Saeed Razavi

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Education

- **Sharif University of Technology** — Tehran, Iran
  B.Sc. in Electrical Engineering; Cumulative GPA: 18.23/20 — *Sept 2019 - 2024*
- **Shahid Ejei Highschool** — Esfahan, Iran
  Diploma in Mathematics & Physics — *Sep 2016 - Sep 2019*

Interests

- Machine Learning
- Image Processing
- Data Science and Statistical Data Analysis
- Optimization and Its Applications

PUBLICATIONS

- Snuffy: Efficient Universal Approximating Whole Slide Image Classification Framework — **ECCV-2024 (Accepted)**

  Authors: Jafarinia, H., Alipanah, A., **Razavi, S.**, Mirzaie, N., & Rohban, M. H
  we introduce an innovative Sparse Transformer architecture and theoretically prove its universal approximability, featuring a new upper bound for the layer count. We additionally evaluate our method on both pathology and MIL datasets, showcasing its superiority on image and patch-level accuracies compared to the previous methods.

- CoCoPro: Concept-Aware Contrastive Prototypes with Weak Supervision — **ICML-2025 (submitted)**
  Authors: Razavi, S., Yeganeh, Y., Adeli, E., Navab, N., & Farshad, A.

  We explore a Concept-aware Contrastive Prototypical approach to utilize predefined concepts in an image as a prior Additionally, we propose a concept contrastive prototypical objective function to better align the extracted features of different concepts within each class and across other classes. We demonstrate the effectiveness of our proposed method in few-shot, fully supervised, and weakly supervised settings on three public benchmarks.

Internship

- **TUM(Technical University of Munich)** — Munich, Germany(Remote)
  Supervision : Prof. Nassir Navab — *Apr. 2024 - Present*
  - Research Objectives: We present a novel **Concept-aware Contrastive Prototypical** approach to utilize the predefined concepts in an image as a prior. To this end, we propose **three levels of concepts based on the granularity of the available data.** Additionally, we propose a **concept contrastive prototypical objective function** to better align the extracted features of different concepts within each class and across other classes

Research Experience

- **RIMLAB Lab at Sharif University of Technology** — Tehran, Iran
  Supervision : Prof. M. H. Rohban — *Jan. 2023 - Present*
  - Research Objectives: The **Image retrieval** problem is being worked on with a specific emphasis on **feature extraction using self-supervised methods**. The main concentration lies in developing and **implementing novel pretext tasks and meaningful augmentations**, tailored to the unique challenges posed by **pathological**

images, thereby significantly improving retrieval analysis. In this project, I reviewed the efficiency of **different SSL** models on pathological images using both **ViT** and **CNN** as backbones.

- **EE Lab at at Sharif University of Technology** Tehran, Iran
  Supervision : Prof. S.Amini *Jan. 2023 - Present*
  - Research Objectives: Conduct a research on training **robust deepfake classifiers**. To reach this goal, **two different backbones are employed.** One of them is a **shallow CNN backbone** used for extracting **frequency features** of the image, such as the phase spectrum. The other backbone is a **Visual Transformer** used for **high-semantic features of the spatial domain**. An **attention-based module is then employed to find the correlation** between these two types of features for concatenation.

TEACHING EXPERIENCE

- **Biomedical Image Processing | Jan 2023**:
  Responsibilities: Design and Provision of computer assignments and course project.
- **Digital Image Processing | February 2022**:
  Responsibilities: Design and Provision of computer assignments and course project.
- **Probability and Statistics | October 2022**:
  Responsibilities: Design and Provision of quizzes and theoretical assignments

Academic Projects

- **Panorama and Image Stitching | Computer Vision | *Python***:
  The panorama is first produced in the project, utilizing five key frames. To enhance its realism, both dp optimization and Laplacian pyramid blending are employed. Additionally, both background, foreground, and shake-less video are created using different techniques. This project can be seen on my Github
- **Face Detection Using HOG | Computer Vision | *Python***:
  A Face Detection model with a HOG (histogram of oriented gradients) descriptor is implemented, and this model is run on some sample images. This project can be seen on my Github
- **Image segmentation(Active Contour) | Image processing | *Python***:
  Implementation of active contour from scratch, using energy forces and constraints for segregation of the pixels of interest. you can see this project on my Github
- **Face Morphing | Image processing | *Python***:
  Face morphing is implemented using Delaunay Triangulation, involving the warping of image shapes and the cross-dissolving of image colors to morph one face into another. This project is available on my Github
- **Reconstructing noisy image using GMM | Machine learning | *Python***:
  Implement GMM(Gaussian mixture model) algorithm to infer "clean" image from corrupted images (in this project, noisy MNIST dataset).This project can be seen on my Github
- **Reconstructing noisy image by dictionary learning | Linear Algebra | *Python***:
  Implement MP(Matching Pursuit),OMP(Orthogonal Matching Pursuit) along with MOD (Method of Optimal Direction) to retrieve noisy image. you can see this project on my Github

Selected Courses

- **Artificial Intelligence** : 20.0/20.0
- **Linear Algebra**: 19.8/20.0
- **Machine Learning** : 19.0/20.0
- **Big Data Analysis**: 17.8/20.0
- **Differential Equations**: 19.2/20.0
- **Principles of Computer Vision**: 18.4/20.0
- **Principles of Image Processing**: 18.3/20.0
- **Signals & Systems**: 19.0/20.0
- **Multi-Variable Calculus**: 20/20.0
- **Communication Systems**: 19/20.0

Skills Summary

- **Programming Skills**: PyTorch, Python (NumPy, SciPy, Matplotlib, Pandas,sklearn,skimage), MATLAB, c, c++ , Java, Verilog
- **Tools**: Jupyter Lab/Notebook, Visual Studio Code, GIT
- **Language Skills**: Persian(native), English(TOEFL): 104/120 (R: 30, L: 28, S: 23, W: 23)