Matteo Nulli

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Projects

- **'Explaining RL decisions with trajectories': A Reproducibility Study**: Research published in TMLR. Reproduced and extended 'Explaining RL decisions with trajectories' from Adobe Research. Investigated new methodologies by changing the clustering algorithm and by encoding trajectories through Hugging Face based Transformers. Obtained better visual cluster representation.
- **Chain-of-Thought Improves Compositional Understanding of Vision-Language Models**: Analysed and evaluated generative and contrastive-based VLMs such as CLIP, LLaVa and cogVLM on compositionality-based benchmarks (ARO, winoground, sugarcrape). Employed synthetic chain-of-thought prompting in a few-shot fashion to enhance model performance. Research submitted to ICML workshop.
- **Vocabulary Reduction and Contrastive Decoding in LLMs**: Modified existing early-exiting techniques and applied contrastive decoding to encoder-decoder Large Language models such t5. By employing vocabulary pruning technique we achieved 100x improvement in FLOPs, while retaining all performance.
- **AI-Lab Competition Winner**: Implemented Unsupervised and Supervised ML methods (Tree based methods and Deep Neural Network) to analyse breast cancer cells and capture interactions between them. Detected with a success rate of 95% Hypoxic vs Normoxic cells. Presented the project at the University of Oxford Oncology Department.
- **Deep Generative models and Transformer based models**: Implemented causal self-attention in gpt-2 and developed Variational Auto-encoders and Adversarial Auto-encoders from scratch in PyTorch.

Education

- **University of Amsterdam** — Amsterdam, The Netherlands
  MSc in Artificial Intelligence; GPA: 4.0/4.0 (8.2/10) — *Sep 2023 - 2025*
  - **Relevant Courses**: Foundation Models, Deep Learning 1 & 2, Computer Vision, Natural Language Processing, Information Retrieval, Machine Learning 1
- **Università Commerciale Luigi Bocconi** — Milan, Italy
  BSc in Mathematics and Computing Sciences for Artificial Intelligence; GPA: 3.6/4.0 (99/110) — *Sep 2020 - July 2023*
  - **Thesis**: Employed **Generative** Adversarial Networks and Recurrent Neural Networks with time-series financial data to determine future prices of stocks.
  - **Relevant Courses**: Machine Learning, Mathematical Modelling for Finance, Mathematical Analysis 1,2 & 3, Physics 1 & 2, Statistical and Quantum Physics, Optimization Algorithms, Programming
- **University of Sydney** — Sydney, Australia
  Exchange Semester in Applied Mathematics and Computing Sciences; GPA: 3.6/4.0 — *Feb 2023 - July 2023*
  - **Relevant Courses**: Stochastic Processes (Adv), Big Data and Data Diversity (Adv), Deep Learning

Experience

- **Aindo** — Milan, Italy
  Machine Learning Engineer — *June 2022 - Sep 2022*
  - **VAEs**: Learned PyTorch library and developed Variational Auto-encoder architecture.
- **BAINSA** — Milan, Italy
  Co-Founder — *Jan 2022 - July 2023*
  - **AI association**: Founded first Artificial Intelligence association at Bocconi.
  - **Events**: Spread awareness & perception on AI's applications through events held inside and outside the university.
  - **Partners**: Main Partners include Bending Spoons, Vedrai and Insitute Europia.
- **BSI - Build Sustainable Innovation** — Milan, Italy
  Tech Consultant — *Jan 2021 - July 2023*
  - **ML Engeneering**: Implemented ML & Statistical based solutions for Companies.
  - **Data Analysis**: Applied Data analysis techniques to costumer provided datasets.

Programming Skills

- **Languages**: Python, R, SQL, LaTeX, C (Beginner)
- **Libraries**: Pytorch, OpenCV, SciPy, Pandas, NumPy, Matplotlib, Scikit Learn, CLIP, Transformers