Fatemeh Tabatabaei

Machine Learning Researcher

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About

My research interests focus on machine learning, particularly in temporal graphs and dynamic networks. I am also passionate about computer vision, image processing, and graph learning. Over the past three years, I have gained valuable experience as a machine learning engineer, developing and optimizing ML pipelines to enhance their effectiveness.

Education

M.Sc. in Artificial Intelligence Engineering, *Amirkabir University of Technology (AUT)* September 2021
Supervisor: Dr. Ahmad Nickabadi
Thesis: "An improved convolutional relational machine for individual and collective activity recognition" (Grade: x/20)
In this work, we used feature maps extracted from deep CNNs for each image and the optical flow information of videos to track actors in different images over time and classify their individual and group activities.

B.Sc. in Software Engineering, *Khajeh Nasir Toosi University of Technology (KNTU)* September 2018
Supervisor: Dr. Behrooz Nasihatkon
Thesis: "Emotion recognition from facial images" (Grade: 19.5/20)
In this work, we classified the emotion of each face into six categories based on 68 keypoints on face images using traditional machine learning algorithms and deep neural networks.

Publications

Contrastive Representation Learning for Dynamic Link Prediction in Temporal Networks – arxiv, Under review 2024
We introduce *tenence* a novel self-supervised method for learning representations of temporal networks, with a focus on their discrete-time versions. Our approach is designed to tackle the dynamic link prediction task more effectively. A key feature of our method is implementing *infoNCE* in the context of contrastive predictive coding for dynamic graphs, which operates at both local and global scales of temporal networks. This approach guides our model to encode data features that span longer periods into the future. The result? More informative and robust representations that capture the dynamics of temporal networks.

Convolutional Spiking Neural Networks for Spatio-Temporal Feature Extraction– Neural Processing Letters 2023
In this paper, we explore the spatio-temporal feature extraction capabilities of convolutional spiking neural networks (SNNs). We propose a novel deep spiking architecture for neuromorphic vision and action recognition tasks, and evaluate its performance on several benchmark datasets.

A Neural Network Based Levinson-Durbin Method for Adaptive Active Sensor Waveform Synthesis– ICEE 2019
This paper presents an ANN-based Levinson-Durbin method for adaptive active sensor waveform synthesis, enhancing the probability of detection for point targets in Gaussian stationary clutter.

Research Interests

- Machine learning on graphs and complex networks
- Dynamic network representation learning and analysis
- Computer vision and image processing
- Artificial intelligence applications in medical health and healthcare
- Deep learning for video analysis, including spatio-temporal modeling and action recognition

Selected Courses

- Differential Equations: 20/20
- Discrete Mathematics: 17/20
- Engineering Probability: 19.3/20
- Pattern Recognition: 18/20
- Artificial Intelligence: x/20
- Image Processing: x/20

Teaching

Teacher Assistant in Statistics & Probability (Under supervision of Dr.Akhbari) 2017, 2018
Teacher Assistant in Artificial Intelligence (Under supervision of Dr.Nickabadi) 2020

Technical Experience

Data Scientist **Feb 2024 — Current**
Ferrum Capital *Baku, Azerbaijan*
- Collaborating with stakeholders to translate business requirements into actionable model features.
- Analyzing customer features and historical data using machine learning algorithms.
- Developing predictive models for loan approval with a range of machine learning techniques.
- Applying statistical methods for portfolio default prediction, enhancing risk management and decision-making.

Machine Learning Researcher **May 2023 — Mar 2024**
The Image Processing and Pattern Recognition Lab - Amirkabir University of Technology *Tehran, Iran*
- Researching on temporal networks and dynamic graph representation learning.
- Analyzing complex networks to identify patterns and trends.
- Developing a collaborative filtering recommender system.

Data Scientist **Dec 2022 — Jun 2023**
Sheypoor.com *Tehran, Iran (Hybrid)*
- Recommender system
  A content-based recommender model that uses real estate's features to find similar homes.
- Analyzing listing descriptions.

AI Scientist **Nov 2021 — Aug 2022**
Devolon.fi *Helsinki, Finland (Remote)*
- Wear-to-meet project
  A computer vision project that takes a video stream from a camera (webcam) uses segmentation and pose estimation methods to extract clothing parts and human body information and applies some different T-shirts to the body of people in each frame of video.

Data Scientist **Nov 2021 — Mar 2022**
Snappfood.ir *Tehran, Iran*
- Comment review labeling
  A natural language processing model for comment review labeling, resulting in improved user feedback analysis.
- Improve quality of data
  Enhancing the quality of stored data in the database, resulting in a more efficient data retrieval process.

Computer Vision Researcher **Oct 2018 — Sep 2021**
Statistical Machine Learning Lab - Amirkabir University of Technology *Tehran, Iran*
- Individual and group activity recognition.
- Optimizing machine learning algorithms for learning relation graphs.
- Improving convolutional relational machine using dynamic graphs.

Technical Skills

- Neural networks and deep learning
- Machine learning and pattern recognition
- Digital image processing and computer vision
- Natural language processing
- Self-Supervised Learning
- Graph Neural Networks and Temporal Models
- Knowledge in mathematics and statistical machine learning
- Designing and implementing machine learning pipelines based on MLOps principles

Technologies

Deep Learning	Pytorch, Torch-Geometric, Tensorflow, Keras
Machine Learning	Numpy, Pandas, Scipy, Scikit-Learn, Networkx
Computer Vision	Opencv, Scikit-Image, PIL, Torchvision, Dlib
Natural Language Processing	NLTK, Hazm, Fasttext
Visualization	Matplotlib, Plotly, Seaborn, Tensorboard
Programming Languages	Python, Java, MySQL
Genral tools	Git, Docker, MLflow, Streamlit, Unix/Linux systems, Shell

Languages

English
Persian