Curriculum Vitae

Mohaddeseh Mozaffari

mohaddeseh.mozaffarii@gmail.com MohiMozaffari MohiMozaffari Personal Website

EDUCATION

Degree: Master of Science in Statistical Physics and Complex Systems *Sep 2022 – Mar 2025*
Where: Shahid Beheshti University, Tehran, Iran
GPA: 18.5/20 (**Second** Rank)

Degree: Bachelor of Science in Physics *Sep 2018 – May 2022*
Where: Shahid Beheshti University, Tehran, Iran
GPA: 17.3/20 (**First** Rank)

RESEARCH INTERESTS

- Bio-Physics
- Brain Network Analysis
- Machine Learning
- Computional Neuroscience
- Network Neuroscience
- Artificial Intelligence

RESEARCH EXPERIENCE

Project: **Coevolutionary and Structural Balance Network Analysis and Classification of ADHD Using the Open-Source ADHD-400 Dataset** *Jul 2025 – Present*
Where: Center for Complex Networks (CCNet), Tehran, Iran
Advisor: Prof. Reza Jafari

- Collaborated on the development and implementation of Coevolutionary and Structural Balance Theories to extract motif-based energy and imbalance metrics from functional brain networks.
- Engineered balance-theoretic features from motif structures, network energy profiles, and polarity patterns for group-level differentiation.
- Designed and trained machine learning models to classify ADHD vs. control subjects based on extracted topological features.
- Contributed to drafting, editing, and reviewing the manuscript for publication.

Project: **Master's Thesis – Analysis of Topological Features of Brain Networks in the Autism Spectrum Disorder and Control Group Using Persistent Homology** *Jan 2024 – Present*
Where: Shahid Beheshti University, Tehran, Iran
Advisor: Prof. Reza Jafari

- Applied topological data analysis (TDA) and persistent homology to fMRI data, utilizing Vietoris–Rips and Sparse Rips filtrations to identify topological differences in ASD brain networks.
- Developed a node-removal-based approach to detect significant changes in the frontoparietal subnetwork of ASD subjects, using Bottleneck and Wasserstein distances for quantification.
- Investigated age-related differences in brain network topology (childhood, adolescence, adulthood), highlighting connected components and loops as key indicators of ASD.
- Trained machine learning models using topological features to classify ASD vs. control subjects and predict age groups, demonstrating the potential for enhanced diagnostic accuracy.
- Developed a private Python package, `NeuroPHorm`, to streamline and automate the full TDA workflow; currently under internal use and documentation for potential release.

Project: **Automatic Classification and Segmentation of Coronary Arteries Using AI** *Dec 2023 – Present*
Where: Shahid Rajaei Heart Hospital, Tehran, Iran
Advisor: Dr. Mehdi Yousefzadeh

- Collaborated on building an angiography dataset from X-ray Coronary Angiography (XCA), including DICOM handling, data cleaning, and vessel annotation.
- Co-developed segmentation pipelines using classical image processing (Frangi, Sato, Meijering filters) and deep learning models (U-Net, U-Net3+, FPN).
- Contributed specifically to image enhancement using the Meijering and Sato filters for coronary vessel segmentation.
- Achieved a 93% Dice score on the test set, exceeding performance of many recent segmentation approaches.

PUBLICATIONS

- Mohammadi, M.S., Shahrokhi, S., **Mozaffari, M.** et al. Nonlinear optical response of IMIP ionic liquid-stabilized magnetic graphene oxide sheets. J Mater Sci: Mater Electron 33, 13224–13233 (2022).

SKILLS

Computing

- Python (Advanced)
- C++ (Intermediate)
- Git (Intermediate)
- Bash/Linux (Intermediate)
- Adobe Illustrator (Advanced)
- Adobe Photoshop (Intermediate)
- HTML/CSS (Elementary)
- LaTeX(Advanced)
- Microsoft Office Suite: Word, Excel, PowerPoint (Advanced)

Languages

- Persian (Native)
- English (Fluent)

TEACHING EXPERIENCE

Position: Teaching Assistant
Where: Department of Physics, Shahid Beheshti University

- Complex Systems Physics (Jan 2025 – Jul 2025)
- Complex Networks and Graph Theory (Jan 2025 – Jul 2025)
- Stochastic Processes (Jan 2024 – Jul 2024)
- Foundations of Numerical Simulations (Sep 2023 – Jan 2024)
- Complex Systems Physics (Sep 2023 – Jan 2024)
- Analytical Mechanics (Sep 2022 – Jan 2023)

WORK EXPERIENCE

Position: Python Instructor *Jul 2024 – Present*
Where: Ostadbank, Tehran, Iran

- Deliver tailored Python lessons on OOP, ML, and AI to diverse learners.
- Guide students in mini-projects using scikit-learn, pandas, Matplotlib, Keras, and TensorFlow.

Position: Python Instructor *Jun 2023 – Present*
Where: Picha Club, Tehran, Iran

- Teach Python fundamentals, algorithms, and OOP to pre-teens and teens.
- Support students in building Tkinter apps and Pygame games.

INVITED TALKS

Where: Yasouj University, Yasouj, Iran *Apr 2025*
Title: Statistical Physics and Complex Systems

- Introduced undergraduate physics students to complex systems in an invited online Persian talk.

CERTIFICATIONS

- Machine Learning Specialization, Coursera (2023).
- Neural Networks and Deep Learning, Coursera (2022).

WORKSHOPS, SCHOOLS, AND CONFERENCES ATTENDED

Where: Shahid Beheshti University, Tehran, Iran *Nov 2024*
Title: fMRI Image Processing With CONN Toolbox

- Gained hands-on experience in preprocessing, denoising, and connectivity analysis for resting-state and task-based fMRI using the CONN toolbox.

Where: School of Biological Sciences, IPM, Tehran, Iran *Oct – Dec 2023*
Title: The School of Evolutionary Dynamics of Cells and Viruses

- Participated in lectures and discussions on evolutionary dynamics in cells and viruses.
- Explored theoretical models and their biological applications.

REFERENCES

- **Reza Jafari**, Professor of Physics, Department of Physics and Institute for Cognitive Science and Brian, Shahid Beheshti University, Tehran, Iran.
  (+98) 21 2990 2773 g_jafari@sbu.ac.ir gjafari@gmail.com HomePage
- **S. Ali Hosseiny Esfidvajani**, Assistant Professor, Faculty of Physics, Shahid Beheshti University, Tehran, Iran.
  (+98) 21 2990 5043 al_hosseiny@sbu.ac.ir alihd22@gmail.com HomePage
- **Marzieh Farhang**, Associate Professor, Faculty of Physics, Shahid Beheshti University, Tehran, Iran.
  (+98) 21 2990 5053 m_farhang@sbu.ac.ir marzieh.farhang@gmail.com HomePage