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# Editorial for Thematic Section:

# New Trends in Artificial Intelligence and its Applications

This thematic section of Computación y Sistemas (CyS) contains fourteen papers presenting advances in Artificial Intelligence (AI) and its applications. AI is a field of study that develops systems and machines capable of performing tasks that typically require human intelligence, such as learning, reasoning, and perception. Since its origin, AI has evolved to incorporate advanced techniques such as deep learning, machine learning, and artificial neural networks. These innovations have enabled significant advancements across various sectors.

The guest editors carefully selected the fourteen papers featured in this thematic issue. At least three scientific committee members evaluated each manuscript in depth. In determining a paper's acceptance, the reviewers considered various aspects, including originality, contribution to the field, soundness, and technical quality.

In the following paragraphs, we have grouped the selected papers by thematic affinity to provide an overview and highlight AI's significant impact on improving efficiency, accuracy, security, and responsiveness across various applications.

**Optimization and Evolutionary Algorithms.** Evolutionary algorithms are a broad field of artificial intelligence in which evolutionary processes inspire algorithms, such as artificial immune systems, inspired by the evolution of acquired immune systems. Combining evolutionary algorithms with optimization creates powerful tools for solving many complex problems, and these algorithms help drive advances in various scientific and engineering disciplines.

An example is the work of Del Angel et al.; the authors propose a methodology for implementing Linear Genetic Programming to evolve programs for the Internet Shopping Multi-item Unit Optimization Problem (ISHOP-U), an NP-Hard optimization problem, propose strategies for readers to quickly implement their proposed approach and produce Linear Genetic Programming algorithms for other problems, giving an example on a test problem. Another work that uses evolutionary algorithms to solve optimization problems is that of Dominguez Guerrero et al.; the authors propose the Normal Attractor Intersection (NAI) and the NAImopso. The NAI avoids the a priori definition of the search direction and equality constraints; it uses a set of attractors covering the entire Pareto front to generate solutions on the Pareto front. The NAImopso is a decomposition-based multi-objective optimization algorithm; we use it to demonstrate the ability of NAI to obtain the Pareto front.

**Artificial Intelligence and Machine Learning.** The articles presented in this section include artificial intelligence techniques to solve various problems; for example, Rodriguez-Arteaga et al. present an architecture to develop a socio-emotional conversational agent that identifies intentions within Socratic dialogues, using a combination of speech act theory and sentiment analysis.

To identify the appropriate intent, this approach considers the influence of personality, the polarity of the words used by the user, and the context in which the dialogue is situated. With this, it is expected to accurately identify communicative intentions, facilitating a natural and empathetic interaction between intelligent virtual agents and users, contributing to the field of artificial intelligence applied to education. Estrada-Patiño et al. use IA to solve climate change problems; they propose HELI, a methodology for temperature forecasting in the context of climate change.

HELI incorporates robust preprocessing that facilitates tuning and learning multiple forecasting strategies, both Classical and machine learning. These strategies are combined and optimized to improve participation and produce a regression function that is at least as effective as the best individually trained method. Some works use

learning strategies; for example, in the following works, Srinivas Naveen et al. present a technique to identify Complex correlations and patterns in data stored in clouds to meet demand.

The proposal offers an innovative approach to decision making since the support systems apply Deep methods Autoencoder Optimization, into the CBA (Cloud-Based Analytics) real. Montalvo-Bereau et al. propose working with spoken language recognition tasks in short sentences, considering two tasks related to speech as auxiliaries in a multitasking architecture. Three models were implemented and trained with different approaches in a single-task and multitask learning paradigm.

The models considered were based on 2D-CNN, one of which was a proposed configuration designed to address less than a second expression. Finally, Mohammed bin Qassim Al-Asiri and Ashwaq Ayed Al-Asmari present an article where they review the state of the art of IA in support of surgical robots; this research highlights the importance of using artificial intelligence robots in surgical operations and increasing awareness of using this technology to increase the success rates of these operations, in addition, the research also shows some gaps in artificial intelligence robot research for surgical operations.

**Cybersecurity and Network Data Analysis.** The selected papers in this thematic section explore various aspects of detecting and preventing cyber threats. Almotairy et al. examine computational propaganda on Twitter, highlighting how Arab propagandists use artificial intelligence to evade detection by constantly changing their writing style and relying on retweet amplification.

The study identifies critical features such as follower ratios and publishing volumes as crucial for detecting propaganda.

They incorporate drift detection and streaming properties to analyze service request traffic patterns, showing effectiveness through statistical metrics. Alluraiah and Chetty present the Anomaly-based Real-Time Prevention (ARTP) framework for real-time detection of application-layer DDoS attacks, particularly those targeting web applications. They employ advanced machine learning techniques and validate the framework's efficacy on the LLDoS benchmark dataset.

**Decision Analysis and Knowledge Management.** The selected papers in this section explore various methodologies for effective decision-making and knowledge management. Leyva López et al. present an extension of the ELECTRE III method, using a 2-tuple linguistic representation model to handle heterogeneous information; this allows the decision-maker to adapt preferences to criteria uncertainty.

The proposed method is applied to evaluate the environmental impacts of industrial activities in a petrol station. Olmos-Sánchez examines the need for a comprehensive framework combining Knowledge Management and Systems Thinking to address complex domains. The KMoS-SSA framework is proposed to facilitate the development of intelligent solutions in rapidly evolving contexts. This framework is particularly relevant for transdisciplinary teams working on AI solutions in Complex Informal Structured Domains (CISD), such as work-related stress.

**Classification, Detection, and Data Mining.** The selected papers in this section explore advanced methodologies for object detection and data stream classification. Kokila et al. propose a fully convolutional neural network with a dilation kernel to enhance salient object detection, addressing challenges in multi-level characteristics and distractions.

Their framework outperforms nine cutting-edge saliency detection techniques in accuracy and robustness across various datasets. Althabiti et al. review the state-of-the-art methods in multi-label classification for IoT data streams, which assign multiple class labels to an instance, such as predicting movie genres.

This review focuses on challenges like class imbalance and concept drift. They also highlight gaps for future research in handling the massive, continuous data stream IoT devices generate.

This compendium of works provides an overview of various directions in which AI is developing and its practical applications, highlighting its crucial role in automating complex

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tasks, improving decision-making, and creating more intelligent and adaptive systems.

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