

Mátyás Vincze

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Education

PhD Student

11/2023 - Present

University of Trento / Bruno Kessler Foundation

Trento, Italy

- Currently leading a project on collaborative synthetic-data generation for multilingual large language model alignment, supported by Cineca, Italy's largest computing center
- First authored paper accepted at AAAI 2025 on interpretable reinforcement learning using down-scaled mixture-of-experts
- Won first place at the Interpretable Control Competition : Continuous Track at GECCO 2024

M.Sc.: Artificial Intelligence Systems

09/2021 - 10/2023

University of Trento

Trento, Italy

- Thesis: "Modular Non-Autoregressive Trajectory Prediction Framework for Edge Device Deployment"
- Completed a research internship at HK3LAB, focusing on multimodal models
- Specialized in machine learning, centering on computer vision and natural language processing

B.Sc.: Mathematics

09/2017 - 06/2021

Budapest University of Technology and Economics

Budapest, Hungary

- Thesis: "Hierarchical Representation Learning using Variational Autoencoders for Generative AI"
- Participated in Erasmus+ program at Charles University, Prague, Czech Republic taking classes on deep learning
- Completed a research internship at HSDS Lab, focusing on machine learning solutions for early dropout detection
- Specialized in applied mathematics and probability theory

Experience

Research Intern

05/2023 - 07/2023

HK3LAB

Rovereto, Italy

- Developed multimodal classification pipelines to predict toxicological lesions from biochemistry data, increasing accuracy by 20% compared to unimodal approaches
- Engaged directly with senior researchers from National Center for Toxicological Research (NCTR), FDA, while defining methodologies to analyze intricate biomedical datasets; findings revealed critical patterns leading to identification of three major factors influencing toxin-related health risks
- Established benchmarks for multimodal learning, integrating Whole Slide Images with textual embeddings using transformers and employing gradient boosting models on the combined tabular dataset

Research Intern

03/2022 - 06/2022

HSDS LAB

Remote, Hungary

- Developed and deployed machine learning models to mitigate early dropout of university students
- Engineered a comprehensive testing protocol for pre-trained machine learning pipelines, achieving a 15% increase in accuracy on the test dataset
- Authored detailed documentation on Automated Machine Learning processes and best practices for model selection, hyperparameter tuning, and deployment

Skills

Programming Languages: 🐍 Python, 📊 R, 🗄️ SQL, 🌐 Lua

Tools and Frameworks: PyTorch, HuggingFace, OpenCV, scikit-learn, LangChain, Git, L^AT_EX

Languages: English (proficient), Italian (elementary), Hungarian (native)

Awards and Honors

First Place, Interpretable Control Competition at GECCO 2024

Publications

P1 **SMoSE: Sparse Mixture of Shallow Experts for Interpretable Reinforcement Learning in Continuous Control Tasks**

M. Vincze, L. Ferrarotti, L. L. Custode, B. Lepri, and G. Iacca

Thirty-Ninth AAAI Conference on Artificial Intelligence (AAAI-25)

P2 **Humanity's Last Exam (dataset contribution)**

L. Phan, et. al.

arxiv:2501.14249