Aylar Sedaei Oghani

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Research Interests

✦ Cosmology ✦ Machine Learning ✦ Computational Astrophysics ✦ Stellar Evolution

Education

Amirkabir University of Technology (Tehran Polytechnic) **2019 – 2023 (Expected)**

Bachelor of Science in Computer Engineering (Rank 2 among all Iranian Universities) *Tehran, Iran*

- GPA for: Recent two years: **17.90**/20 Total 132 units: **17.30**/20
- Selected Coursework:
  - ✦ *Cosmology* (**20**/20)
  - ✦ *Stellar Structures and Evolution* (**19**/20)
  - ✦ *Applied Linear Algebra* **(18.95/20)**
  - ✦ *Information Retrieval* (**18.26**/20)
  - ✦ *Research and Technical Presentation* (**18.10**/20)
  - ✦ *Data Mining* (**17.27**/20)
  - ✦ *Principles of Artificial Intelligence* (**17.20**/20)
  - ✦ *Principles of Computational Intelligence* (**17**/20)

Tehran Farzanegan High School (NODET) **2016 – 2019**

Diploma in Physics and Mathematics Discipline, GPA: **19.14**/20 *Tehran, Iran*

*Attended courses of **Iran's Olympiad of Astronomy & Astrophysics** using advanced-level textbooks*

- ✦ *Cosmology*
- ✦ *Stellar Structures*
- ✦ *Galactic Dynamics*
- ✦ *Astronomical Data Analysis*
- ✦ *Astrophysics*
- ✦ *Orbital Mechanics*

Research Experience

Research Intern, *MEF University, İstanbul, Turkey* **Jul. 2023 – Present**

- Created an automated neuroscientific data preprocessing and model training system.
- Data preprocessed by several combinations, to gain an insight on the best methods to use for each dataset.
- Model trained by different supervised/unsupervised machine learning algorithms, based on user's choice.
- A report of evaluation metrics is shown to the user, making it possible to compare results for a given dataset.
- Accomplished during a paid summer internship supervised by Prof. Tuna Cakar.

Undergraduate Research Assistant, *Sharif University of Technology, Tehran, Iran* **Mar. 2023 – Jun. 2023**

- Reviewed challenges in standard model of cosmology including H_0 tension, S_8 tension, A_{lens} Anomaly, and Ω_k.
- Provided a comprehensive research on gravitational lensing, its specific attributes, and the time delay arising from it.
- Surveyed different methods to determine the H_0 constant using gravitational lensing parameters.
- Supervised by Associate Prof. Shant Baghram. A comprehensive report of the findings can be accessed here: 🔗

Undergraduate Research Assistant, *Amirkabir University of Technology, Tehran, Iran* **Dec. 2022 – Present**

- Developed an automated estimation system using neural networks to determine gravitational lens parameters in images.
- Simulated a large number of galaxy images to become gravitationally lensed using Lenstronomy package.
- Utilized simulated images as input for neural network training to determine attributes of lensed galaxies.
- Ongoing research constituting my B.Sc. thesis, supervised by Associate Prof. Maryam AmirMazlaghani.

Teaching Experience

Astronomy Olympiad Instructor, *Farzanegan 2 Highschool* **Sep. 2020 – Jan. 2022**

- Cosmology
- Data Analysis
- Celestial Mechanics
- Astrophysics

Teaching Assistant, *Amirkabir University of Technology*

- Information Retrieval (Spring 2023)
- Research & Technical Presentation (Spring 2023)
- Discrete Mathematics (Fall 2022)
- Applied Linear Algebra (Spring 2022)

Work Experience

Associate Product Manager, *Snapp!* **Feb. 2023 – Aug. 2023**

- Improved a ride-hailing product's online payment share using data-driven decisions (queries, event-logging, user surveys).

Honors & Awards

- Awarded a fully-funded internship at MEF University, Istanbul, Turkey **Jul. 2023**
- Ranked **top 1%** place among approximately 140,000 applicants in Mathematics and Physics **Aug. 2019**
- Ranked **top 0.5%** place among approximately 120,000 applicants in Foreign Languages (English) **Aug. 2019**
- **Silver Medal** at National Olympiad of **Astronomy and Astrophysics** (NOAA) **Aug. 2018**

Online Courses

Deep Learning Specialization, *DeepLearning.AI* [🔗]

Quantum Mechanics for Engineers Specialization, *University of Colorado Boulder* [🔗]

Electrodynamics Specialization, *Korea Advanced Institute of Science and Technology (KAIST)* [🔗]

Data-driven Astronomy, *University of Sydney* [🔗]

Understanding Modern Physics: Relativity and Cosmology, *Hong Kong University* [🔗]

Notable Projects

Data Analysis on GAIA-collected M67 Open Cluster's stars | **Jun. 2023**

✦ Derived parameters: luminosity, magnitude, mass, density, and main sequence membership.

Galaxy Cross-Matching From Different Catalogues | **Apr. 2023**

✦ Used k-d trees to align galaxies from radio survey (AT20G BSS) and optical survey (SuperCOSMOS).

Red-shift Prediction Using Decision Trees | **Feb. 2023**

✦ Implemented a decision tree regression classifier to predict galaxy redshifts from photometric colors.

Classification of Ellipticals, Spirals, and Merging Galaxies | **Oct. 2022**

✦ Leveraged ensembled decision tree classifiers on Galaxy Zoo's image dataset to classify galaxies.

Persian News Search Engine | **Jan. 2023**

✦ Developed a document retrieval system utilizing positional indexing & tf-idf method.

NeuroEvolution Game | **Jun. 2022**

✦ Applied evolutionary algorithms to train neural networks in a low-data environment of a game.

Fuzzy Inference System for Heart Disease Diagnosis | **Mar. 2022**

✦ Developed a Fuzzy Expert System for Heart Disease Diagnosis, Utilizing Input Variables to Diagnose Disease.

Applying AI Algorithms to Pac-Man Game | **Dec. 2021**

✦ Developed Various Search Algorithms (DFS, BFS, UCS, A*), Multi-agent Minimax, and Expectimax Algorithms.

Skills

Technical Skills

- **Programming Languages and HDLs:** Python, Matlab, Java, Javascript, C, C++, VHDL, Verilog
- **Software Packages:** Astropy, Lenstronomy, Tensorflow, Numpy, Matplotlib, Pandas, SKLearn
- **Tools and Typesetting:** Git, Jira, Microsoft Word and Excel, LaTeX

Personal Skills: Detail-oriented, eager to learn and teach, strong research abilities, adept at problem-solving

Language Skills: Persian (native), English (fluent), French (familiar)

- **TOEFL iBT: 103**/120 *(Reading **21**/30, Listening **30**/30, Speaking **26**/30, Writing **26**/30)*
- **GRE subject physics:** To be taken in November 2023

Volunteer & Extracurricular Activities

Student Scientific Chapter, Computer Engineering Department, Amirkabir University of Technology

- Member of Executive Committee of 6th Amirkabir Artificial Intelligence Competitions (AAIC) **Apr. 2022**
- Member of Executive Committee of 3rd Amirkabir Artificial Intelligence Student Summit (AAISS) **Aug. 2021**

Students' Guild Council, Computer Engineering Department, Amirkabir University of Technology

- President of Students' Guild Council **Jun. 2021 – Dec. 2022**
- Member of Pouyesh Editorial Committee *(Students' Guild Council Publication)* **Aug. 2020 – Dec. 2022**

References

Official certificates, documents and other references are available upon request.