Sepehr Kazemi Ranjbar

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Education

2020-now **Sharif University of Technology**, *B.Sc., Electrical Engineering, Communication Systems.*
GPA: 18.36/20 (= 3.85/4)

2016-2020 **Allameh Tabatabaei High School**, *High School Diploma, Physics and Mathematics.*
GPA: 19.83/20

Research Interests

- **Explainability and Fairness of Machine Learning Systems :** Currently focused on the explainability and fairness of VLMs in computer vision, robotics, and healthcare tasks.
- **Vision-Language Models :** Applying VLMs to specific domains such as image/video understating, healthcare, robotics (using as a policy maker or a reward model), etc.
- **Reinforcement Learning :** Developing preference optimization algorithms such as RLHF, DOP, and IPO. Advancing in robotics applications such as Vision-Language Navigation (VLN).
- **Graph Neural Networks :** Dynamic GNNs with application on temporal interaction networks.

Publications

Published Papers

1. Amirabbas Afzali, Borna Khodabandeh, Ali Rasekh, Mahyar JafariNodeh, **Sepehr Kazemi Ranjbar**, Simon Gottschalk. Aligning Visual Contrastive Learning Models via Preference Optimization (under-review).
2. **Sepehr Kazemi Ranjbar** and Emad Fatemizadeh. ExIQA: Explainable Image Quality Assessment Using Distortion Attributes (under-review).
3. **Sepehr Kazemi Ranjbar***, Ali Rasekh*, Milad Heidari, and Wolfgang Nejdl. ECOR: Explainable Clip for Object Recognition (under-review).
4. Ali Mamaghani, Ali Nourian, Negin Mohtaram, Alireza Shokrani, Seyed Mohsen Nasiri, **Sepehr Kazemi Ranjbar**, Alireza Mohammadi, Navid Nikaein, and Babak Hossein Khalaj. LLM for 5G: Network Management, ICLMCN 2024.

In-Processing Papers

5. **Sepehr Kazemi Ranjbar**, Mohammad Ostadmohammadi, HamidReza Rabiee and Arash Amini. GNTIN: Graph Neural Temporal Interaction Network.
6. **Sepehr Kazemi Ranjbar***, Ali Rasekh*, Simon Gottschalk and Wolfgang Nejdl. Generative Explinabale Image Classification via Identifying Rationales.

Skills

Programming Skills: Python (pytorch, numpy, scipy, pandas, etc.), C/C++, Matlab, Java, Assembly
Computer Skills: PsPice, Proteus, MPLAB, Linux(ubuntu,Kali), Comsol, LaTeX

Research Experiences

2023-present | **L3S Laboratory, Hannover, Germany**

- Working under the supervision of Prof. Wolfgang Nejdl (Leibniz University) and Ahmet Iscen (Google DeepMind).
- Did a research project about the explainability of VLMs such as CLIP for the object recognition task. Despite classical models, we aimed first to predict rationales in an image and then infer the category of the image from those predicted rationales. This work resulted in a publication [3] where I am the co-first author.
- Currently, we are implementing the idea of "first predict rationales, then predict category" in a generative case with open vocabulary [6].
- I am also involved in another research project about utilizing DPO (Direct Policy Optimization) for addressing typographic attacks and Gender Bias in VLMs such as CLIP [1].

2023-present | **Sharif University of Technology, Electrical Engineering Department**

- Working under the supervision of Prof. Emad Fatemizadeh (Sharif University of Technology).
- Conducted a research project on utilizing Vision Language Models for Image Quality Assessment. We developed an explainable approach for distortion identification based on attributes/effects of those distortions, then inferred the quality score of the photo based on predicted distortions and attributes. This resulted in one publication [2] where I am the first author.

2023-present | **DML Laboratory, Tehran, Iran**

- Working on my bachelor's thesis under the supervision of Profs. HamidReza Rabiee and Arash Amini (Sharif University of Technology).
- Developing a novel model for graph interaction networks, where the goal is to predict the time and features of the next interaction (edge) in a dynamic graph network [5].

2023-2024 | **5G Laboratory, Sharif University of Technology / Eurecom Research Center, Biot, France**

- Worked under the supervision of Prof. Babak Khalaj (Sharif University of Technology) and Prof. Navid Nikaein (Eurecom Research Center).
- I did a research project on utilizing LLMs such as GPT-3 for 5G network management. This was achieved by creating datasets for different commands of a 5G network and fine-tuning GPT-3. We also consider a feedback loop for correcting the mistakes with users' responses. This project resulted in a publication [4].

Selected Courses

Graduate Courses

- Deep Generative Models (on-going)
- Foundation of Data Science (on-going)
- Reinforcement Learning(19/20) (Project: Presenting recent advancements in language-based reinforcement learning.
- Game Theory(18/20) (Project: Modeling resource allocation in a communication network with stable matching and auction
- Computer Vision(17.7/20)
- Deep Learning(17.1/20) (Project: GAN-Bert: a semi-supervised learning method for text classification → link)
- Image Processing (20/20) (Project: SR-GCN: a GNN for Image Super Resolution → link)

Under-Graduate Courses

- Introduction to Machine Learning (20/20) (Project: Denoising of images based on mixture models → link)

- Microprocessor Systems (20/20) (Project: Presenting of recent advancements in ARM architecture)
- Computer Architecture (18.2/20) (Project: Building a calculator with floating point operations on STM-32 → link)
- Introduction to Robotic Systems (18/20) (Project: Simulation of a manipulator and a mobile robot → link)
- Digital Signal Processing (19.1/20) (Project: Circle detection based on wavelet transform → link)
- Signal and System (20/20) (Project: Song Detection based on Fourier transform → link)
- Convex Optimization (17.2/20)
- Object Oriented Programming (20/20) (Project: Building Farm Frenzy 3 with JAVA → link)

Teaching Assistance

2024 Computer Vision (*Instructor*)
2024 Digital Image Processing (*Prof. Emad Fatemizadeh*)
2023 Machine Learning (*Prof. Mohammad B. Shamsollahi*)
2023 Communication Systems (*Prof. MohammadReza Pakravan*)
2023 Electric Circuits Theory (*Prof. Emad Fatemizadeh*)
2022 Engineering Mathematics (*Prof. Davood Poreh*)
2022 Electrical Circuits and Lab (*Prof. Emad Fatemizadeh*)

Languages

English: Fluent
Persian: Native

Honors and Awards

2019 Awarded Silver Medal in the 32nd Iranian National Physics Olympiad
2020-persent Top 10% GPA of my class
2024 Best Undergraduate Project in Electrical Engineering Department, Sharif University of Technology