Preface to the CLEI 2025 Special Issue

Volume II

The present issue of CLEI Electronic Journal (CLEIej) is devoted to extended and revised papers of selected works presented at the 51st Latin American Informatics Conference (CLEI 2025), held in Valparaíso, Chile, from October 27th to 31st, 2025. This is the second volume of selected articles from the conference.

The CLEI 2025 conference included five major tracks on different computer science and informatics areas, particularly: Computer Technology, Intelligent Systems, Software Systems, Systems In Practice, and Computer Science Education. A total of 275 submissions were received in these tracks; 91 were accepted as full papers and 23 as work-in-progress. It resulted in an acceptance rate of 33,1% for full papers.

Based on the recommendations of the track chairs, we invited the authors of the 20 papers with the highest score to extend their work and submit it to this special issue. The authors of 14 papers accepted the invitation, and submitted an extended version of the previous article. These articles were reviewed by external researchers and revised by the authors accordingly. This process resulted in five papers being accepted and already published in the first volume of this special issue, and six papers accepted for publication in this second volume. Next we introduce the articles included in this volume of the special issue:

"*Practical Machine Learning for Self-Tuning Buffer Pools in DBMS Mainframe Systems*". This work focuses on the automated optimization of buffer pools in database management systems running on mainframes, a critical area for performance in high-demand enterprise environments. Its main contribution is an empirical validation in a real production setting, applying a methodology that integrates exploratory factor analysis, LASSO regression, and Bayesian optimization with Gaussian processes to tune buffer pool configurations based on actual workloads. Tested in a large-scale financial system, the approach achieved substantial performance improvements, including up to a 95% reduction in maximum synchronous I/O wait time, demonstrating that machine learning techniques are both practical and effective in mission-critical mainframe environments.

"*Enhancing an Arbovirus Control System with Georeferencing and Geolocation Resources*". This paper addresses the enhancement of arbovirus control systems, through the integration of advanced georeferencing and geolocation technologies. Focusing on dengue and other mosquito-borne diseases in Brazil, the study introduces innovative features that shift operational focus from postal addresses of individual properties to block-based polygons of areas, significantly improving spatial accuracy and data reliability. The system, tailored specifically for field agents and health coordinators, facilitates precise visit validation, allows building dynamic heat maps, and optimized route plans, ultimately enabling more targeted and efficient vector control efforts. The main contribution of this work lies in developing a modular, scalable geospatial architecture embedded within existing health management platforms, which has demonstrated substantial improvements in operational effectiveness and strategic decision-making in disease surveillance.

"*Beyond PageRank in GraphHD: Centrality Metrics and Efficient Hyperdimensional Encodings*": This article addresses graph classification within the field of Hyperdimensional Computing (HDC). It proposes efficient hypervector encoding methods that extend the GraphHD framework, which is the basis of this proposal. The authors systematically evaluate alternative graph centrality indicators—e.g., degree, closeness, betweenness, Katz, and eigenvector—in place of the standard PageRank to assign node hypervectors. Additionally, they introduce two novel encoding variants: GraphHD-Level, which preserves quantitative centrality information, and GraphHD-Order, a simplified method that omits edge encoding altogether. Experimental results on six benchmark datasets demonstrate that replacing PageRank with alternative centralities maintains comparable classification performance, while significantly reducing encoding time. Notably, GraphHD-Order achieves similar accuracy to the baseline, but offers consistent speedups (especially on large graphs), making it an attractive lightweight alternative for resource-constrained scenarios. This study highlights the potential of HDC for efficient and robust graph representation and classification tasks.

"*IT Governance and Corporate Sustainability: Decision Frameworks for Digital Transformation Aligned with GRI Standards*": This study explores the role of IT governance and management frameworks—such as COBIT, ITIL, CMMI, and Six Sigma—in facilitating organizational sustainability within the context of digital transformation,

aligning with Global Reporting Initiative standards. Through a systematic literature review that analyzed 61 primary studies, this work identifies how these frameworks support economic, environmental, and social sustainability indicators, by improving operational efficiency, waste reduction, and quality enhancement. The research highlights that IT frameworks not only optimize internal processes, but also enable the conversion of technical data into measurable sustainability metrics, thereby informing strategic decision-making and promoting long-term sustainable value creation. This work contributes with a structured decision-making guide for organizations seeking to integrate digital transformation initiatives with sustainability objectives.

"*Early Computing Education in Brazilian Public Schools: Insights from Teachers*": This paper addresses the Computing Education field, with a particular focus on K–12 computer science education, teacher professional development, and gender inclusion in STEM. It presents a mixed-methods study that investigates teachers' perceptions of the long-running *Meninas.comp* outreach initiative, which introduces programming, robotics, and computational thinking into Brazilian public schools. Unlike most previous studies that primarily assess students' experiences, this work places teachers at the center of the evaluation, providing new insights into their professional development, pedagogical practices, and perceived impacts on students, schools, and local communities. The study demonstrates that participation in the project strengthens teachers' technical and pedagogical skills, increases student engagement—particularly among girls—and fosters broader institutional and social benefits, highlighting the crucial role of teachers as agents of sustainable and inclusive computing education.

"*Agent-Based Modeling and Simulation - Feature Spaces, Macroscopic Statistical Analysis, and Specification Fidelity*". This work focuses on evaluating Agent-Based Modeling (ABM) frameworks, by proposing the Feature Space Maturity Model to systematically assess how well frameworks meet modeling task requirements. It also introduces a macroscopic statistical protocol to validate implementation fidelity across multiple frameworks. Testing six frameworks on a standardized experiment, the study finds that five of them produce statistically equivalent results, highlighting the value of statistical validation for ensuring reliable and reproducible ABM simulations.

After concluding the process of preparing, processing and publishing these two-volume special issue, we would like to express our deep appreciation to all the CLEI 2025 Track Chairs for their collaboration throughout the paper review process, and their vital role in evaluating and selecting the papers invited to this special issue.

We also extend our sincere thanks to the reviewers, who selflessly dedicated their time and expertise to assess the content and quality of the papers featured in this issue.

Finally, we are grateful to the authors for accepting the invitation to extend their conference papers, and incorporate the reviewers' feedback to create these high-quality extended versions of the manuscripts.

We hope you find this special issue as insightful and enjoyable as we do, as it helps to disseminate significant research from the Latin American Computer Science community.

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