

– ENIAC 2025 –

Proceedings

**22nd National Meeting on Artificial and
Computational Intelligence**

**XXII Encontro Nacional de Inteligência
Artificial e Computacional**

Event co-located with the 35th Brazilian Conference
on Intelligent System (BRACIS)

Fortaleza-CE, Brazil
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(Program Chairs and Editors)

Preface

The **National Meeting on Artificial and Computational Intelligence (ENIAC)** is one of Brazil's leading forums for presenting and discussing research advances, innovations, experiences, and emerging trends in Artificial and Computational Intelligence. Supported by the Special Interest Groups on Artificial Intelligence (CEIA) and Computational Intelligence (CEIC) of the Brazilian Computer Society (SBC), ENIAC has established itself as a key venue for fostering collaboration and strengthening the Brazilian AI community.

The **22nd edition of ENIAC (ENIAC 2025)** was held jointly with the 35th *Brazilian Conference on Intelligent Systems* (BRACIS 2025), the 16th *Brazilian Symposium in Information and Human Language Technology* (STIL 2025), the 40th *Brazilian Symposium on Databases* (SBBDD 2025), the 13th *Symposium on Knowledge Discovery, Mining and Learning* (KDMiLe 2025), the 19th *Workshop-School on Agents, Environments, and Applications* (WESAAC 2025), and the 18th *Brazilian Symposium on Bioinformatics* (BSB 2025), in Fortaleza, Ceará, Brazil. Together, these events provided a vibrant and comprehensive environment for researchers, practitioners, educators, and students to share ideas, explore new directions, and discuss scientific and technological advances in the field.

Following the successful tradition of previous editions, ENIAC 2025 included a special track dedicated to papers authored by undergraduate students, encouraging early engagement in research and offering young scholars the opportunity to experience the full cycle of academic publication and presentation. This volume contains **177 full papers** selected through a double-anonymous review process. The Program Committee worked carefully to ensure a fair and thorough evaluation process. We sincerely thank all Program Committee members and reviewers for their dedication, time, and expertise, which were essential to maintaining the scientific rigor and excellence of ENIAC 2025.

We hope that the papers included in these proceedings will inspire new ideas, collaborations, and advances in Artificial and Computational Intelligence, continuing the tradition of excellence that has characterized ENIAC over the past years.

Topics of Interest

The event focused on papers presenting novel ideas, discussions of existing work, and practical studies and experiments relevant to the field of Artificial and Computational Intelligence that had not been previously published. Topics of interest included, but were not limited to:

- Analytics and Data Science
- Artificial Life and Real-Time Simulation
- Artificial Neural Networks and Deep Learning
- Automated Planning, Routing and Scheduling
- Automated Reasoning
- Bioinformatics and AI in Medicine/Healthcare
- Combinatorial Optimization
- Complex Networks
- Constraint Satisfaction Problem and Programming
- Decision Support Systems
- Distributed AI and Agent/Multiagent Systems
- Education for AI and AI for Education
- Embedded AI
- Emerging Countries and Public Policies and AI
- Evolutionary Computation and Metaheuristics
- Explainable AI
- Ethics and Human-centric AI
- Foundation Models and Systems
- Fuzzy Systems
- Game Playing and Intelligent Interactive Entertainment
- Generative AI
- Graph-Based AI
- Hybrid Systems and Metaheuristics
- Intelligent Data Analysis
- Intelligent Human-Computer Interfaces
- Intelligent Systems
- Intelligent Robotics
- Knowledge Acquisition and Base Construction
- Knowledge Representation and Reasoning
- Large Language Models

- Logic Programming
- Machine Learning
- Model-Based Reasoning
- Multidisciplinary AI and CI
- Natural Language Processing
- Ontologies, Semantics, and Explanations
- Pattern Recognition and Cluster Analysis
- Quantum Computing and Learning
- Reinforcement Learning
- Software Tools for Artificial Intelligence
- Temporal and Spatio-Temporal Data Mining
- Time Series
- Transformation of Work through AI
- Transformers
- Trustworthy Software and AI Systems
- Vision AI

Best Paper Award

Main track

The **main track** featured five papers nominated for the Best Paper Award. The evaluation was conducted by a judging committee composed of:

- Prof. Dr. Diego Furtado Silva (USP)
- Profa. Dra. Heloisa Camargo (UFSCAR)
- Prof. Dr. Rodrigo Barros (PUCRS)

After papers presentation during the event and careful consideration, the committee selected the following paper as the **Best Paper** of the main track:

- **Parallel-Hierarchical Multi-Task Learning for Skin Lesion Classification with Multimodal Data**
Camila Dias, Thiago Lermen, Romulo Marconato Stringhini, Manuela Costa, Fabiana Carvalho, Marcelo Gonçalves, Dimitris Rucks Varvaki Rados, Claudio R. Jung, Cristiano A. Costa

An **Honorable Mention** was awarded to:

- **A Non-Dominated Sorting Evolutionary Algorithm Updating When Required**
Lucas Farias, Abimael Jonas Furtuoso dos Santos, Matheus Ribeiro Brant Nobre

The other finalists were:

- **Enhancing ARIMA with Residual Kalman Filtering for Robust Time Series Prediction**
Mouglas Gomes, Bárbara Silva Moraes, Paulo Salgado Gomes de Mattos Neto
- **A Comparative Analysis of Combination Operators in Heterogeneous Ensembles for One-Step-Ahead Time Series Forecasting**
Rodolfo Viegas de Albuquerque, João Fausto Lorenzato de Oliveira
- **Multi-Class Classification of Immature Leukocytes in AML Blood Smears Using an Ensemble of CNNs**
Ana Valéria Silva Coelho, Leonardo Pereira de Sousa, Nicole Ellen Magalhães Silvestre, Maila Claro, Andre Macedo Santana, Rodrigo de Melo Souza Veras

Undergraduate Track

The **undergraduate track** featured three papers nominated for the Best Paper Award. The evaluation was conducted by a judging committee composed of:

- Prof. Dr. Daniel Ratton Figueiredo (UFRJ)
- Prof. Dr. Giancarlo Lucca (UFPEL)
- Profa. Dra. Viviane Moreira (UFRGS)

After papers presentation during the event and careful consideration, the committee selected the following paper as the **Best Paper** of the undergraduate track:

- **A Hybrid Approach Combining CNN and Ensemble Algorithms for Dermoscopic Image Classification**
Pedro Augusto Acordi Soares, Leandro Augusto Ensina, Juliano Henrique Foleiss

An **Honorable Mention** was awarded to:

- **BichoBot – A Chatbot to Assist in the Reception of Incoming University Students**
Sheiely Nascimento, Enyo Gonçalves, Erlânio Freire, Marcos A. de Oliveira

The other finalist was:

- **Reinforcement Learning for Automated Investment in the Brazilian Stock Market: A Comparative Study Between DQN and PPO, and Their Recurrent Versions**

Paulo Ricardo Sturion, André Ponce de Leon F de Carvalho

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