Matteo Cacioppo

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ML researcher

WORK EXPERIENCE

ENEA **09/2025 - Present**
Research Fellowship **Frascati, Italy**
Project title: "Development of Artificial Intelligence systems for the generation of machine learning algorithms in smart node networks, pattern and feature analysis in data series, and research support using Large Language Models (LLMs)"

EDUCATION

Master of Science in Physics
La Sapienza University • GPA: 110/110 cum laude — Rome, Italy • 10/2022 - 01/2025

- Thesis: LSTM Neural Network for Real-Time Motion Artefact Correction in MRS Scans
- Advisor: Prof. S. Giagu

Bachelor of Science in Physics
La Sapienza University — Rome, Italy • 10/2015 - 11/2022

- Thesis: Spettroscopia Raman nel dominio delle frequenze ed in trasformata di Fourier
- Advisor: Prof. T. Scopigno

Scientific High School Diploma
Liceo Scientifico — Italy • 09/2010 - 06/2015

PROJECTS

LIS Gesture Classification using LSTM and Feature Fusion — 01/2025

- Developed an LSTM-based neural network to classify 126 Italian Sign Language gestures.
- Extracted features from RGB and radar modalities using pre-trained and custom CNNs.
- Implemented late fusion to combine multimodal features before temporal modeling.
- Handled variable-length videos through padding and packed sequences for efficient training.
- Explored different fusion strategies and evaluated the model on the official test set using accuracy and best epoch metrics.

Research on machine learning for Artefact Correction in MRS — 01/2024

- Implemented an LSTM-based neural network to predict patient movement based on navigator data.
- Utilized affine transformation parameters to correct spatial misalignment in MRS signals.
- Designed a deep learning pipeline for real-time motion prediction to improve scan quality.
- Evaluated the model on patient data to assess its effectiveness in noise reduction and artefact correction.
- Contributed to the RECENTRE project, aiming to enhance the robustness of high-resolution MRS imaging.

Graph Coloring with Graph Neural Networks — 01/2023

- Implemented a Graph Neural Network (GNN) using the Deep Graph Library (DGL) to solve Graph Coloring Problems (GCPs).
- Designed a model where each node is assigned a probability distribution over colors via a one-hot encoding and softmax normalization.

- Employed mean aggregation and ReLU activation in the message-passing layers to update node features.
- Defined a physics-inspired loss function based on the Hamiltonian of the Potts model to encourage distinct color assignments among adjacent nodes.
- Added an auxiliary metric to count incorrect color assignments for evaluation during inference.
- Applied dropout regularization and trained the model using PyTorch's backpropagation; final color predictions are obtained with argmax over output vectors.

PUBLICATIONS

Real-Time Motion Correction in Magnetic Resonance Spectroscopy: a complete overview of the reconstruction process. 10/2025

Poster presented at *The XIV Workshop of the International School on Magnetic Resonance and Brain Function (ISMRBF)*, Erice, Italy.

Real-Time Motion Correction in Magnetic Resonance Spectroscopy: AI solution inspired by fundamental science 06/2025

arXiv:2509.24676 (2025);

Poster presented at EuCAIFCon, Cagliari, Italy.

SKILLS

Programming: C, C++, LATEX – basic, Python, PyTorch, R - advanced

Communication: English (high level), Italian (native)

Other: Docker, Git, GitHub, Linux