# Editorial for Thematic Section:
# Advances in Pattern Recognition

This thematic section of Computación y Sistemas (CYS) compiles eleven papers from fifteen submitted that present crucial advances in Pattern Recognition (PR). It is a must-read for anyone interested in the field. PR is a discipline concerned with finding patterns in data and using these patterns to make decisions or predictions using mathematical models and computer algorithms. Nowadays, PR is a powerful tool that the world's most advanced industries employ to make intelligent decisions and predictions.

The guest editors carefully handled and selected the eleven papers in this thematic section. At least three scientific committee members reviewed each paper, and originality, contribution to the field, soundness, and technical quality were considered for acceptance. In the following, we provide an overview of the papers included in this thematic section.

**P. Wiederhold** proposes an algorithm for boundary tracing where triangular tiles describe digital objects. In this proposal, both edge-adjacency and vertex-adjacency-based connectivity types are considered, and the proposed algorithm proves some properties of boundaries and k-contours of objects of triangular tiles, which are useful in some processes, such as object description and recognition. The performance of the proposed algorithm is competitive when compared to previously known works from the literature considering k-adjacency graphs.

**D. A. Martinez-Barba et al.** propose a sensor fusion block that integrates RGB and depth features to improve perspective transformation performance. They transform monocular front camera perspective images into semantically segmented bird's-eye view representations. The experimentation considers data augmentation and depth integration for training deep learning architectures, concluding that the proposed method helps improve performance in the autonomous vehicle field.

**M. P. Jimenez-Martinez et al.** propose an ensemble classification model that integrates outputs from gender-specific and age-specific models based on ROBERTuito. They performed an error analysis based on visualizing attention weights, which helped identify the most relevant words in detecting subtle sexism. They also leveraged ChatGPT's capabilities to model language nuances, generating potential interpretations of texts associated with the classifications. Their study highlights the importance of demographic considerations in sexist language detection and demonstrates that combining diverse perspectives with advanced techniques can enhance this detection on social media in Spanish. From experiments on the EXIST corpus, the authors concluded that perceptions of sexism vary considerably among different demographic groups, especially across genders and age groups. Results indicate a 25% discrepancy between male and female annotators' classification of comments as sexist or non-sexist.

**A. K. Gárate-Escamilla et al.** analyze various scenarios related to omitting some data available for training in algorithm selectors, which are high-level strategies that manage sets of algorithms (in this study for supervised classification), allowing them to run interchangeably, avoiding the single selection of a poor individual algorithm. The authors assess the performance of algorithm selectors to estimate how resistant they are to the presence of missing values within the training data. Their results show that given a proper training set and deciding which runs to omit entirely at random, some supervised classifiers such as Neural Networks, Naïve Bayes Classifiers, and Support Vector Machines can correctly operate as algorithm selectors with up to 50% of the data missing (data about the solvers to choose from), without any further treatment of the missing values.

**E. Ruiz-Muñoz et al.** use Digital Breast Tomosynthesis (DBT) for early detection and accurate staging of breast lesions by comparing the efficacy of direct analysis of preprocessed sinograms versus reconstructed images for breast lesion detection using Convolutional Neural Networks (CNNs). Specifically, sinograms were

evaluated from 180-degree projections versus those from 360-degree projections and reconstructed images using simple back projection. The results demonstrate that 180-degree sinograms, when preprocessed for contrast enhancement, significantly outperform 360-degree sinograms and reconstructed images in terms of accuracy, recall, and F1 score. The superior performance of 180-degree sinograms underscores their potential as a viable alternative to traditional image reconstruction methods, offering a more practical approach to lesion detection and classification.

**E. G. Platas-Campero et al.** addresses the problem of automated diagnosis of leukemic retinopathy using deep learning techniques and models such as YOLO for lesion detection and SAM for automatic labeling. The results show that SAM-DR outperforms manual labeling, especially in detecting intraretinal hemorrhages, with a mAP50 of 0.804. Furthermore, a comparison between transfer learning and dual transfer learning reveals that dual transfer learning improves lesion detection in specific classes such as "roth spots" and "hemorrhages". This automated approach enhances accuracy in lesion segmentation. It represents a valuable complement in scenarios where labeling by specialists is limited, and data is scarce, effectively allowing the leverage and transfer of the acquired knowledge to similar pathologies.

**C. A. Hernández-Linares et al.** introduce a new Spatial Dynamics Behavioral Analysis method using weighted Voronoi diagrams. This study aims to provide a method to analyze the behavioral patterns of individuals in a region under different conditions, such as water or food restriction, to find behavioral patterns produced in response to different motivational environmental situations. Voronoi Diagrams allow for representing and analyzing those regions of behavioral relevance and identifying areas where the key behaviors occur. Some experiments about the behavior of Wistar rats under different controlled conditions conducted at the Comparative Psychology Laboratory of the Universidad Veracruzana, Mexico, are shown. Based on these experiments, the authors conclude that using weighted Voronoi diagrams would allow the identification and

visualization of several behavioral phenomena, including spatiotemporal learning and motivation.

**O. Mendoza et al.** explore the application of unsupervised learning to identify patterns associated with depression among Mexican university students from 18 to 20 years old, aiming to discover subgroups of students that share similar depression characteristics. Depression is a public health problem that affects students of public and private universities in Mexico and around the world. This study analyses psychosocial and psychological symptoms collected from a survey based on the Center for Epidemiological Studies Depression Scale (CES-D). For building groups, three clustering algorithms were evaluated: K-Means, Agglomerative Nesting, and Differential K-Means analyzing depression symptoms at the beginning, middle, and closing parts of an academic period. According to the results, Stress, loss of focus, and insomnia were the most common symptoms independently of the part of the academic period.

**J. C. Olivares-Rojas et al.** deal with the problem of converting one type of user interface (UI) to another. A methodology to automatically convert a Graphic User Interface /GUI) on medical systems to a Voice User Interface (VUI) is introduced. This methodology allows for obtaining a multimodal GUI-VUI interface. The objective is to enable automatic changes to the user interface without significant changes in the whole system, providing better patient care by making it easy to interact with medical systems. The proposed methodology was tested on a functional prototype based on the Mexican Social Security Institute (IMSS) family medicine system. This practical case shows that automatic user interface conversion is possible, facilitating the interaction with the system and, in this way, improving patient care.

**E. Jardón et al.** introduce an approach to optimize the allocation of public administrative services, considering case studies in Valle de Toluca. They combine the well-known multi-objective evolutionary algorithm, Non-dominated Sorting Genetic Algorithm II (NSGA-II), with fuzzy logic. Different objectives are considered: minimizing client-to-service distances, reducing waiting times, maximizing service coverage, and

optimizing resource utilization. The approach achieved a 15% improvement in Pareto front convergence, a 12% increase in service coverage, and a 20% reduction in travel distances for service workers.

**J. P. Guerra-Ibarra and F. Cuevas-de-la-Rosa** present a greedy algorithm for optimizing a segmentation method by color dominance using the RGB color model. The idea is to emphasize the dominance of green leaves and the red of tomato plants 'natural ripe fruits. Such segmented images can help detect pests, diseases, or nutritional deficiencies. Three hundred images were used in the experiments, and the results obtained are encouraging.

Guest editors:

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