FATEME MIRZAABOLHASSANI

Computer Science

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FIELDS OF INTEREST

- Single-cell RNA-seq analysis in cancer research
- Molecular dynamics of drug–DNA-protein interactions
- Machine learning and deep learning
- Bioinformatics and Computational biology
- Gene regulatory network inference

EDUCATION

Master of Computer Science

Oct. 2020 – Sept. 2023 | Sharif University, Tehran, Iran

- GPA: 17.80/20 with total 32 passed credits
- Class Rank: Third

Bachelor of Computer Science

Sept. 2016 – Sept. 2020 | Alzahra University, Tehran, Iran

- GPA: 19.44/20 with total 136 passed credits
- Class Rank: First

Mathematic and Physics high school diploma

Sept. 2012 – Aug. 2016 | Farzanegan High School, Tehran, Iran

- GPA: 18.98/20

SKILLS

Programming & Scripting: Python, R, Bash, Git/GitHub.

Single-cell & Bioinformatics tools: Seurat, Monocle3, SoupX, Harmony, pySCENIC, CellOracle, TradeSeq, SCPA, InferCNV, CopyKAT, Phylogenetics, Galaxy, Cytoscape, BioRender.

Molecular modeling & MD: GROMACS, Amber, AutoDock Vina, trajectory analysis, PyMOL.

Deep Learning & Machine learning & Statistics: Machine learning pipelines, statistical testing, scikit-learn, PyTorch.

HPC & Reproducibility: Docker, conda, renv, pipeline development.

PROJECTS

Molecular Dynamics Simulation of Doxorubicin Binding to DNA and Topoisomerase II

Jun. 2025 – present

- Building an MD workflow to simulate and analyze how doxorubicin binds DNA and stabilizes specific binding poses.
- Collaborating with biologists and computational physicists to validate computational predictions.
- Assistant Supervisors: Dr. Arash Boochani and Dr. Fatemeh Zare-Mirakabad

Integrative Single-Cell Transcriptomics to Identify Regulatory Drivers in the Dedifferentiation of Thyroid Cancer

Sep. 2024 – present

- Role: **Lead author for bioinformatics analyses** (co-first contribution; overall second author).
- Identified candidate transcription factors and genes driving transitions from **Normal → PTC → ATC**, with results currently under experimental validation in collaboration with biologists.
- Assistant Supervisors: Dr. Kaveh Kavousi and Dr. Vahid Haghpanah

Identification of driver genes in Glioblastoma based on single-cell gene expression data utilizing the concept of pseudotime and phylogenetic analysis

Oct. 2022 – present

- Draft manuscript and awaiting review from supervisor.
- Developed an approach integrating gene expression and mutation data to identify key driver genes in GBM.
- Work formed the basis of my Master's thesis, with an additional year of post-defense analysis.
- Presented at the **Iran Conference on Bioinformatics**.
- Thesis Supervisor: Dr. Mohammad Hadi Foroughmand Araabi
- Article Supervisors: Dr. Kaveh Kavousi and Dr. Fatemeh Zare-Mirakabad

Implementation of RNA Secondary Structure Prediction

Feb. 2024 – May 2024

- Implemented methods from: "RNA Secondary Structure Prediction Using Stochastic Context-Free Grammars and Evolutionary History."
- Supervised a B.Sc. student. GitHub repository
- Assistant Supervisor: Dr. Fatemeh Zare-Mirakabad

Implementation of an article which is titled 'Approximation algorithms for color spanning diameter'

Oct. 2019 – June 2020

- Reference Article: Spanning Colored Points with Intervals
- Assistant Supervisors: Dr. Payam Khanteimouri and Dr. Mohammad Reza Kazemi

PRESENTATIONS

Identification of Driver Genes in Glioblastoma Using Single-Cell Gene Expression, Pseudotime, and Phylogenetic Analysis

- Poster presentation: Feb. 2025, Iran Conference on Bioinformatics, Zanjan, Iran. Abstract (P.140) Poster
- Oral presentation: Apr. 2025, Computational Biology Research Center, Amirkabir University, Tehran, Iran.

WORK EXPERIENCE

Research Center Memberships

2022 – present

- Member, Computational Biology Research Center (CBRC), Amirkabir University
- Member, Complex Biological Systems and Bioinformatics (CBB), Tehran University

Workshop Instructor

Sep. 2024 — Institute Pasteur, Tehran, Iran

- Conducted training on Next-Generation Sequencing techniques.

Teaching Assistant

2018 – 2023 — Sharif University, Alzahra University

- Foundations of Computation Theory (Dr. Fatemeh Zare-Mirakabad, Fall 2023)
- Database (Dr. Kamyar Izadi, Fall 2019)
- Foundations of Computation Theory (Dr. Payam Khanteimouri, Spring 2019)
- Data Structures and Algorithms (Dr. Marzieh Eskandari, Fall 2018)

Volunteer Instructor

Spring 2018 — Marziehyazdi Elementary School, Tehran, Iran

- Taught Algorithms and ICDL to elementary school students.

HONORS

- M.Sc. Fellowship Award at Amirkabir University of Technology, Tehran University, and Sharif University as an exceptionally talented student (exempt from entrance exam).
- Ranked first in my B.Sc. class for three consecutive years.
- Received governmental fellowships for outstanding Bachelor performance.
- Admitted to NODET (National Organization for Development of Exceptional Talent) via competitive entrance exam for high school.

LEADERSHIP & EXTRACURRICULARS

Coach, ICPC (International Collegiate Programming Contest, Asia Region, Tehran site), 2025

- Mentored and guided a competitive programming team, coordinating strategy, training, and problem-solving.

Co-founder, Computer Science Journal Club

Winter 2018 – Summer 2020

LANGUAGES

English

- IELTS: 7 (2022 – 2024), Next exam expected in Jan. 2026

REFERENCES

Dr. Kaveh Kavousi

Associate Professor, Dept. of Bioinformatics, Institute of Biochemistry & Biophysics, University of Tehran
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Dr. Fatemeh Zare-Mirakabad

Assistant Professor, Dept. of Mathematics & Computer Science, Amirkabir University of Technology
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Dr. Vahid Haghpanah

Associate Professor of Molecular Medicine, Endocrinology and Metabolism Research Center, Clinical Sciences Institute, Tehran University of Medical Sciences
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Dr. Marzieh Eskandari

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