Soroush Mehraban

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RESEARCH INTEREST

- **Computer Vision**
- **Vision-based Gait Analysis**
- **Human Pose Estimation**
- **Action Recognition**
- **Self-supervised learning**

EDUCATION

- **University of Toronto**, Toronto, ON, Canada
  - **PhD**, Biomedical Engineering — *Sep. 2022 - Present (expected graduation date: November, 2027)*
- **Amirkabir University of Technology** (Tehran Polytechnic), Tehran, Iran
  - **B.Sc.**, Computer Engineering — *Sep. 2017 - July 2022*
    GPA: **19.15** / 20 (**4.00**/4.00)

PUBLICATION

- **Soroush Mehraban**, Mohammad Javad Rajabi, Babak Taati
  STARS: Self-supervised Tuning for 3D Action Recognition in Skeleton Sequences
  arXiv preprint arXiv:2407.10935 (2024).
- Vida Adeli, **Soroush Mehraban**, Yasamin Zarghami, Irene Ballester, Andrea Sabo, Andrea Iaboni, Babak Taati
  Benchmarking Skeleton-based Motion Encoder Models for Clinical Applications: Estimating Parkinson's Disease Severity in Walking Sequences
  IEEE International Conference on Automatic Face and Gesture Recognition (**FG**), 2024.
- **Soroush Mehraban**, Yiqian Qin, Babak Taati
  Evaluating Recent 2D Human Pose Estimators for 2D-3D Pose Lifting
  IEEE International Conference on Automatic Face and Gesture Recognition (**FG**), 2024.
- **Soroush Mehraban**, Vida Adeli, Babak Taati
  MotionAGFormer: Enhancing 3D Human Pose Estimation with a Transformer-GCNFormer Network
  IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**), 2024.
- Armin Mahmoodi, Leila Hashemi, Milad Jasemi, **Soroush Mehraban**, Jeremy Laliberté, Richard C. Millar
  A developed stock price forecasting model using support vector machine combined with metaheuristic algorithms
  Opsearch, 60(1), pp.59-86.

SELECTED PROJECTS

3D Human Mesh Recovery Using Diffuson Models

- Designed a latent diffusion model to recover 3D human mesh conditioned on RGB videos.
- Outperformed all the SOTA diffusion models using a single diffusion step.
- Work is under the progress.

Self-supervised Skeleton-based Action Recognition

- Proposed a new self-supervising technique for action recognition from 3D skeleton sequences without using labels.
- Achieved state-of-the-art performance on NTU60, and NTU120 benchmarks.
- Manuscript is submitted to ICLR 2025 conference. Project Page.

3D Human Pose Estimation

- Introduced a novel method for estimating 3D human pose by lifting it from 2D pose sequence.
- Achieved state-of-the-art performance on MPI-INF-3DHP and Human3.6M (Without pretraining) benchmarks.
- Paper accepted at WACV 2024 conference. Code on GitHub.

Real-time and Layout-independent Automatic License Plate Recognition System

- Annotated different vehicles and license plates (Iranian, Indian, European) using labelImg.
- Using Darknet as the framework, a combination of YOLOv2, Fast-YOLOv2, and CR-NET is used for car detection, license plate detection, and license plate recognition, respectively.

TEACHING ASSISTANT EXPERIENCE

- **CSC420: Introduction to Image Understanding (University of Toronto)** *Winter 2024*
  Instructors: Dr. Babak Taati, and Dr. David Lindell
  - Created course lectures about the deep learning topics including Transformers, Vision Transformers, video tracking, activity recognition, and body tracking.
- **CSC209: Software Tools and Systems Programming (University of Toronto)** *Winter 2024*
  Instructor: Kuei (Jack) Sun
  - Responded to inquiries regarding lab assignments during tutorial sessions on a weekly basis
  - Addressed assignments during designated office hours.
  - Graded assignments and exams.
- **Principles of Computational Intelligence (CE, AUT)** *Fall 2021*
  Instructor: Prof. Mohammad Mehdi Ebadzadeh
  - Made supplementary video tutorials about neural network (Available on YouTube).
  - Graded assignments.
  - Graded & defined a project about neuroevolution (Available on GitHub).

- **Applied Linear Algebra (CE, AUT)** *Fall 2020*
  Instructor: Dr. Ehsan Nazerfard
  - Made supplementary video tutorials for students and covered first 7 chapters of *linear algebra and its applications by david c. lay*.
  - Graded assignments.
  - Graded & defined projects.
- **Operating Systems (CE, AUT)** *Fall 2020*
  Instructor: Dr. S.Ahmad Javadi
  - Made supplementary video tutorials for students.
  - Graded assignments.

SKILLS

Programming Languages: Python, Java, C, C#.
Data-related Libraries: NumPy, pandas, Matplotlib, seaborn.
Machine Learning: PyTorch, OpenCV, scikit-learn.
Database: MySQL, PostgreSQL, SQLAlchemy.
Virtualization: Docker, VMware.
Operating Systems: Windows, Linux (Ubuntu).
Web Development: Django, Flask, FastAPI, HTML, CSS, JavaScript, Bootstrap, JQuery.
Code Versioning Tools: Git.
Others: Photoshop, Microsoft Office, Camtasia.

WORK EXPERIENCE

CryptoBey *January 2022 - October 2022*
Backend Developer (Freelance).
- Backend is developed using **FastAPI**, **pydantic**, **pika** (RabbitMQ), **SQLAlchemy**, **Keycloak** for identity and SSO
- Designed and implemented the CI pipeline via GitHub actions to containerize and publish the micro-services using Buildpack **Packeto**
- Designed and implemented the CD pipeline via GitHub actions to be deployed on EC2 Instances with the appropriate AWS infrastructure

IDmelon Technologies Inc. *June 2022 - August 2022*
Vancouver, BC, Canada
Software Development Engineer (Remote).
- Developed windows services to interact with virtual drivers
- Used **design patterns** e.g. Observer, Factory, Singleton, Command
- Provided documentation for every section
- Drew **BPMS** diagram to demonstrate flow of work

Tecvico *December 2020 - September 2021*
Vancouver, BC, Canada
Web Developer (Remote).
- Developed front-end of the website using Bootstrap, and back-end using Django.
- A dashboard has been designed so that users can apply for a project and mentors can select the candidates based on the profiles.
- Deployed server using Apache and did the maintenance.
- Led 3-5 people on web development.