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 technqiues and applied contrastive decosing to encoder-decoder Large Language models such t5. By employing vocabulary pruning technqiue we achieved 100x improvement in FLOPs.
- **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