Timur Oner

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RESEARCH INTERESTS: My research explores the intersection of human cognition and AI, investigating how computational models can mirror cognitive processes to achieve more robust reasoning capabilities. I'm particularly interested in understanding how different modalities (visual, linguistic, symbolic) interact in both human cognition and transformer architectures. Currently focused on numerical cognition and multimodal reasoning, I'm broadly motivated by developing AI systems that exhibit human-like cognitive flexibility across diverse reasoning tasks.

WORK EXPERIENCE

University of Padova Cognitive Computation Neuroscience Lab. - Research Intern   **June 2025 – Current**

- **Investigated computational mechanisms of visual numerosity in LLaVA** through systematic LoRA fine-tuning in Linux environment on synthetic and real datasets with PyTorch and Huggingface transformers library, comparing model processing to human cognitive systems while improving counting accuracy from 39.2% to 51.2%.
- **Designed and implemented custom training loops for LLaVA** using PyTorch in a Linux environment, fine-tuning with LoRA by selectively adapting the projector layer to enable efficient prompt optimization and strong performance with limited data.
- **Analyzed modality gap between visual and textual number representations**, investigating how cross-modal alignment influences counting performance using dimensionality reduction techniques like UMAP, tSNE and SVD.
- **Developing novel pretraining and instruction-tuning pipelines** to enhance numerosity capabilities across diverse datasets, with findings potentially contributing to an arXiv preprint on improving MMLLM numerical reasoning.

Infina Software   - Junior Data Scientist   **November 2022 – June 2023**

- Conducted data analysis and finetuned LightGBM (gradient boosted decision tree) using messy and noisy real world transaction data, achieving a test set accuracy of 78%, which improved credit risk classification over the previously used baseline model by 8%.
- Wrote and reviewed backend code and integrated APIs to facilitate seamless communication between machine learning models and the Fintech web application.
- Performed data cleaning and feature engineering on large datasets, ensuring high-quality data inputs for models, achieving an accuracy improvement of as high as 3%.
- Collaborated with cross-functional, multidisciplinary teams to integrate machine learning models into a Fintech web application, contributing to the company's core product.

EDUCATION

Università Degli Studi di Padova - Data Science, MSc - 27.5/30.   **October 2023 - Dec 2025 (Expected)**

- Courses completed: cognition and computation (28/30), vision and cognitive systems, machine learning, statistical learning, reinforcement learning, big data computing, optimization
- Team projects on statistical methods, natural language processing and reinforcement learning are completed.
- Currently finishing the degree working on my thesis fine tuning MMLLMs using LORA to achieve better downstream task performance. .

Istanbul Technical University - Electronics and Communications, BSc.   **Graduated July 2023**

- GPA: 3.26/4.00 (Electronics and Communications), 3.52/4.00 (Engineering Physics).
- Active member of ITU Astronomy Club and ArtITU Club, organizing events and presentations.
- Enhanced soft skills through theater and speaking classes.

PROJECTS

Email Sentiment Analysis Web Application Using BiLSTM - Blog Post

- Developed a BiLSTM model with an attention mechanism in PyTorch, achieving 84.5% test accuracy on the processed ENRON dataset.
- Built a Flask-based API and Bootstrap frontend, enabling real-time sentiment classification of emails.
- Containerized and deployed the web app on AWS using Docker (via Lambda function and API gateway), ensuring scalability and ease of access.
- Implemented data annotation and preprocessing pipelines, converting raw email datasets into structured high-quality training data.

SKILLS & INTERESTS

- **Languages**: English (C1), Italian (B2), Turkish (Native)
- **Programming**: Python, R, SQL, Docker, TensorFlow, PyTorch, Git, Linux, AWS
- **Machine Learning**: MMLLMs, PEFT, BERT, Attention Models, LSTMs, Dimensionality Reduction, Data Visualization (Matplotlib, Seaborn)
- **Web Development**: RESTful APIs, Flask, JavaScript, HTML/CSS, Bootstrap
- **Mobility:** EU Blue Card eligible – easily employable across the EU with minimal administrative effort.