

Alireza Hashemi

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EDUCATION

The City University of New York - PhD in Physics Sep 2022 – Aug 2026

- Applied graph machine learning and graph neural networks on social & biological data. Application of symmetries and fibrations in studying graph-based problems, machine learning on protein structure. (Python)
- Application of open-source Large Language Models in social media sentiment detection.

Sharif University of Technology - Master of Science in Physics Sep 2019 – Jan 2022

- Numerical simulation of chaos in systems of many topological defects. (Python: [Github](#))
- Simulation of social distancing in pedestrian dynamics. (Python: [Github](#))

University of Zanjan - Bachelor of Science in Physics Sep 2015 – Jun 2019

- Radiative heat transfer in many-body fractal nano-structures (computational linear algebra). (C++, OpenMP, CUDA)
- Ground-state energy eigenvalues for fractal quantum potentials. (C++: [Github](#))

WORK EXPERIENCE

Memorial Sloan Kettering Hospital, New York, USA

Student Researcher

Jul 2024 – Present

- Research on the study of brain functional and physical networks using graph theory & machine learning on fMRI data.

The City College of New York, New York, USA

Adjunct Lecturer – Physics

Sep 2023 - Present

blu Bank (1st Iranian Neobank), Tehran, Iran

Data Scientist (Founding Member of the Data Science Team)

May 2020 – Aug 2022

- Implemented fraud detection on large-scale user transactional data using user-specific isolation forests.
- Fine-tuning and training of several CNNs for face & ID card verification and liveness detection.
- Development of a Neo4j graph database and graph machine learning solutions to identify money-laundry networks, community detection, and recommender system in a user transaction database with >2 million users.
- Data engineering pipelines & automations with Apache Airflow and ETL with Python on different databases (SQL, NoSQL).
- High-level presentations of results and solutions to business and marketing teams.

Rahnema College, Tehran, Iran

Machine Learning Course Mentor (Volunteer work)

Mar 2021 – Jun 2021

Machine Learning Intern

Jan 2020 – Mar 2020

PUBLICATIONS & CONFERENCES

Protein Secondary Structure Prediction with GNNs and a Large-Scale Novel Graph Dataset – *under review*

Visiting distant neighbors in graph convolutional networks - *ICTIS* (2024)

Social distancing in pedestrian dynamics and its effect of disease spreading - *Physical Review E* (2021)

Chaotic dynamics of active topological defects - *Soft Materials* (2021)

Analysis of the ground-state energy eigenvalues of fractal quantum potentials - *Physica Scripta* (2019)

Many-body effects on the radiative heat transfer in fractal nanostructures - *IJAA* (2017)

Social distancing in pedestrian dynamics - *Dynamical Biological Systems* (2020), **COVID-19 in Iran** - *NetSci* (2020)

Effectiveness of social distancing through the lens of Agent-Based Modelling - *Complex Systems Society* (2020)

RELEVANT SKILLS

Python, C++, MATLAB, R, **Standard Machine Learning Libraries:** GBM (xgboost), sklearn, NetworkX, **Deep Learning:** TensorFlow, PyTorch (PyTorch geometric), **Computational Tools:** LAPACK, OpenMP, CUDA, **SQL, Databases:** PostgreSQL, MongoDB, Neo4j, **Timeseries:** Causal impact analysis, anomaly & fraud detection, **Data Reporting:** Metabase, PowerBI, Superset, **Data Engineering & ML Automation Tools:** Apache Airflow, Python ETL, Spark, AWS

OTHER

NTD Hackathon runner-up team ([NPR.org](#)), Translation of the book “Dark Matter & Dark Energy” by Brian Clegg to Farsi, DBS 2020 award for best visualization.

RELEVANT COURSEWORK

Deep Learning, Stochastic Optimization, Numerical Methods in Physics, Statistical Machine Learning, Algorithms & DB

LINKS

[Google Scholar](#)

[Researchgate](#)

[Linkedin](#)

[Github](#)