primer paso es llevar a cabo un análisis preliminar para identificar un criterio óptimo de selección de datos de entrenamiento y comparar el rendimiento de modelos de diferentes tamaños. Este estudio evalúa los siguientes criterios: el uso de una muestra pequeña de datos manualmente verificada, una muestra más grande con exactitud sin verificar, y una combinación de ambos enfoques mediante aprendizaje auto-supervisado. Todos los datos provienen del corpus de Mozilla Common Voice, y los modelos fueron entrenados a partir de diferentes versiones multilenguaje de Whisper. Encontramos que incluir una muestra más grande de datos sin verificar mejora drásticamente la precisión del modelo final, y que el aprendizaje auto-supervisado no mejora la precisión con respecto al modelo inicial.

Desarrollo de una herramienta de código abierto para el cálculo automático del índice de calidad de agua subterránea en un Sistema de Información Geográfica

Hugo Marcelo Molas Cespedes, Carin Lucía Martínez Espínola, Cynthia Villalba, Liz Báez Lovera

https://indico.una.py/event/11/contributions/161/

Lista de aportaciones

Descripción

El índice de calidad del agua (Water Quality Index, WQI) es un modelo matemático utilizado para evaluar la calidad del agua, transformando múltiples parámetros en un solo valor indicador. QGIS ofrece una interfaz intuitiva y amigable que facilita la visualización de datos geoespaciales relacionados con la calidad del agua. La integración de WQI en QGIS aprovecha las capacidades de esa plataforma para proporcionar una herramienta versátil para la evaluación y gestión de la calidad del agua.
El objetivo de este trabajo consiste en automatizar el cálculo de WQI mediante el desarrollo de una herramienta de código abierto integrada en un Sistema de Información Geográfica (SIG), específicamente QGIS. Este trabajo se encuentra actualmente en desarrollo. La herramienta permitirá implementar un algoritmo para calcular el índice y presentar los resultados en un mapa, incorporando herramientas de consulta, visualización y análisis geoespacial. Será personalizable, permitiendo ajustar el número de parámetros y modificar los pesos y estándares de calidad de agua según las necesidades del usuario. Se otorgará una herramienta independiente y distribuible, y se demostrará su funcionalidad y eficiencia con datos reales de acuíferos.
La creación de esta herramienta automatizada, además de facilitar el análisis y la toma de decisiones en la gestión de la calidad del agua subterránea, mejorará la precisión y eficiencia del cálculo del WQI, optimizando el uso de recursos computacionales y reduciendo el tiempo en comparación con los métodos manuales.

Descubriendo reglas de asociación en bases de datos del sector ganadero para la toma de decisiones informadas

Matías Medina, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

Hoy en día, la producción de carne es una industria esencial a nivel mundial, desempeñando un papel crucial en la seguridad alimentaria y en la economía global. En este sentido, la toma de decisiones informadas es vital para optimizar los procesos y mejorar la eficiencia en la producción, asegurando la sostenibilidad y competitividad del sector. Este trabajo de investigación tiene como objetivo principal aplicar técnicas de Minería de Datos para el descubrimiento de reglas de asociación, tomando como período de estudio datos transaccionales de la faena productiva, en un intervalo de 3 años de los principales frigoríficos a nivel país. Se describe la fase de selección y recopilación de los datos así como también la preparación de los mismos. En la fase de modelado se ha ejecutado los algoritmos Apriori y Eclat implementados en el paquete arules de la herramienta R donde se obtuvo el conocimiento principal mediante la consolidación de las asociaciones resultantes. Los resultados revelan patrones significativos en las combinaciones de origen del animal, raza y frigorífico, que afectan el peso y la calidad de la carne. Asimismo, el análisis se enfoca en describir las relaciones entre los animales con mejor y peor desempeño en la faena del país, lo cual es fundamental para apoyar la toma de decisiones informadas en el sector.

Design of a mathematical model to optimize farmer food security and promote rural development in Paraguay

María Margarita López, Jorge Vera Andreo, Lluís Miquel Plà Aragonés & Jorge L. Recalde-Ramírez

DOI: https://doi.org/10.1007/s10479-024-06199-8
https://link.springer.com/article/10.1007/s10479-024-06199-8#citeas

Annals of Operations Research (2024)

Abstract

Peasants occupy many rural areas with low income, excessive self-consumption, and deficient access to resources, which translate into poverty and lack of food security. In developing countries, support programs push incentives for better crop planning decisions, exchanging crops between farmers, and improving market access. Decision-making in this context is complex, given the many available options and criteria regarding nutrition, income, and work capacity that must be satisfied, as well as several uncertainties. Considering the primary agricultural operations, we develop a mixed integer optimization model that maximizes farmer's profit and food security. We test our model for cooperatives from the Department of Caazapá, Paraguay. First, we solve the deterministic model for 60-month horizon planning and generate alternative scenarios. Then, we compare the plan for the actual production with the plan from the model solution. To study the effects of uncertainty, we also develop a two-stage stochastic model in which results for four cooperatives and 24-month horizon planning are compared considering sources of uncertainty on the supply side (harvest yield) and on the demand side (sales price). The proposed plans have economic, environmental, and social advantages: a mix of crop production, crop rotation performance, and the partial fulfillment of nutritional requirements. In the short term, the plans could guide production decision-making. In the long term, the results could support the generation of concrete line actions for programs or projects according to the Sustainable Development Goals (SDG), such as food security and small-scale production planning

Development of evaluation and quality control protocols for mammography

C. Yegros, E. Quintana, L. Recalde

https://www.iaea.org/sites/default/files/24/10/cn-326_boa.pdf

International Conference on Hybrid Imaging (IPET-2024)

Background

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 Mammogram. 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.

Energy Management in buildings – ISO 50001: A Review

J. Gómez, J. Fariña, E. Ortigoza, T. Coronel, A. González and V. Oxilia

DOI: 10.1109/ICA-ACCA62622.2024.10766775
https://ieeexplore.ieee.org/document/10766775/keywords#keywords

2024 IEEE International Conference on Automation/XXVI Congress of the Chilean Association of Automatic Control (ICA-ACCA)

Abstract

Energy management of buildings is crucial to cope with increasing energy demand and reduce environmental impact. This article presents a review of the implementation of ISO 50001 in buildings around the world, with a focus on energy efficiency and sustainability. Through a structured methodology that includes a literature review and data analysis, the study examines the current status of ISO 50001 adoption in buildings, including public and university facilities. Key research questions are addressed, such as global leaders in ISO 50001 adoption and the financial implications of implementing energy-saving measures. The results highlight successful case studies, which demonstrate significant energy and emissions reductions through the implementation of ISO 50001. In addition, the study emphasizes the need to increase ISO 50001 certifications in public and university buildings, especially in Latin America, to promote energy efficiency and reduce dependence on non-renewable energy sources. The findings provide valuable information for future research and advocate the widespread adoption of ISO 50001 to improve energy management practices in buildings worldwide.

Estrategias de Clustering para la Optimización de la Recolección y Acopio de Neumáticos Fuera de Uso (NFU) en el Cultivo de Soja en Paraguay

Agustín Scarpetta, Matías Medina, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

Hasta la fecha, los neumáticos fuera de uso (NFU) representan un problema significativo a nivel mundial debido a su volumen masivo y la dificultad para su adecuada disposición y reciclaje. En un país agropecuario como Paraguay, la mayor cantidad de NFU se encuentra en los cultivos de soja, debido al intenso uso de maquinaria agrícola. En adición, dada la prohibición de importación de neumáticos usados y la deficiente calidad de los neumáticos utilizados, se generan grandes cantidades de NFU que impactan negativamente el medio ambiente y la salud pública. Este estudio analiza la posibilidad de recolectar y/o acopiar eficientemente la mayor cantidad de NFU en el cultivo de soja en Paraguay. Utilizando datos del Instituto Forestal Nacional (INFONA), se identificaron 20.492 áreas de cultivo de soja y se calcularon las cantidades de maquinarias y NFU consecuentes. Mediante la implementación de un método basado en clustering se ha podido determinar las ubicaciones sub-óptimas de centros de acopio basado en el número de clústeres y su cobertura. Evaluando 3 escenarios con coberturas del 50 %, 75 % y 90 %, los resultados demuestran que con una distribución adecuada de los centros de acopio, es posible manejar eficientemente los NFU, mitigando su impacto ambiental y contribuyendo a la sostenibilidad del sector agrícola crucial para la economía paraguaya.

Explorando el Rendimiento Académico: Un Análisis Basado en Áreas de Conocimiento

Rossana Martínez, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

Hoy en día, el desempeño académico de los estudiantes universitarios es un tema crucial a nivel mundial, ya que el éxito educativo impulsa el desarrollo económico y social. A pesar de los significativos avances en diversas áreas del conocimiento, los factores que influyen en el éxito o fracaso académico de los estudiantes universitarios siguen siendo en gran medida enigmáticos. El presente estudio se enfoca en investigar los factores que influyen en el rendimiento académico de los estudiantes universitarios, específicamente a través del análisis del histórico de calificaciones según el área de conocimiento de las materias. Para ello, se utiliza un conjunto de datos de 916 estudiantes de 4 carreras de 10 semestres cada una. Los resultados preliminares demuestran que este enfoque permite identificar las características específicas de cada área de estudio como factores que pueden ayudar a predecir el rendimiento general de los estudiantes en términos de éxito o riesgo de fracaso, ofreciendo así una base para el temprano desarrollo de estrategias educativas más efectivas y personalizadas.

Evolutionary Multiobjective Multicast Virtual Network Function Placement in NFV-SDN Networks

Carlos Cañete; Cristhian Medina; Luis G. Moré; José Colbes; Diego P. Pinto-Roa

DOI: 10.1109/CLEI64178.2024.10700344
https://ieeexplore.ieee.org/abstract/document/10700344

2024 L Latin American Computer Conference (CLEI)

Abstract:

Software-defined networking (SDN) and network functions virtualization (NFV) are promising technologies for demand services that require building flexible multicast transmission mechanisms with requirements for data processing functions at the network nodes. The multicast routing problem in NFVSDN networks seeks to compute multicast-routing trees and place virtual network functions (VNFs), satisfying the traffic demand with optimal resource use and fair data transmission. Since the problem is computationally complex with conflicting objective functions, this paper approaches multicast routing and VNF placement as a multiobjective optimization problem (MOP), minimizing the total resource cost and the maximum transmission delay variance. In this context, this study develops solutions based on Multiobjective Evolutionary Algorithms (MOEAs). Simulations performed on test instances show that the proposals are promissory by computing efficient and non-dominated solutions when compared to a state-of-the-art mono-objective approach.

Feature selection applied to QoS/QoE modeling on video and web-based mobile data services: An ordinal approach

Miguel García-Torres, Diego P. Pinto-Roa, Carlos Núñez-Castillo, Brenda Quiñonez, Gabriela Vázquez, Mauricio Allegretti, María E. García-Diaz

DOI: https://doi.org/10.1016/j.comcom.2024.02.004
https://www.sciencedirect.com/science/article/pii/S0140366424000410

Computer Communications

Abstract

Nowadays, mobile service providers perceive the user experience as a reliable indicator of the quality associated to a service. Given a set of Quality of Service (QoS) factors, the aim is to predict the Quality of Experience (QoE), measured in terms of the Mean Opinion Score (MOS). Although this problem is receiving much attention, there are still some challenges that require more research in order to find effective solutions for meeting user's expectation in terms of service quality. A core challenge in this topic refers to the analysis of the contribution of each factor to the QoS/QoE Model. In this work, we study the mapping between QoS and QoE on video and web-based services using a machine learning approach. For such purpose, we design a lab-testing methodology to emulate different cellular transmission network scenarios. Then, we address the problem of inducing a predictive model and identifying relevant QoS factors. Results suggest that bandwidth is a key factor when analyzing user's perception of service quality.

Fuzzy Compensator Design for Induction Motor Control Using a Frequency Converter in Networked Control Systems

Víctor Galeano, Diego González, Enrique Fernández Mareco & Diego P. Pinto-Roa

DOI: https://doi.org/10.1007/978-981-97-7426-5_33
https://link.springer.com/chapter/10.1007/978-981-97-7426-5_33

Proceedings of International Conference on Communication and Computational Technologies

Abstract

In this study, a fuzzy logic compensator incorporated in a Smith predictor is designed to control an induction motor using a frequency converter in a network control system, thus forming an intelligent controller. Through research on the state of artificial intelligence techniques applied to network control systems, controllers based on fuzzy logic are taken as the main axis to improve the response of network control systems. A commonly used technique is the Smith predictive control algorithm based on error modeling for time delay compensation of a networked control system. When the controlled plant is a nonlinear time-varying system, the Smith predictor identification model error also varies, resulting in poor control performance. For this problem, the fuzzy control method, which is based on the self-adjustment of the gain of the Smith predictor identification model to improve the robustness of the compensator, is introduced. The proposed compensator was implemented in a training kit to evaluate its performance in a real plant. The experimental and simulation results demonstrate that the fuzzy-Smith compensator has better performance in time delay compensation, with a shorter response time, small overshoots of less than 5%, and correction of modeling errors reaching a minimum error of 3%, compared to a conventional PID controller for a network control system.

Hacia la Predicción Efectiva de Fallos en Software: Identificación de Factores Críticos

Andrés Ortiz, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

A día de hoy, la predicción de fallos en aplicaciones de software es fundamental dado que estas aplicaciones, presentes en casi todos los aspectos de la vida moderna, requieren un funcionamiento continuo y confiable para soportar actividades críticas en diversos sectores. Este trabajo explora las características esenciales para la predicción de fallos en el lanzamiento de aplicaciones. Se analizan varias dimensiones críticas como la complejidad, el tiempo, el código, la difusión, los commits y el texto. Además, se presentan modelos de predicción y resultados basados en estas dimensiones, destacando su efectividad y las líneas de acción futuras.

Identification of Liquid-Level Systems in Industrial Processes Through Artificial Neural Networks

Víctor Galeano, Diego González, Enrique Fernández Mareco & Diego P. Pinto-Roa

DOI: https://doi.org/10.1007/978-981-97-7426-5_32
https://link.springer.com/chapter/10.1007/978-981-97-7426-5_32

Proceedings of International Conference on Communication and Computational Technologies

Abstract

In the present work, two generic identification systems are designed and implemented, applicable to industrial processes through artificial neural networks of NARX time series and later a simplified version of the same, GADALINE. The algorithm is developed online and offline, providing clear and precise information about the behavior and critical parameters of the system to be identified. For the execution and validation of this new technique, first, measurements are made within a real plant to measure liquid levels. The new identification methods are compared with another conventional system identification technique, LAPLACE, thus revealing that these methods have various applicable structures and configurations with excellent potential for predicting response signals. The results showed that the complete NARX neural network and a simplified GADALINE neural network improve the identification of a system compared to the identification through LAPLACE, verified by implementing a controller tuned based on the identification of a system through these techniques.

Identifying the Features of Graduated Students of the Computer Science Degree of the National University of Asunción

Jesús Gabriel Román Mancuello, Luis Fernando Ríos Alvarez, Julio Manuel Paciello Coronel, Ellen Lujan Mendez Xavier, Christian Daniel Von Lucken Martínez

DOI: https://doi.org/10.54808/IMCIC2024.01.89
https://www.iiis.org/DOI2024/ZA613XH/

Proceedings of the 15th International Multi-Conference on Complexity, Informatics and Cybernetics: IMCIC 2024

Abstract

This study addresses identifying characteristics of graduated Computer Science students in Paraguay. Using Data Mining (DM) and Educational Data Mining (EDM) techniques, data from 1751 students was analyzed, uncovering patterns and crucial factors that influence student success. Attribute selection techniques, including ANOVA and Chi-Square Test of Independence, were implemented, significantly reducing the dataset and increasing the precision of the analysis. Machine learning algorithms were employed within the H20 framework, focusing on supervised models. The experiments showed that appropriate attribute selection notably improves performance, achieving an F1 metric of up to 80% for predicting student graduation. This work highlights the importance of analyzing academic data to better understand the factors contributing to the success of computer science students, proposing a model that can be a valuable tool for decision-making in the educational field.

Impact of ANEAES Accreditations on the Continuous Improvement of the Production Systems Engineering Degree Program at the Polytechnic Faculty of the National University of Asunción

Zulma Lucia Demattei Ortiz; José Luis Vázquez Noguera; Julio César Mello Roman

DOI: 10.1109/ICACIT62963.2024.10788612
https://ieeexplore.ieee.org/abstract/document/10788612/authors#authors

2024 International Symposium on Accreditation of Engineering and Computing Education (ICACIT)

Abstract:

This work analyzes the impact of the National Agency for Higher Education Evaluation and Accreditation (ANEAES) accreditations on the continuous improvement of the Production Systems Engineering degree program at the Polytechnic Faculty of the National University of Asunción. The academic quality evaluation model in Paraguay, regulated by ANEAES, establishes that an improvement plan must be implemented once a degree is accredited. This model was applied to the Production Systems Engineering degree, using the Deming cycle (plan, execute, verify, and act) to guide the development and implementation of the improvement plan from 2020 to 2023. Through this accreditation process and the implementation of the improvement plan, several areas of improvement were identified and worked on. The evaluations carried out with different instruments demonstrated that the program has implemented effective actions that have solidified the quality of its educational offer in higher education. The accreditation and the corresponding improvement plan have allowed the Production Systems Engineering degree not only to comply with predefined quality standards, but also to foster a culture of continuous improvement. This has resulted in a more robust educational offer adapted to the demands and changes of the environment.

Infrared and Visible Image Fusion Using the Top Hat Transform

Yan Claude Bajac Figueredo, Juan Pablo Bazan, Julio César Mello-Román, José Luis Vázquez Noguera, Horacio Legal-Ayala

https://proceedings.sbmac.emnuvens.com.br/sbmac/article/view/4917

Proceeding Series of the Brazilian Society of Computational and Applied Mathematics

Resumo

Infrared (IR) images help us detect hidden targets in the environment based on the radiation they emit. They work well in daytime, nighttime conditions or in weather environments such as rain or fog. However, visible images (VIS) provide us with textural details of scenes that are better appreciated by the human eye. Therefore, extracting useful image features and preserving details effectively is a crucial part of image fusion. Mathematical morphology is composed of techniques used in image processing and analysis. The Top Hat transform and its variants is a widely used mathematical morphology operation for extracting bright and dark features from images. It has also been used for Visible-NIR image fusion. This work presents a visual and numerical analysis of performing visible and infrared image fusion using the Top Hat transform. In general, the fusion algorithm using Top Hat is competitive, because it provides better results in contrast, brightness and texture than other algorithms with which the comparison was performed.

Low-Rank Adaptation Applied to Multiclass Diabetic Retinopathy Classification

Sebastián Ferreira-Caballero, Diego P. Pinto-Roa, José Luis Vázquez Noguera, Jordan Ayala, Pedro E. Gardel-Sotomayor, Pastor Pérez-Estigarribia

DOI: 10.1109/CLEI64178.2024.10700586
https://ieeexplore.ieee.org/abstract/document/10700586

Abstract

Diabetic retinopathy is an eye complication caused by a widespread disease named diabetes mellitus. The examination of retinal fundus images procured by retinography is the most commonly used method for diagnosing diabetic retinopathy. Strategies based on deep learning have shown promising results in detecting diabetic retinopathy, achieving performance similar to that of the human eye regarding image inspection. However, the performance of these strategies heavily depends on fine-tuning the algorithm hyper-parameters and big datasets. In this work, we propose training a Deep Learning model with Low-Rank Adaptation (LoRA) approach 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 using a low-rank representation to reduce significantly the number of trainable parameters. The experiment shows that the LoRA approach for image classification of the three stages of diabetic retinopathy manages to obtain state-of-the-art results even with a small dataset.

MEGAN: Integrando Tecnología y Juego para la Comunicación en Guarderías

Jazmín María Del Lujan Gamarra Benítez, Diego Rubén Gómez Morel, Dafne Aylen Torrez Vera, José María Cabrera Peralta, Lucas Damián Goncalvez Basabe, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

Se presenta MEGAN, una solución innovadora para mejorar la comunicación entre el personal de cuidado infantil y los padres en las guarderías de Paraguay. Integrando tecnología y juego para involucrar activamente a los niños en la generación de información a través de actividades lúdicas educativas, MEGAN transforma procesos tradicionales en experiencias interactivas en las que los niños aprenden de acuerdo a su edad y etapa de desarrollo, mientras generan información útil en tiempo real para sus padres. Este enfoque representa un avance hacia la integración efectiva de la tecnología y el juego en el ámbito educativo, mejorando la experiencia de los niños en las guarderías y fortaleciendo la colaboración entre el personal de cuidado infantil y los padres. MEGAN surge como una respuesta a la necesidad de información continua y a la interrupción de la comunicación entre los padres y el personal de las guarderías acerca del estado de sus hijos durante todo el día.

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

Luis Cubilla, Diego P. Pinto-Roa, Jose Colbes

DOI: https://doi.org/10.1145/3685323.3685324
https://dl.acm.org/doi/abs/10.1145/3685323.3685324

LANC '24: Proceedings of the 2024 Latin America Networking Conference

Abstract

Multicast transmission in elastic optical networks (EON) is a central problem. When EON admits modulation schemes, the multicast problem is called multicast routing and modulation level and spectrum assignment (MRMLSA). Whenever EON supports light-splitting capabilities, the structure of the MRMLSA solution is a light-tree. Conversely, when EON does not support light-splitting, the multicast request is divided into several unicast requests, one per destination. In the latter case, the structure of solutions is a light-path that inefficiently uses transponders compared to a light-tree. Note that light paths are acyclic structures, which means they can only pass through the same node once. A recent alternative proposes a Light-hierarchy (LH) structure that relaxes this constraint so that a light-path can pass more than once through a node to get all node destinations. Literature has proposed integer linear programming (ILP) based approaches to solve MRMLSA considering LH structure; however, multicast routing is an NP-complete problem, so this paper proposes scalable solutions based on Heuristic and Genetic Algorithm (GA) for the LH-MRMLSA problem. Numerical simulations were performed on different test instances to analyze the proposals. The results show that the GA based on permutations can compute efficient solutions compared to the Heuristic but at a higher computational time.

NLP para la Protección Social: Clasificación Multinomial de Vulnerabilidades en Derechos de Niños y Adolescentes

Arturo González Fernández, Romina Rojas Moreno, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

Este estudio presenta un sistema para la clasificación semi- automática de vulnerabilidades en situaciones que afectan a niños y adolescentes. Se aplican técnicas de procesamiento del lenguaje natural (NLP) para analizar informes de denuncias, e incluye un módulo que categoriza semi-automáticamente dichas denuncias. Se emplea una clasificación multi-etiqueta que identifica las diversas formas de vulnerabilidad presentes en cada caso. La mejora de este proceso proporciona a las autoridades una visión más precisa de la situación de vulnerabilidad que enfrentan los niños y adolescentes, sugiriendo la clasificación de denuncias recibidas, lo que a su vez facilita la toma de decisiones y la intervención oportuna.

Paraguayan Sign Language Translation Using Machine Learning

Bethania Gutierrez, Ever Alfonzo, Julio Paciello, Christian von Lucken

DOI: https://doi.org/10.54808/IMCIC2024.01.157
https://www.iiis.org/DOI2024/ZA515SE/

Proceedings of the 15th International Multi-Conference on Complexity, Informatics and Cybernetics

Abstract

The Paraguayan deaf community often faces daily challenges in interacting with teachers and people who do not understand the Paraguayan Sign language, obstructing their access to standard communication. Paraguay requires more resources to promote the learning and teaching of Paraguayan Sign Language.
By applying machine learning techniques to preprocess Paraguayan Sign Language signs videos, we can create a dataset that serves as a foundation for various applications. These tools can help disseminate knowledge, bridge communication gaps, and enable deaf individuals to communicate effectively, even with those who do not understand Sign Language. Additionally, they can assist in educating the public about this language.

Predicting Density Gradients in Aqueous Salt Solutions with Equations of State

Iván Cubilla, Marcos Cáceres, Christian Schaerer, Marcelo Castier

https://drive.google.com/file/d/1wvY8NLjdF5JjxaFDCDrQlcUSq7YpMvrj/view
ISBN: 978-65-5458-325-1 (E-book)

Anais do XII Congresso Brasileiro de Termodinâmica Aplicada e da VIII Escola de Termodinâmica

Abstract

Density gradients are routinely used for the separation of biological samples in clinical laboratories. One technique for forming such gradients is to disperse Percoll (colloidal silica particles coated with polyvinylpyrrolidone) in the biological sample, which is ultracentrifuged. Because of the centrifugal field, Percoll tends to accumulate away from the rotation axis, forming a density gradient, with densities increasing as the distance from the rotation axis increases. The biological particles migrate to where the density of the medium is equal to its own, enabling their separation. Another technique is to dissolve a salt in the medium to be centrifuged. A salt commonly used for this purpose is cesium chloride because cesium forms a relatively heavy cation, thereby enhancing the density gradient effect. Although such salt systems are conceptually simple, they represent a challenge to equations of state for electrolyte solutions for various reasons. First, depending on the ultracentrifuge's arm length and on its angular velocity, the pressure away from the rotation axis may reach hundreds or thousands of atmospheres. At the same position, the salt concentration is the highest in the system, and electrolyte models notoriously struggle at high salt concentrations. Also, as there is no noticeable experimental evidence of charge distribution, it is necessary to formulate the model under the assumption that the solution is electrically neutral at any point of the simulated region. In this work, we compare experimental data from the literature with the predictions of two equations of state for electrolyte solutions: the Q-electrolattice and the eSAFT-VR Mie models. Q-electrolattice is a lattice-based model that incorporates the Born and mean spherical approximation terms. eSAFT-VR Mie extends the SAFT-VR Mie equation of state with the inclusion of the Born and Debye-Hückel terms.

Promoviendo la Educación Inclusiva mediante el uso de la tiflotecnología / Promoting Inclusive Education through use of Typhlotechnology

Luciana Dalila Coronel

https://www.compdes.org/compdes2024/

PRE-ACTAS del XVII Congreso Iberoamericano de Computación para el Desarrollo COMPDES 2024

Resumen

Este estudio muestra, como las facultades se ocupan de la inclusión en Educación Superior, en ese rol de comprender, la igualdad de oportunidades y en este caso, de las personas con discapacidad visual que desean acceder a una carrera universitaria en la Universidad Nacional de Asunción, que aun cuentan con algunos obstáculos como; la preparación de los docentes, la infraestructura, los recursos tiflotecnológicos entre otros, para ello, se toma una de las variables con el objetivo de “Promover la Educación Inclusiva mediante el uso de la tiflotecnología”, para ello se desarrolló una metodología de tipo aplicada que permite descubrir y explicar el uso de las nuevas tecnologías de enseñanza-aprendizaje y de carácter mixto con las técnicas de análisis documental y el trabajo de campo consistió en dos grupos focales.

Prototype for Measurement and Registration of Physiological Parameters Related to Diabetic Foot

César Yegros, Eladio Quintana, Luciano Recalde, Sofía Aquino & Sergio Mendoza

https://link.springer.com/chapter/10.1007/978-3-031-89514-2_14

X Latin American Conference on Biomedical Engineering

Abstract

To design a system for measuring and recording physiological parameters related to the diabetic foot stage, applied research with a mixed approach was carried out from July to October 2023. An experimental methodology was chosen for the design. During the development of the proposal, diagnostic procedures and systems for measuring diabetic foot-related parameters in a public referral center were examined. The system's design involved the fabrication of electronic boards and the development of software to measure and record blood pressure, temperature, and cardiac pulse in the foot. In addition, the financial feasibility of its implementation was evaluated. This system has been shown to optimize parameter measurement times, a fundamental aspect for improving efficiency in preventive and follow-up care for diabetic patients. As a recommendation for future research, we suggest the integration in the prototype of the capacity to export data to Excel spreadsheets for statistical analysis, as well as the performance of specific tests with diabetic patients.

Reinforcement Learning Based Routing, Modulation Level and Spectrum Assignment in Elastic Optical Networks

Enzo Unzain, Roberto Fernandez, Diego P. Pinto-Roa

DOI: 10.1109/CLEI64178.2024.10700307
https://ieeexplore.ieee.org/abstract/document/10700307

2024 L Latin American Computer Conference (CLEI)

Abstract:

Routing, Modulation Level, and Spectrum Assignment (RMLSA) problems are critical to the success of Elastic Optical Networks (EONs). The literature reports several techniques for approaching RMLSA. However, the complexity of this problem necessitates the development of innovative approaches, which is the very essence of our work. Reinforcement Learning (RL) is an emerging alternative to dynamic RMLSA due to its ability to adapt to changes in the network's state through a learning process. Accordingly, this work proposes approaching the problem with RL techniques based on the Q-learning model. The experimental study conducts simulations over several test instances. The results confirm that the proposed approach shows promise in obtaining good results compared to the state-of-the-art heuristics

Sistema Empotrado de Adquisición de datos Sensoriales en Tiempo real basado en FPGA

Federico Fernández y Diego Pinto

https://drive.google.com/file/d/1wCzfbrPjpMHm_dnMRPcGHrQLGh4yzqfM/view

Actas das Conferências Ibero-Americanas Computação Aplicada e www/internet

Resumen

Hoy en día, en cualquier área en donde se utilice un sistema de monitorización de señales sensoriales, es importante contar con un dispositivo que permita monitorizar cualquier tipo de señal ya sea analógica o digital, utilizar un sistema de tratamiento y acondicionamiento de las señales como filtrado, digitalización, etc. Un factor importante a tener en cuenta en el caso de los procesos industriales, es que el sistema de monitorización sensorial pueda adaptarse a los cambios que puedan experimentar los procesos como el número de entradas y salidas, por ejemplo, sin tener que realizar una modificación significativa de la configuración del hardware. Esta ventaja se evidencia claramente con respecto a otras tecnologías tradicionalmente utilizadas para realizar este tarea como los microprocesadores y microcontroladores, mediante la utilización de sistemas basadas en FPGAs, ya que cualquier modificación en el hardware en operación solo requiere una modificación en el entorno que programe la interconexión entre los diferentes elementos del mismo, compuertas lógicas, temporizadores, contadores, registros, etc. No solo eso, el uso de microprocesadores empotrados como MicroBlaze reduce el tiempo de diseño de los proyectos complejos permitiendo una rápida implementación gracias a las herramientas de diseño y simulación que suministran los fabricantes con el entorno de desarrollo. En este trabajo presentamos una breve revisión bibliográfica acerca de los sistemas de adquisición de datos basados en FPGAs, y un sistema de adquisición de datos sensoriales en tiempo real de propósito general basado en el microprocesador empotrado MicroBlaze.

Sistema Empotrado de Monitorización de Señales Ambientales en Tiempo Real

M. Díaz, F. Fernández

https://www.even3.com.br/mec3f2024/

Libro de resumos 5o Congresso de Engenharias e Ciências Aplicadas das Três Fronteiras

Resumen

Este trabajo presenta la implementación de un sistema empotrado basado en FPGA o Field-Programmable Gate Array, por sus siglas en inglés, para el monitoreo e integración de variables ambientales. Se eligió la FPGA por su capacidad de realizar procesamiento paralelo, bajo consumo de energía, capacidad de reconfiguración, lo que permite modificar un diseño que se presenta como mejorable, uso de librerías IPs o Intellectual Property, por sus siglas en inglés, que permite acelerar los tiempos de diseño, prueba y puesta a punto con las ventajas en el costo del proyecto que eso implica. Se ha elegido variables medioambientales por la importancia que esto implica actualmente por las necesidades de analizar las condiciones ambientales en diferentes puntos. En el proyecto se ha utilizado el procesador soft MicroBlaze de AMD lo que nos permite obtener en poco tiempo un diseño práctico, de funcionamiento robusto que mide en tiempo real la variables medioambientales de nuestro interés en este caso la temperatura y la humedad del ambiente que rodea el punto de medida. Este proyecto está pensado para ser capaz de ampliar sus capacidades en etapas posteriores como el número de señales sensoriales a ser procesadas, darle capacidad de almacenamiento para el análisis off line de las variables guardadas como data minning, realizar transmisión inalámbrica para unirse a otros sistemas de monitoreo, etc.

TinyICS: An Industrial Control System Simulator Based on NS-3

Alejandro Candia, Cristian Cappo

DOI: 10.1109/SCCC63879.2024.10767629
https://ieeexplore.ieee.org/document/10767629

2024 43rd International Conference of the Chilean Computer Science Society (SCCC)

Abstract:

Industrial control systems (ICS) are essential in industrial applications and critical infrastructure. These systems can be composed of various components involving different communication methods. Conducting tests in an ICS can be dangerous and costly. Therefore, having simulation tools is of high value for research and development teams. This work aims to develop an open-source industrial control systems simulator capable of simulating arbitrary process behavior and capturing communication traffic. The NS-3 network simulator was used to simulate communication between the industrial components, and Modbus was developed as the application-level industrial protocol. Abstractions were developed for commonly used industrial devices, as well as the controlled physical process, where end users can define the behavior of these components. Python bindings were developed for the simulator to reduce the learning curve and target system experts. Finally, the proposed simulator is used to model and evaluate an industrial application scenario.

Transformación de la Asistencia en Entidades Gubernamentales a través de NLP Preentrenado

Gustavo A. Galeano-Duarte, Gustavo Sosa-Cabrera

https://cacic2024.info.unlp.edu.ar/libro-de-actas-cacic-2024-ebook/

Libro de Actas CACIC 2024 – Ebook

Resumen

En este trabajo, se presenta la optimización de la asistencia a usuarios en una empresa pública del sector eléctrico mediante la adaptación de modelos preentrenados de NLP. Se detalla el proceso de entrenamiento de un modelo en español basado en BERT. Los resultados demuestran su alta eficiencia en la clasificación de textos dado el caso de estudio analizado basado en tipos de reclamos de los usuarios. El estudio aborda la creciente necesidad de mejorar la gestión de solicitudes de usuarios en servicios públicos, ofreciendo una solución innovadora basada en tecnologías de vanguardia. El trabajo busca, por sobre todo, brindar un esquema completo replicable a bajo costo que permita a más instituciones, públicas o privadas, académicas o no, tener acceso a las tecnologías relacionadas al NLP y a las herramientas basadas en Inteligencia Artificial.

Una breve Revisión del Hardware Evolutivo

Federico Fernández y Diego Pinto

https://drive.google.com/file/d/1wCzfbrPjpMHm_dnMRPcGHrQLGh4yzqfM/view

Atas das Conferências Ibero-Americanas Computação Aplicada e www/internet

Resumen

En todos los ámbitos tecnológicos hay una evolución vertiginosa hacia la inteligencia artificial implicando esto la necesidad de hardware más veloz, paralelismo, reconfiguración del hardware, ejecución de algoritmos evolutivos, optimización, multiprocesamiento, ahorro de consumo de energía, etc. Los microprocesadores y microcontroladores clásicos han respondido hasta hace poco tiempo a estas exigencias, pero la aparición de las FPGAs han supuesto una evolución notable desde el punto de vista del diseño de circuitos electrónicos ya que en estos dispositivos lo que se programa es hardware. Por tanto a diferencia de los circuitos clásicos se puede realizar un diseño a medida de las necesidades y volver a diseñar para otra aplicación o su optimización. Pero esta ventaja ha tenido una evolución aún más grande con la aparición de la reconfiguración parcial dinámica, lo que ha supuesto un salto notable en las tecnologías relacionadas al mantenimiento y corrección de circuitos que no pueden ser accedidos fácilmente ya sea por su ubicación geográfica, por estar en una zona peligrosa o de difícil acceso, etc. La aparición del hardware evolutivo es un paso más en ya que además de la utilización de las capacidades de la reconfiguración parcial dinámica propios de las FPGAs, se utilizan algoritmos de inteligencia artificial para facilitar la búsqueda de diseños electrónicos óptimos según especificaciones requeridas de circuitos electrónicos o para adaptarse a cambios en el entorno del mismo por lo que su funcionalidad debe adaptarse a ello. En este trabajo presentamos una breve revisión de los conceptos asociados con el hardware reconfigurable y el hardware evolutivo, para finalmente describir algunas aplicaciones que se están implementando en la actualidad con esta tecnología.

Understanding Effects of Temperature and Precipitation in the Dynamics the Mosquito Population

Diego Balbuena, Mathias Barrios, Diego H. Stalder, Christian E. Schaerer, Nilsa Gonzaléz, María Ferreira

https://proceedings.sbmac.org.br/sbmac/article/view/4907/4968

Proceeding Series of the Brazilian Society of Computational and Applied Mathematics

Mosquito populations are crucial factors in understanding the spread of mosquito-borne diseases. Deterministic models can be used to analyze these populations by incorporating local mosquito characteristics, temperature, and precipitation data [1]. Moreover, temperature is recognized as a significant factor influencing disease transmission [2].

This study utilizes real weather data from the Global Data Assimilation System (GDAS) alongside trap data collected from Miami-Dade County (2017-2019) to analyze mosquito populations. Additionally, information from traps in the same area is accessible to verify and refine the model preditions and parameters [3].

An ODE model with time-dependent parameters to simulate the mosquito (Ae. aegypti) population (in a community) is represented by the following equations [3]: (...)

University student dropout prediction for female students in the Computer Engineering career

Ellen L. Méndez Xavier, Fabrizio Coscia, and Christian von Lücken

https://ceur-ws.org/Vol-3872/paper6.pdf

Proceedings of the XVI Congress of Latin American Women in Computing 2024 (LAWCC 2024)

Abstract

University student dropout is a complex phenomenon raising concern both academically and socially. This issue affects students from different areas and contexts; it appears as the premature interruption of higher education, and it has meaningful consequences both on the people involved and on society as a whole. This paper uses prediction models to analyze academic and socioeconomic data about students of the career of Computer Engineering of the Facultad Politécnica of the Universidad Nacional de Asunción (FP-UNA) focusing on women. These models show their effectiveness to predict dropout, and therefore can be useful tools for educational management and to develop preventive actions

Valorización catalítica de una Mezcla acetona-butanol-etano (ABE) para su integración en Biorrefinerías

G.A. Alvarenga, A. Sabaca, L.A. Luque-Álvarez, F.M. Baena-Moreno, L.F. Bobadilla, J.A. Odriozola

https://drive.google.com/file/d/1pueWZ_Hv3mV-kSPWV2Wf0Mb5Er68fGL1/view

Livro de resumos 5° Congresso de Engenharias e Ciências Aplicadas das Três Fronteiras

Introducción

El presente estudio de investigación se centra en la producción de hidrocarburos de cadenas largas, transformadas de la reacción catalítica mejorada de una mezcla de acetona, butanol y etanol (ABE), que en la actualidad despierta un gran interés dentro del sector químico. Los catalizadores utilizados han sido seleccionados, por su alta prestancia en campo de la catálisis, por su valor económico muy favorable y su gran impacto para las industrias petroquímicas.(Ketabchi, et al. 2020). Estas nuevas formas de combustibles para el transporte surgen de una imperiosa necesidad de reducir los impactos negativos de las emisiones de gases de efecto invernadero y, al mismo tiempo, proporcionar una alternativa adecuada a los procesos basados en combustibles fósiles. Es así, que la mejora de la ABE daría lugar a una amplia gama de productos químicos de valor añadido derivados de alcoholes primarios de origen renovable de una manera económicamente favorable. (Sutradhar et al. 2011). Además, crea una oportunidad para integrar la biorrefinería y la refinería tradicional de petróleo, con el objetivo de realizar una transición hacia la producción sostenible de combustibles y/o productos químicos, tratando de reducir las materias primas de fuentes no renovables, promoviendo una industria más verde. (Sreekumar et al. 2015).

Capítulos de libros

Caracterización del distrito de Filadelfia como potencial para el Turismo de Reuniones y Negocios en el marco del Corredor Bioceánico

Eliane Elizabeth Alderete Garcete, Viviana Dejesús González Rodríguez, Carmen Cabrera González, Mario Gustavo Leiva Enrique

DOI: 10.29327/5399561
https://unirila.edu.py/wp-content/uploads/2024/08/20240616081353995 61unirilaturismodesarrollolocalesaspectoseducacionalesy.pdf
ISBN: 978-65-86376-54-8

UNIRILA, Turismo, Desarrollo Locales, Aspectos Educacionales y Lingüísticos V.2

Introducción

Conforme con Nardone (2014), se puede considerar que el turismo de reuniones y eventos es una actividad con vida propia que se manifiesta como un sector de la economía en sí mismo, ligado absolutamente al turismo en general. Teniendo en consideración esta premisa, los docentes de la Universidad Nacional de Asunción abocados al desarrollo de este artículo, presentan inicialmente una contextualización relacionada con el turismo de reuniones y negocios, en la que se pueden apreciar conceptos que permiten comprender el turismo como un sector de la actividad económica con vida propia y los tipos de turismo de reuniones en la que se agrupan, además de otros aspectos resaltantes que permiten aclarar los conceptos específicos del sector. Seguidamente se presenta una comparación sociodemográfica de las principales ciudades del Departamento de Boquerón, de la Región Occidental del Paraguay, además de resaltar los aspectos socioeconómicos que influyen en el desarrollo de la actividad turística en el mencionado departamento. Seguidamente, se presentan los atractivos turísticos que caracterizan al Departamento de Boquerón, partiendo de datos obtenidos en el marco de las actividades de la Mesa Turismo del equipo de trabajo del Proyecto Corredor Bioceánico, además de tener en consideración el Plan de Desarrollo Turístico Sostenible del Departamento de Boquerón. En un bloque posterior, se puede apreciar la caracterización y descripción del turismo de reuniones y negocios en el Distrito de Filadelfia, con la descripción de los equipamientos y la infraestructura ligada a esta actividad, para luego presentar apreciaciones relacionadas específicamente al turismo de reuniones y negocios en el distrito de Filadelfia, en el marco del Corredor Bioceánico Océano AtlánticoPuertos del Norte de Chile.

Es oportuno resaltar la importancia de la Mesa Red de Universidades del equipo de trabajo del Corredor Bioceánico, en su intención de procurar servir como soporte académico y científico a las demás mesas de trabajo, además de la relación de la misma con la Mesa Turismo, que inicialmente formaba parte de aquella en el mencionado equipo de trabajo. A modo de consideraciones finales se presentan informaciones conclusivas y recomendaciones con respecto al desarrollo de la actividad objeto de estudio, teniendo en cuenta las oportunidades que podría presentar el Corredor Bioceánico para este sector.

Degradation and Environmental Impacts of Starch Nanomaterials

Shirley Duarte, Omayra Ferreiro & José Vega-Baudrit

DOI: https://doi.org/10.1007/978-3-031-60086-9_11
https://link.springer.com/chapter/10.1007/978-3-031-60086-9_11

Abstract

The current chapter aims to review the degradation standards, and biodegradability of starch-based nanomaterials (SNMts), as well as their nanotoxicity, and environmental impacts. SNMts are promising biomaterials with potential applications in various fields, such as food engineering, medicine, and textiles, because of their unique properties. However, their degradation, potential toxicity, and environmental impacts are emerging concerns. There is limited research on the potential toxicity of SNMts, but some studies have shown that they can adversely affect living organisms.

Hollow fiber membranes

Loreto García-Fernández, Omayra B. Ferreiro, Carmen García-Payo, Naser Tavajohi, Mohamed Khayet

https://doi.org/10.1016/B978-0-323-95628-4.00015-X
https://www.sciencedirect.com/science/article/abs/pii/B978032395628400015X?via%3Dihub

Polymeric Membrane Formation by Phase Inversion

Abstract

Nonsolvent induced phase separation and thermally induced phase separation are the commonly used spinning techniques for the preparation of polymeric hollow fiber membranes. These are thoroughly described throughout this chapter. Different involved spinning configurations such as dry/wet, wet/wet, or other gap type variants are presented and explained together with the precipitation mechanisms occurring during hollow fiber membrane formation. Various spinning parameters, apart from the spinneret type and dimension, influence both the internal and external phase separation processes, thereby impacting the characteristics of the hollow fiber membrane. The spinning parameters' effects are discussed together with the adopted engineering and strategies to design, develop, and improve the desired hollow fiber membrane morphological characteristics for specific applications.

Datos estadísticos

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

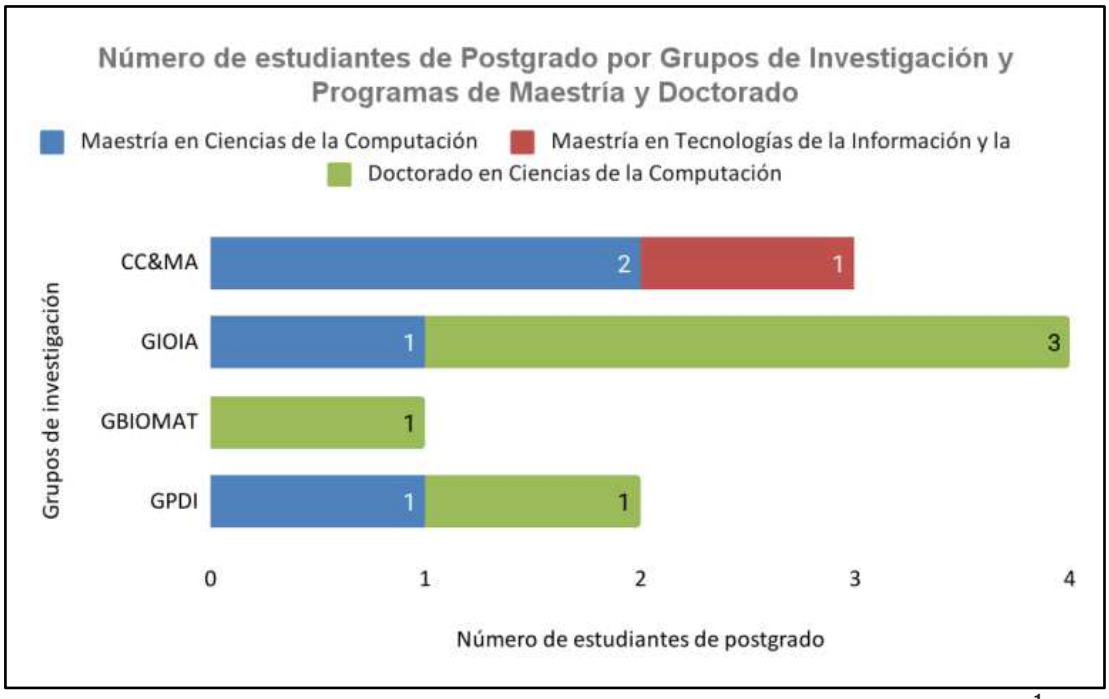

Gráfico 1. Número de estudiantes de postgrado por grupos de investigación[1]

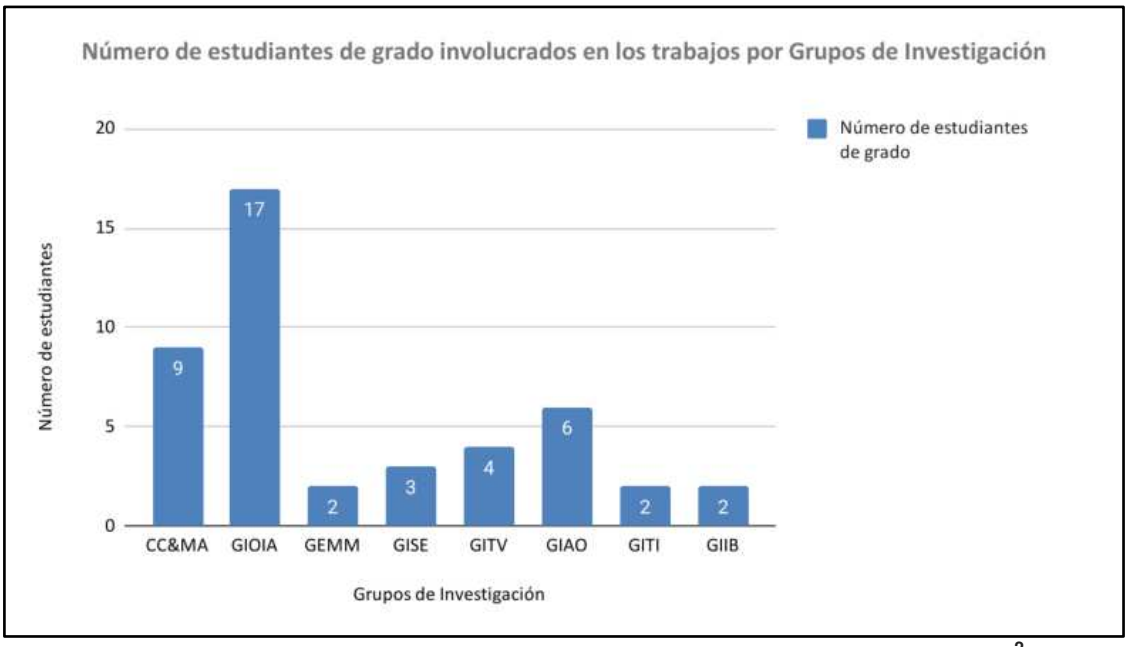

Gráfico 2. Número de estudiantes de grado por grupos de investigación[2]

[1] Grupos de Investigación (GI): GIAO: GI en Algoritmo y Optimización, GBIOMAT: GI en Biomateriales, CCyMa: GI en Ciencias de la Computación 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, GEMM: Grupo en Formación Ensayos y Materiales Metálicos.

[2] Idem

Producción científica de estudiantes de postgrado por programas y de grado por carreras

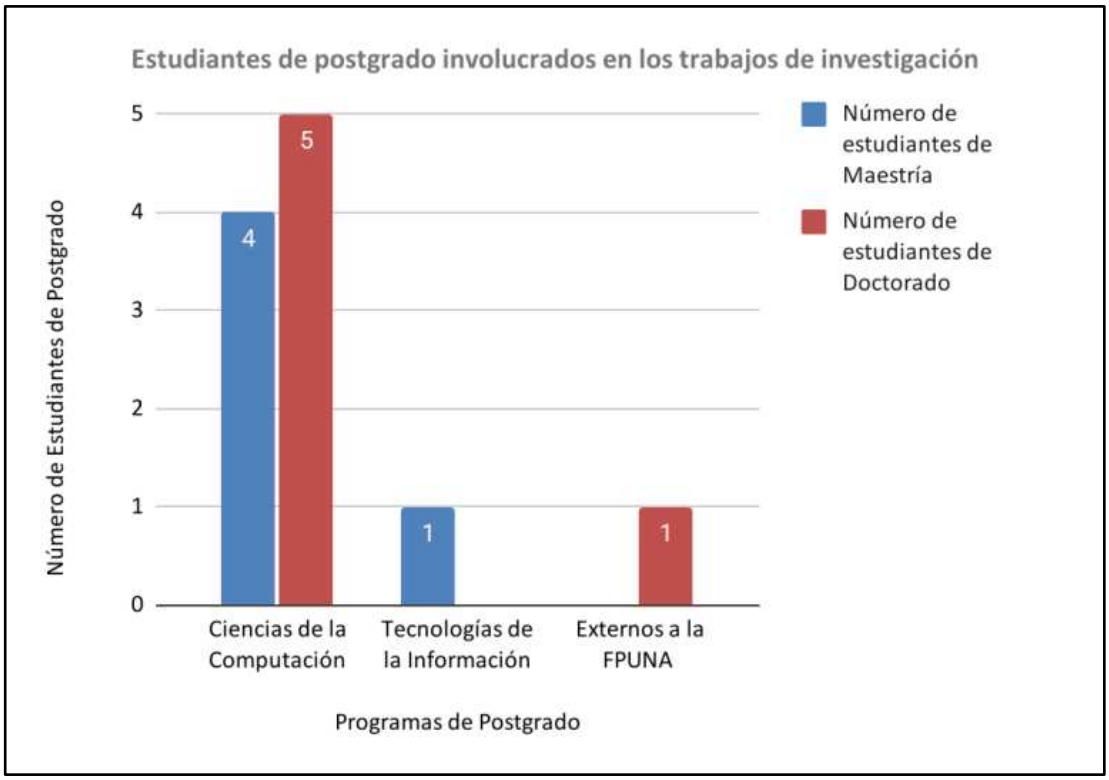

Gráfico 3. Número de estudiantes de postgrado por programas

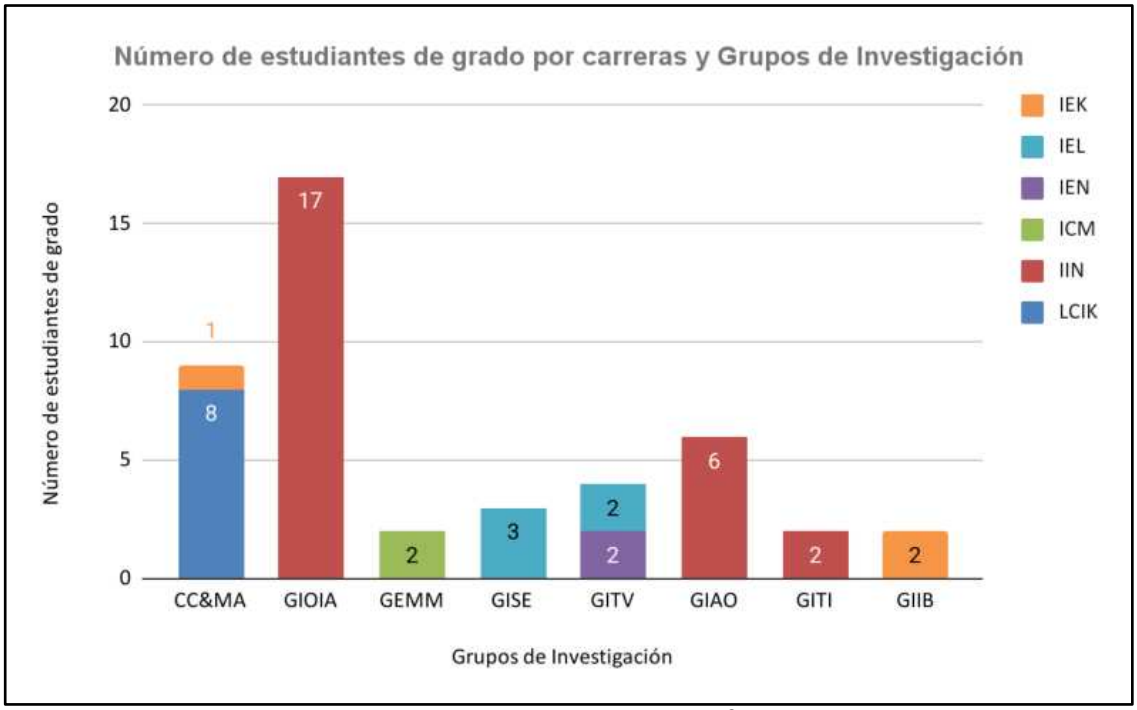

Gráfico 4. Número de estudiantes de grado por carreras[3] y por grupos de investigación

[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

Número de estudiantes de grado involucrados en trabajos de investigación por carreras

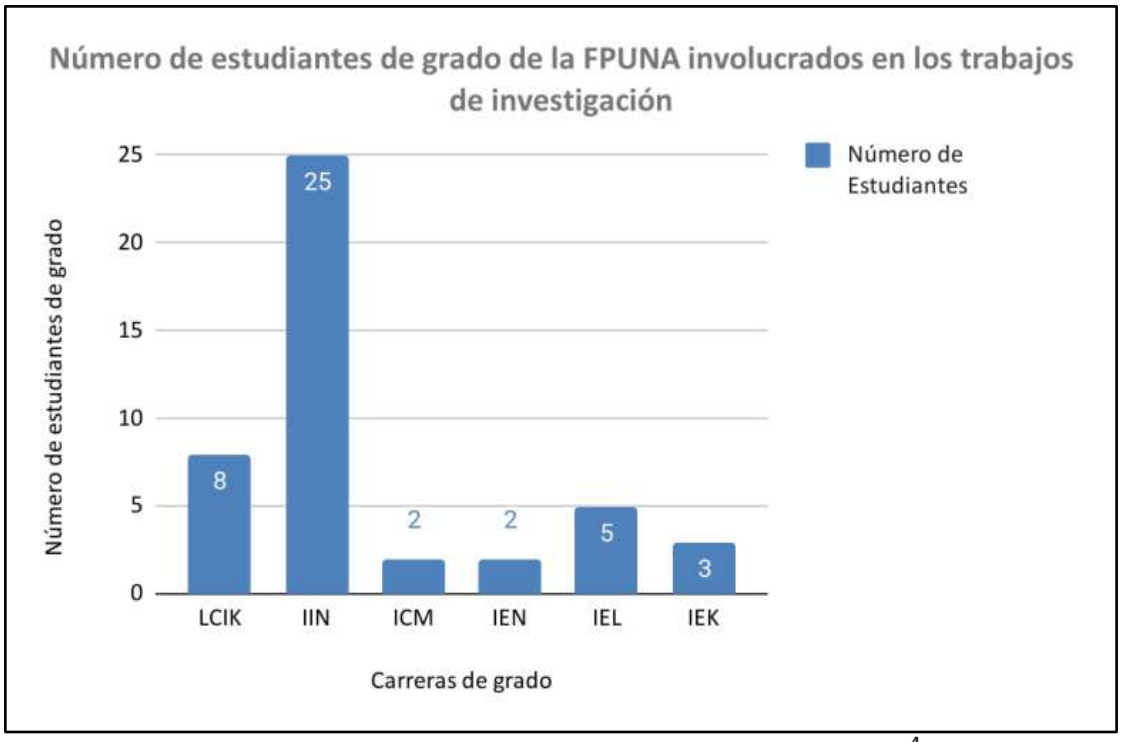

Gráfico 5. Número de estudiantes de grado por carreras[4]

[4] **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

Índice de autores con adscripción FP-UNA

A

Acevedo Zarza, Santiago Rubén p. 37
Allegretti, Mauricio p. 46
Alderete Garcete, Eliane Elizabeth p. 71
Alfonzo, Ever p. 57
Alvarenga, G.A. p. 69
Aquino, Sofía p. 60
Ayala, Jordan p. 53

B

Báez Lovera, Liz p. 38
Benítez, F. G. p. 35
Bogado, Federico p. 15
Bogado-Martínez, César F. p. 30
Botta, Rocío pp. 10, 22
Buzarquis, Enrique p. 31

C

Cabral, Juan C. p. 29
Cabrera González, Carmen p. 71
Cabrera Peralta, José María p. 54
Cáceres, Marcos pp. 9, 58
Candia, Alejandro p. 64
Cañete, Carlos p. 45
Cappo, Cristian p. 64
Casanova, Pablo p. 4
Castier, Marcelo pp. 3, 6, 7, 9, 24, 58,
Centurión Funes, Eduardo p. 34
Céspedes-Sánchez, Pedro P. p. 13

Colbes, José pp. 34, 45, 55
Coronel, Luciana Dalila p. 59
Coronel, T. p. 42
Cubilla, Iván p. 58
Cubilla, Luis p. 55

D

Dávalos, Enrique Javier p. 19
Demattei Ortiz, Zulma Lucía p. 51
Díaz, M. p. 63
Díaz Barúa, David Arturo p. 36
Díaz Ruiz Díaz, Fernando David p. 36

E

Espínola, Gustavo E. p. 29

F

Falcon de Legal, Edith p. 26
Fariña, J. p. 42
Fernández, Federico pp. 62, 63, 66
Fernández, Félix pp. 15, 31
Fernández, Karen p. 15
Fernández, Roberto p. 61
Fernández Mareco, Enrique pp. 47, 49
Fernández-Nestosa, María José p. 12, 21, 23
Ferreira-Caballero, Sebastián p. 53
Ferreiro, Omayra pp. 73, 74
Fidabel Gill, Mateo Andrés p. 37

G

Galeano, Ramona p. 16
Galeano, Víctor pp. 47, 49
Galeano-Duarte, Gustavo A. p. 65
Gamarra Benítez, Jazmín María Del Luján p. 54
García-Díaz, María E. p. 46
Gómez, J. p. 42
Gómez-Guerrero, Santiago p. 14
Gómez Morel, Diego Rubén p. 54
Goncalvez Basabe, Lucas Damián p. 54
González, Arturo pp. 15, 42, 56
González, Diego pp. 47, 49
González, M. E. p. 35
González Fernández, Arturo p. 56
González Rodríguez, Viviana Dejesús p. 71
Grossling-Vallejos, Benicio pp. 5, 26
Gutierrez, Bethania p. 57

L

Legal-Ayala, Horacio pp. 5, 13, 26, 52,
Lezcano, Laine p. 15
López, María Margarita pp. 40
López, Sonia p. 15
López-Pires, Fabio p. 19

M

Martínez, Víctor pp. 12, 23
Martínez Espínola, Carin Lucía p. 38
Medina, Cristhian p. 45
Mello-Román, Julio César pp. 5, 8, 20, 26, 51, 52,

Méndez Xavier, Ellen Luján pp. 67, 68
Mendoza, Sergio p. 60
Molas Céspedes, Hugo Marcelo p. 38
Monteiro, Magna María pp. 4, 11
Moré, Luis G. p. 45

N

Núñez-Castillo, Carlos p. 46

O

Ortigoza, Eduardo pp. 36, 42
Oxilia, Victorio pp. 36, 42

P

Paciello Coronel, Julio Manuel pp. 50, 57
Pereira, Uriel p. 19
Pérez Estigarribia, Pastor pp. 5, 53
Pinto-Roa, Diego P. pp. 13, 20, 30, 34, 37, 45, 46, 47, 49, 53, 55, 61, 62, 66,
Prado, Antonella p. 31

Q

Quintana, E. pp. 41, 60
Quintana, Ramón p. 20
Quiñonez, Ever p. 32
Quiñonez, Brenda p. 46

R

Ramírez, Guadalupe p. 31
Recalde-Ramírez, Jorge L. p. 40
Recalde, Luciano p. 41, 60
Ries, Andreas p. 18
Ríos Álvarez, Luis Fernando p. 50
Ríos-Festner, Daniel p. 15
Riveros-Rojas, Gerardo J. p. 13
Roa, Fredy p. 20
Rojas Moreno, Romina p. 56
Román Mancuello, Jesús Gabriel p. 50
Ruiz Rodas, Juan Ramón p. 8

S

Schaerer, Christian E. pp. 9, 10, 14, 22, 28, 29, 58, 67,
Sosa-Cabrera, Gustavo pp. 14, 39, 43, 44, 48, 54, 56, 65,

T

Torrez Vera, Dafne Aylen p. 54

U

Unzain, Enzo p. 61

V

Varela, Jhabriel pp. 28, 29
Vázquez, Gabriela p. 46

Vázquez Noguera, José Luis pp. 5, 20, 26, 51, 52, 53,
Villalba, Cynthia p. 38
Villegas-Colmán, Carolina Elizabeth pp. 5, 26
Von Lucken Martínez, Christian Daniel pp. 19, 37, 50, 57, 68,

Y

Yegros, C. p. 60

PRODUCCIÓN CIENTÍFICA DE LA FP-UNA 2024

Grupos de Investigación

- GIAO - ALGORITMO Y OPTIMIZACIÓN
- GBI - BIOINFORMÁTICA
- GBIOMAT - BIO Y MATERIALES
- GICI - CIENCIAS DE LA INFORMACIÓN
- CC&MA - COMPUTACIÓN CIENTÍFICA Y MATEMÁTICA APLICADA
- GIEM - ELECTRÓNICA Y MECATRÓNICA
- GIIB - INGENIERÍA BIOMÉDICA
- GIOIA - OPERACIONES E INTELIGENCIA ARTIFICIAL
- GPDI - PROCESAMIENTO DIGITAL DE IMÁGENES
- GISE - SISTEMAS ENERGÉTICOS
- GITI - TECNOLOGÍA DE LA INFORMACIÓN
- GITV - TECNOLOGÍAS VERDES
- GITOC - TEORÍA DE LA COMPUTACIÓN

Grupos de Investigación en Formación

- GIAE - AERONÁUTICO Y ESPACIAL
- GIA - ASTRONOMÍA
- GICAI - AUTOMATIZACIÓN Y CONTROL INDUSTRIAL
- GICCG - CIENCIAS DEL CAMBIO GLOBAL
- GEMM - ENSAYOS DE MATERIALES METÁLICOS
- GISPA - SISTEMAS DE PROPULSIÓN AEROESPACIAL
- GISD - SISTEMAS DIGITALES
- GITAE - TECNOLOGÍA APLICADA Y EDUCACIÓN
- GITE - TECNOLOGÍA ESPACIAL
- GITHG - TURISMO, HOTELERÍA Y GASTRONOMÍA

PUBLICACIÓN FP-UNA
Dirección de Investigación
Campus de la UNA
San Lorenzo, Paraguay
investigacion@pol.una.py
www.pol.una.py/investigacion