Mohammadkazem Rajabi

Github
Linkedin
Padova, Italy
mohammadkazem.rajabi@studenti.unipd.it
(+39) 389 438 9992

Education

University of Padua — Padova, Italy
Master in Computer Science(Major in Artificial Intelligence) — *Sep 2022 – Sep 2025*
Final Grade: **105/110**

Shahid Beheshti University — Tehran, Iran
B.Sc. in Computer Science — *Sep 2017 – Sep 2021*
GPA: 15.83/20, Final Year GPA: 17.53/20

Selected Courses

- **Machine Learning** [30+/30](cum laude)
- **Computer Vision** [29/30]
- **Natural Language Processing** [28/30]
- **Deep Learning** [25/30]
- **Network Science** [28/30]

Thesis

Improving Zero-Shot Multi-Object Navigation by Enhancing Object Detection in LLM-Based Embodied AI Framework

Improved the performance of navigation and detection in an LLM-based embodied AI framework (TANGO) by using fine-tuned state-of-the-art models and enhancing the detection module through a synthetic dataset in Habitat-Sim for the MultiObject task. Improved the agent's success rate compared to the baseline and outperformed prior end-to-end methods. Additionally, conducted an ablation study on a memory-based filtering mechanism that maps visited areas to reduce redundant exploration and enhance robustness. The final system achieved strong zero-shot generalization in unseen environments without task-specific retraining.(Full thesis available on *GitHub*)

Supervisor: Prof. Lamberto Ballan

Course Projects

- **Sentiment and Topic Analysis of Tech Product Reviews**
  Built a robust sentiment analysis pipeline by fine-tuning Transformer models and deep learning architectures. Explored the impact of pre-trained word embeddings on representation quality using the Amazon Electronics 5-core dataset. Employed focal loss and stratified splitting to mitigate class imbalance, and applied LDA, NMF, and BERTopic to uncover latent semantic themes linked to sentiment patterns. *(Code and report on* GitHub)
- **Image Colorization with Conditional GANs and Pretrained U-Net**
  Implemented a conditional GAN framework for automatic image colorization, using a U-Net generator and PatchGAN discriminator. Trained on ImageNet samples in the Lab color space to predict color channels from grayscale inputs. Integrated and fine-tuned a pre-trained ResNet18 backbone in the U-Net encoder to enhance feature extraction and output realism. Balanced GAN and L1 losses to improve visual fidelity and reduce artifacts. *(Code and report on* GitHub)

- **Comparative Analysis of Closed-Set and Open-Vocabulary Object Detectors**
  Conducted a comparative study of CNN and transformer-based object detectors on PASCAL VOC. Fine-tuned ViT models and evaluated RF-DETR for real-time detection, chosen for its deformable attention and fast convergence. Assessed zero-shot generalization with OWL-ViT2, highlighting trade-offs between supervised accuracy and open-vocabulary flexibility. *(Code and report on* GitHub)

- **LLM Pruning and Fine-Tuning for Efficient Text Summarization**
  Applied SparseGPT pruning to compress large language models, reducing parameters and computational cost while preserving baseline performance; leveraged LoRA fine-tuning to adapt the pruned model to downstream tasks, achieving significant improvements in perplexity and task-specific performance with minimal additional parameters.

- **Graph-Based Community Detection and Topic Modeling in Climate Discourse**
  onstructed interaction graphs from Reddit climate discussions and applied community detection (Louvain) to reveal structural patterns. Combined with BERTopic and sentence embeddings to analyze semantic coherence across communities.

For other works, Explore more on my *GitHub*

Skills

Languages: Python, Java, C++, JavaScript

Frameworks: PyTorch, TensorFlow, OpenCV

Libraries: Pandas, NumPy, NLTK, SciPy, Scrapy, Selenium, Matplotlib, Plotly, Seaborn

Web Dev: React, Next.js, Node.js, Django, Git, Docker, SQL, MongoDB

Teaching & Research Experience

- **Thesis Researcher**, Visual Intelligence and Machine Perception (VIM) Group *2024 – 2025*
- **Teaching Assistant**, Data Structures *2018*
  Shahid Beheshti University – Supervisor: Prof. Farnaz Sheikhi
- **Teaching Assistant**, Compiler Design *2019*
  Shahid Beheshti University – Supervisor: Dr. Fatemeh Ahmadi Moughari

Work Experience

- **Front-End Developer**, MeNEW (Remote) *2023 – 2024*
  Developed a digital restaurant platform using React, Next.js. Focused on UI components, real-time features, and solving front-end integration challenges.

Languages

- English: Proficient – Studied in English
- Italian: A2
- Persian: Native