SHAYAN SHEKARFOROUSH

Google Scholar ◇ Github

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RESEARCH INTERESTS

Computer Vision: 3D Reconstruction, Implicit Representation Learning

Deep Learning: Deep Learning Theory, Neural Tangent Kernel

EDUCATION

University of Toronto 2020 - Present
Direct PhD in Computer Science GPA: A+
Supervisors: David J. Fleet, Marcus A. Brubaker

Sharif University of Technology 2015 - 2020
Bachelor's of Science in Computer Engineering GPA: 4/4 (19.58 / 20)
Minor in Mathematics

PUBLICATIONS

1. **Residual Multiplicative Filter Networks for Multiscale Reconstruction**
   S. Shekarforoush, David B. Lindell, David J. Fleet, Marcus A. Brubaker *Under Review*
2. **Graph Convolution Based Attention Model for Personalized Disease Prediction**
   A. Kazi, **S. Shekarforoush**, S.A Krishna, H. Burwinkel, G. Vivar, B. Wiestler, K. Kortuem, SA. Ahmadi, S. Albarqouni, and N. Navab *MICCAI 2019*
3. **Cell-type Identification in Single-cell RNA Sequencing Based on Gene Interaction Networks**
   E. Heidari, **S. Shekarforoush**, L. Haghverdi, and W. Huber *ISMB/ECCB 2019*
4. **InceptionGCN: Receptive Field Aware Graph Convolutional Network for Disease Prediction**
   A. Kazi, **S. Shekarforoush**, S.A. Krishna, H. Burwinkel, G. Vivar, K. Kortuem, SA. Ahmadi, S. Albarqouni, and N. Navab *IPMI 2019*
   Oral Presentation (7% Acceptance rate)
5. **Self-Attention Equipped Graph Convolutions for Disease Prediction**
   A. Kazi, S.A. Krishna, **S. Shekarforoush**, K. Kortuem, S. Albarqouni, and N. Navab *ISBI 2019*
   Oral Presentation

HONORS AND AWARDS

– **Travel Award for PIMS workshop on Mathematical and Computational Challenges in Cryo-EM** May 2022

– **Twice Recipient of International Undergraduate Excellence Award** Summer 2018, 2019
Awarded by TUM to strongly-motivated international undergraduate students interested in improving their research skills in machine learning, medical imaging, and computer vision.

– **Ranked 1st based on GPA among all Bachelors of Computer Engineering Department entered in the program in 2015.**

– **Ranked 92nd among more than 180,000 participants of National Universities Entrance Exam.** Summer 2015

RESEARCH EXPERIENCE

Doctoral Research *September 2020 - Present*
University of Toronto
Supervisors: David J. Fleet, Marcus A. Brubaker.

- Studying Implicit Neural Representations to reconstruct protein structures using noisy, CTF corrputed 2D projections obtained from cryo-EM.
- Coupling Invertible-ResNet with Implicit Neural Nets to jointly model structure and 3D deformations of proteins in the context of heterogeneous cryo-EM.

Visiting Student *July 2018 - July 2020*
Computer Aided Medical Procedures & Augmented Reality Lab (CAMPAR)
Technical University of Munich (TUM)
Supervisor: Nassir Navab.
Supported by a scholarship from TUM

- Studying Attention Mechanisms and Receptive Field in GCNs applied to disease prediction tasks.
- Working on a project to adaptively learn the receptive field size of graph convolutions with applications in Shape Correspondence.

Remote Research Collaboration December 2018 - March 2019
European Molecular Biology Laboratory (EMBL)
Superviser: Laleh Haghverdi. (Erwin Schrodinger Prize winner)

- Studying the effect of receptive field size of GCNs on Gene Interaction Networks for identification of Cell-types in Single-Cell RNA sequencing.

Research Assistant December 2018 - February 2020
Machine Learning Lab (MLL)
Sharif University of Technology, Iran
Supervisor: Marzieh Soleymani.

- Proposing a multi-layered GCN-based model in the context of link prediction.

RELATED COURSES

Graduate

- **Geometry Processing (A+)**
- **Introduction to Machine Learning (A+)**
- **Current Algorithms in 3D Vision (A+)**
- **Probabilistic Learning and Reasoning (A+)**

Undergrad

- **Differential Geometry (19/20)**
- **Introduction to Machine Learning (20/20)**
- **Information Theory (20/20)**
- **Stochastic Processes (20/20)**
- **Linear Algebra (19.8/20)**
- **Probability and Statistics (20/20)**

VOLUNTEER EXPERIENCE

Senior Scientific Member December 2018 - March 2019
Sharif Datadays National Competition, Tehran, Iran
(more than 500 participating teams)

- Our team designed some tasks that could be solved by Machine Learning and Deep Learning techniques, based on advertising data gathered from Divar platform.
- This was the first Data Analytics event held by Sharif University of Technology consisting of different stages. Its main goal was to broaden the appeal to work on problems related to data analytics. It was also a large-scale attempt to assess the level of knowledge in this field in Iran.

TECHNICAL SKILLS

Programming Languages	Python, C/C++, Java, Matlab, Julia
Machine Learning Libraries	PyTorch, JaX, Tensorflow, Scikit-learn
Operating Systems	OS X, Linux, Windows
Miscellaneous	PostgreSQL, Git, Terminal, LaTeX

LANGUAGES

Persian	Native
English	Fluent