Sepehr Noey Kordkandi

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Education

B.Sc in Computer Engineering (Major in Artificial Intelligence) Sep. 2020 - Feb. 2025
***Amirkabir University of Technology (Tehran Polytechnic)**, Tehran, Iran* (Expected)

- **GPA:** 3.91/4 (18.42/20)
- **GPA (Last Two Years):** 4/4 (19.36/20)

High School Diploma, Mathematics and Physics Sep. 2017 - Sep. 2020
***Alborz High School**, Tehran, Iran*

- **GPA:** 4/4

Research Interests

- Computer Vision
- Generative AI
- Multimodal Learning
- Medical Image Processing
- Explainable AI
- Machine Learning

Research Experience

B.Sc. Thesis, *Amirkabir University of Technology, Tehran, Iran* July 2024 - Present
Supervisor: Dr. Mohammad Rahmati

- Thesis Title: "*Image Editing System Using Generative Text-to-Image Diffusion Models*"
- Leveraged multiple **Generative Text-to-Image Diffusion Models** for diverse **image editing** tasks.
- Editing tasks included Object Addition/Removal, Inpainting/Outpainting, and Style Transfer.
- Incorporated concepts such as **Diffusion Models**, **Cross-Attention Mechanisms**, **Classifier-Free Guidance**, and **Text Embedding Techniques**.
- Employed tools and technologies like **PyTorch**, **Hugging Face**, **Kaggle Notebooks**, and the **W&B Tracking System**.

Research Intern, *Sharif University of Technology*, [GitHub] July 2023 - Sep. 2023
Supervisor: Dr. Hossein Sameti at Speech and Language Processing Laboratory (SLPL)

- Utilized **transformer-based models** including mt5 and ParsBERT for fine-tuning on paired datasets for **Persian grammar correction**.
- Involved concepts include **Attention Mechanisms**, Seq2Seq Learning, **Masked Language Modeling**, Transfer Learning, and Parameter-Efficient Fine-Tuning techniques like LoRA.
- Used technologies and tools like **PyTorch**, **Hugging Face Transformers**, **LoRA PEFT**, and the W&B Tracking System.

Selected Projects

Landscape Image Generation Using Diffusion Models [GitHub] Spring 2024

- Implemented first Diffusion Model from the **DDPM** paper.
- Developed **U-Net** architecture in **PyTorch** with downsampling, upsampling, and attention blocks.
- Trained the model to generate 32x32 landscape images over 500 epochs.

Image Captioning Using Vision Transformers [GitHub] Spring 2024

- Implemented a vision encoder and text decoder to caption input images.
- Used **Sinusoidal Embeddings** for spatial and sequential relations in patches and tokens.
- Used **PyTorch** for implementations and **MS COCO 2014** as the training dataset.

Data Mining Course Projects [GitHub] Spring 2024

- Used classification algorithms like **XGBoost**, **SVM**, **KNN**, Logistic Regression and **Decision Trees**
- Used algorithms like Linear and Polynomial Regression with different loss functions for prediction
- Involved Data Cleaning and used algorithms like **K-Means**, DBScan for clustering them
- Involved using PCA for Dimensionality Reduction and techniques like SMOTE for over-sampling

Fine-Tuning YOLOv8 for Enhanced Detection in Crowded Scenes [GitHub] Winter 2023

- Labeled several crowded images with numerous people and cars to create a **custom dataset**.
- Fine-tuned YOLOv8n with the custom dataset for better detection in crowded scenes.
- Used **LabelImg** for annotation and **Ultralytics** for fine-tuning and **object counting**.

Information Retrieval System [GitHub] Winter 2023

- Implemented Boolean and **Ranked Retrieval** systems for Persian texts
- Involved **Data Cleaning** and Preprocessing techniques for more accurate indexing
- Used Champion List and Heap Sort for efficient document retrieval and responding

Retina Blood Vessels Segmentation Using U-Net [GitHub] Fall 2023

- Implemented U-Net architecture in **TensorFlow** for blood vessels segmentation.
- Used a combination of DRIVE and HRF datasets for training.
- Employed **data augmentation** techniques, including flips, elastic transforms, and distortions.

ANN Framework From Scratch for Handwritten Digit Recognition [GitHub] Fall 2023

- Implemented a framework from scratch for training Fully-Connected Neural Networks (**FCNN**).
- Developed several optimizers like **SGD**, Momentum, **Adam**, and RMSprop.
- Implemented **MSE** and **Categorical Cross-Entropy** for regression and classification tasks.
- Trained a FCNN using the framework to recognize handwritten digits from the **MNIST** dataset.

Explaining ResNet-50 Predictions with LIME and SHAP [GitHub] Winter 2022

- Used LIME and SHAP to explain predictions of a **pre-trained ResNet-50** on image classification.
- Compared LIME and SHAP to highlight key image regions affecting predictions.

Classic AI Projects [GitHub] Fall 2022

- Associated projects of Artificial Intelligence course in **UC, Berkeley** (Pacman).
- Implemented multiple **search algorithms** in AI including BFS, DFS, UCS, Greedy, and A*.
- Involved concepts like CSPs, **MDPs**, Q-Learning, **Reinforcement Learning**, and Bayesian Nets.

Teaching Experience

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

- **Teaching Assistant** in Principles of Cloud Computing Fall 2024
  Under Supervision of *Dr. Seyyed Ahmad Javadi*
- **Teaching Assistant** in Operating Systems (Lab) Spring 2024
  Under Supervision of *Dr. Hamid R. Zarandi*
- **Teaching Assistant** in Computer Networks Spring 2024
  Under Supervision of *Dr. Fatemeh Ziaeetabar*

- **Teaching Assistant** in Computer Networks — Fall 2023, Spring 2024
  Under Supervision of *Dr. Masoud Sabaei*
- **Head Teaching Assistant** in Microprocessor and Assembly Language — Spring 2023, Fall 2023
  Under Supervision of *Dr. Hamed Farbeh*
- **Teaching Assistant** in Applied Linear Algebra — Spring 2023
  Under Supervision of *Dr. Maryam Amirmazlaghani*
- **Teaching Assistant** in Advanced Programming — Fall 2022
  Under Supervision of *Dr. S. Roostaei*
- **Teaching Assistant** in Fundamentals of Computers and Programming — Spring 2022
  Under Supervision of *Parham Alvani*

Selected Courses

Major Related Courses

- Artificial Intelligence: 17.6/20 (A)
- Research and Technical Presentation: 18.72/20 (A+)
- Information Retrieval: 20/20 (A+)
- Computational Intelligence: 20/20 (A+)
- Data Mining: 19.1/20 (A+)
- Algorithm Design: 18.25/20 (A+)

Online Courses

- DL for Computer Vision (University of Michigan)
- PyTorch for Deep Learning Bootcamp (Udemy)
- Machine Learning (Stanford University)

Technical Skills & Languages

Programming Languages: Python, Java, C, Go, C#, JavaScript
Libraries & Frameworks: PyTorch, TensorFlow, OpenCV, Hugging Face, NumPy, scikit-learn
Tools: LaTeX, Linux, Git, Docker, Jupyter, Kaggle, VS Code
Languages:

- **English:** Full Professional Proficiency, TOEFL iBT scheduled for November 13, 2024.
- **Persian:** Native

Honors & Awards

- Ranked among the **top students**, Amirkabir University of Technology — 2023
- Awarded **Tuition-Waiver**, Amirkabir University of Technology — 2020
- Ranked in the **top 0.2%** among 155,250 participants, Iranian University Entrance Exam. — 2020
- Awarded 2nd place in the mathematics competition of the NOET. — 2019

References

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

- *Dr. Hamed Farbeh*, Assistant Professor, Computer Engineering Department
  Email: farbeh@aut.ac.ir
- *Dr. Mohammad Rahmati*, Professor, Computer Engineering Department
  Email: rahmati@aut.ac.ir
- *Dr. Alireza Bagheri*, Associate Professor, Computer Engineering Department
  Email: ar_bagheri@aut.ac.ir