Alessio Devoto

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Education

PhD in Data Science Nov 2022 – Present
La Sapienza, University of Rome.
Focus on Efficient and Adaptive neural networks and Explainability for AI models.
Supervisor: Prof. Simone Scardapane.

Visiting Researcher Mar 2024 – Jul 2024
The University of Edinburgh.
Focus on NLP with emphasis on efficient inference and explainability.

Master's Degree in Computer Engineering Sep 2019 – Jan 2022
La Sapienza, University of Rome – Final mark: 110/110 cum Laude.

Visiting Student Feb 2021 – Jul 2021
Universidad Politecnica de Valencia, Spain.

Bachelor's Degree in Control and Computer Engineering Sep 2016 – Oct 2019
La Sapienza University of Rome – Final mark: 110/110 cum Laude.

Experience

Teaching Assistant Sep 2023 – Present
Teaching assistant for Neural Networks for Data Science Applications.
Led hands-on PyTorch tutorials and project supervision for 120+ MSc students.

ICF trainee Coach Feb 2020 – Present
Training to become a life & business coach (30+ hours experience as individual coach).

Tutor Sep 2016 – Present
Tutor for 40+ university/high school students (Maths, Latin, Ancient Greek).

Research Internship – ISPAMM Lab Jan 2022 – Nov 2022
Development of models for explainable High Energy Physics.

Blog

I maintain a small blog where I share code tutorials and insights on various deep learning topics, like implementing a *"ViT from scratch in pure JAX"* or *"Logitlens from scratch without interpretability libraries"*.
Visit my blog here: https://alessiodevoto.github.io/blog.

Projects

Explainability for High Energy Physics Feb 2023 – Present
Parternship with CERN and University of Liverpool.
Developed explainability methods for AI models (mainly GNNs) for Science Discovery.
MUCCA Project Website

Next Generation 6G communications. Mar 2023 – Present
EU funded project with academic and industrial partners. Designed adaptive neural networks to make communication pipelines efficient and goal-oriented, for next-generation 6G.
6G-GOALS Website

Selected Publications

A Simple and Effective L_2 Norm-Based Strategy for KV Cache Compression. A. Devoto* , Y. Zhao*, S. Scardapane, and P. Minervini. *Empirical Findings in Natural Language Processing (EMNLP)*, 2024. (arXiv:2406.11430)

Steering Knowledge Selection Behaviours in LLMs via SAE-Based Representation Engineering. Y. Zhao, **A. Devoto** , G. Hong, X. Du, A. P. Gema, H. Wang, K.-F. Wong, and P. Minervini. *arXiv preprint* arXiv:2410.15999, 2024.

Adaptive Computation Modules: Granular Conditional Computation For Efficient Inference. B. Wójcik, **A. Devoto** , K. Pustelnik, P. Minervini, and S. Scardapane. *arXiv preprint* arXiv:2312.10193, 2023.

Adaptive Layer Selection for Efficient Vision Transformer Fine-Tuning. A. Devoto , F. Alvetreti, J. Pomponi, P. Di Lorenzo, P. Minervini, and S. Scardapane. *arXiv preprint* arXiv:2408.08670, 2024.

Analysing the Residual Stream of Language Models Under Knowledge Conflicts. Y. Zhao, X. Du, G. Hong, A. P. Gema, **A. Devoto** , H. Wang, X. He, K.-F. Wong, and P. Minervini. *Mechanistic Interpretability Workshop (MINT) NeurIPS 2024.* arXiv:2410.16090, 2024.

Are We Done with MMLU? A. P. Gema, J. O. J. Leang, G. Hong, **A. Devoto** , A. C. M. Mancino, R. Saxena, X. He, Y. Zhao, X. Du, and M. R. G. Madani. *arXiv preprint* arXiv:2406.04127, 2024.

Adaptive Semantic Token Selection for AI-native Goal-oriented Communications. A. Devoto , S. Petruzzi, J. Pomponi, P. Di Lorenzo, and S. Scardapane. *Global Communications Conference (GlobeComm 2024)* arXiv:2405.02330, 2024.

Reidentification of Objects From Aerial Photos With Hybrid Siamese Neural Networks. A. Devoto , I. Spinelli, F. Murabito, F. Chiovoloni, R. Musmeci, and S. Scardapane. *IEEE Transactions on Industrial Informatics*, vol. 19, no. 3, pp. 2997–3005, 2022. IEEE.

Enhancing High-Energy Particle Physics Collision Analysis through Graph Data Attribution Techniques. A. Verdone, **A. Devoto** , C. Sebastiani, J. Carmignani, M. D'Onofrio, S. Giagu, S. Scardapane, and M. Panella. *WIRN*, arXiv:2407.14859 2024.

Conditional computation in neural networks: principles and research trends. S. Scardapane, A. Baiocchi, **A. Devoto** , V. Marsocci, P. Minervini, and J. Pomponi. *Artificial Intelligence*, arXiv:2403.07965 2024.

Cascaded Scaling Classifier: class incremental learning with probability scaling. J. Pomponi, **A. Devoto** , and S. Scardapane. *arXiv preprint* arXiv:2402.01262, 2024.

Technical Skills

Deep Learning Frameworks: PyTorch, JAX, Hugging Face Transformers

Programming Languages: Python, C, Java

Development Tools: Git, Docker, Unix/Linux

Research Areas: Adaptive & Dynamic Neural Networks, Efficient Inference & Training, AI Interpretability

Web Development: HTML, JavaScript, CSS

Languages

Italian: Native
English: C2
Spanish: C1
Portuguese: B2 & learning