Aeirya Mohammadi

Curriculum Vitae

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Research Interests

Computational Linguistics, Natural Language Processing and Understanding, Linguistics, Languages, Programming Languages, Human-Centered Computing

Also interested in Mathematical Logic, Human-Computer Interaction, Multimodal AI, Computer Vision, Compilers, Computer Architecture, Computer Networks, Operating Systems, Computational Science

Interests

Languages	(Computational) Linguistics & **Mo**rphology, **N**LP for **L**ow-**R** **e**source **L**anguages
NLU	Natural & **Pr**ogramming Langauge **Un**derstanding, Reasoning, Inference, **C**ognition
Social	Human-Centered Computing, **Sp**eech **Va**riety and **Di**alects, Hate-Speech
AI	**A**ffective Computing, Autonomous AI Agents (Life-long Learning)
Math.	Mathematical Logic, (Algorithmic) **Ga**me Theory
Brain	Computational **Ne**uroscience, Human and **L**LM Language **Re**presentation Alignment
Systems	Programming Language Design, **Co**mpilers, OS, Networks, Computer Architecture

Education

Since 2023 **M.Sc. in Artificial Intelligence**, *Amirkabir University of Technology (AUT)*, Iran.

2018-2023 **B.Sc. in Computer Science**, *Sharif University of Technology (SUT)*, Iran.
- CGPA 17.05/20 (3.68/4)

2011-2018 **Diploma**, *Sampad (National Organization for Development of Exceptional Talents)*, Iran.

Selected Projects

2023 (Ongoing) **Natural Language Understanding Projects**, *NLU Course*, Dr. Hossein Zeinali, AUT.
- Pretrained and fine-tuned BERT for classification of Persian poem metres.
- Implemented sequence-to-sequence modeling using RNN encoder-decoder with attention and beam search, for generation of predicted poem metres string.
- Trained a multilingual generative model utilizing transformers for intent detection, and slot-filling.
- Currently working on SemEval 2024 tasks on semantic evaluation.

AUT: Amirkabir University of Technology

2023 (Ongoing) **Information Retrieval Projects**, *IR Course*, Dr. Saeedeh Momtazi, AUT.
Information retrieval and recommendation systems, using traditional & language-model-based & neural network-based methods.
Current project: Relation extraction from unstructured text using generative models.

2023 (Ongoing) **GraphDB Search Engine**, *Personal Project*.
Creating a Wikipedia-style application with mini-documents that get merged upon user query, utilizing document semantic relations, knowledge graph, language understanding, and retrieval techniques.

2023 **Application & Compiler Development**, *Part-time University Work Project*, Dr. Mahdi Sharifzadeh, SUT.
- Designed a programming language and compiler for algebraic modeling.
- Developed a latex-to-algebraic modeling language transpiler, used for mathematical optimization problems.
- Developed an app using REST API and services, and a web UI.

2022 **Natural Language Processing Projects**, *NLP Course*, Dr. Ehsaneddin Asgari, SUT.
- Developed NLP pipeline tools for Gilaki, a very low-resource Iranian language.
- Compared syntax of Sorani Kurdish and Gilaki words after crawling Wikipedia.

2021-2022 **Research in Systems Biology**, *Sharif Optimization and Applications Laboratory*, Dr. Mojtaba Tefagh, SUT.
Worked on finding minimal sets, which are subnetworks that are essential for a metabolic network. The code of the project was written in Julia.

2022 **Big Data Projects - Customer Data Platform and Mini Projects**, *Big Data Engineering Course*, Mr. Mojtaba Ostovari, SUT.
- Designed a robust system with lambda architecture in a team of 3 people.
- Implemented the TF-IDF algorithm using the map-reduce framework and did the same with Scala.
- Crawled the web and did simple tasks using the shell.

2020 **Image Processing Projects**, *Course*, Dr. Mostafa Kamali Tabrizi, SUT.
Implemented image processing algorithms and used techniques such as image morphing, texture synthesis, blending, image manipulation, Fourier transform, k-means, and mean-shift.

2022 **Decaf Compiler**, *Compiler Course*, Dr. Hadi Foroughmand, SUT.
Partly implemented a compiler using C++ and Java.

2021-2022 **Analysis of Blockchain Consensus Protocols**, *Algorithmic Game Theory Course*, Dr. Mojtaba Tefagh, SUT.
Worked on Byzantine Fault Tolerant Consensus Protocols in Blockchain. Implemented a multi-agent game theory framework and did simulations on two different games.

2022 **Machine Learning Project**, *ML Course*, Dr. Reza Rezazadegan , SUT.

Note for all projects **Most project codes are available in my github**.

Programming Languages, Libraries & Tools

Proficient	Python, Java, C#, C++, MIPS assembly
Familiar	Julia, Scala, C, Rust, Z Shell, SQL, MATLAB, JS, HTML, LaTeX
NLP, ML, Vision, DNN	{PyTorch, Scikit-learn}, {OpenCV}, {NLTK, spaCy}, {NumPy, Pyplot}
Big Data, etc	{Kafka, Cassandra, Docker, HDFS},{Unity3D}, {Flask}

Teaching Assistant

Spring 2023	**Machine Learning**	*Instructor: Dr. Mahdi Sharifzadeh*
Spring 2023	**Advanced Programming**	
Spring 2023	**Computer Networks**	*Instructor: Dr. Laleh Arshadi*
Fall 2022	**Principles of Computer Systems**	*Instructor: Dr. Laleh Arshadi*
Spring 2022	**Advanced Programming (Java)**	*Instructor: Dr. Mojtaba Tefagh*
Spring 2022	**Computer Networks**	*Instructor: Dr. Laleh Arshadi*
Spring 2022	**Operating Systems**	
Fall 2021	**Principles of Computer Systems**	*Instructor: Dr. Laleh Arshadi*

Fall 2020 **Fundamentals of Programming (Python)**

I **managed** TA teams, held **coding** sessions and **workshops**, gave lectures, had troubleshooting sessions, **designed** and corrected **assignments** and **projects**, developed auto-checkers and other **infrastructure** code, **showcased** sample projects and assignment solutions, and prepared lecture content and **slides**.
As a TA, I always make sure to be **responsive**, and I **assist** and guide students step-by-step to leverage their **problem-solving** skills.

Selected Courses

Ongoing Natural Language Understanding, Web Search & Information Retrieval, Large Language Models

Audit Natural Language Processing, Regression Analysis, Bandit Learning

Finished

- Image Processing, Big Data Engineering (Computer technology in the transcript)
- Machine Learning, Compilers
- Mathematical Logic (Zeroth and first order + Godel incompleteness theorem)
- Algorithmic Game Theory, Linear Programming, Game Theory

Voluntary Activities

2023 **Instructor**, *Neuromatch Workshop*, Connected Neuroscience Group, University of Tehran.
Covered the first week of the Neuromatch course, which included an introduction to scientific scripting and plotting with Python, linear algebra, probability, and stochastic processes.

2021 **Presentor**, *Minimal Cut Sets*, Systems Biology Journal Club, SUT.
Article: Minimal cut sets in biochemical reaction networks (Klamt).

2029-2022 **Extracurricular**.

- Bavan: We routinely collected dozens to hundreds of kilograms of **paper**, books, and other materials from students, faculties, and departments, and then separated and reused or **recycled** them. We reduced paper garbage in our and even some other universities drastically.
- Yarigaran: We voluntarily provided free, high-quality **education** and emotional support to **children in need** of all ages, including orphans and those with imprisoned parents. The group has also held special fun artistic or sports events before the pandemic.
- Some of my roles involved socializing, presentations, and recruiting like-minded enthusiastic volunteers. Other roles were either technical or involved manual labor.

Attended Workshops and Online Courses

2022 **NLP Workshop**, *Loop Academy*, Beginner - 12 hours.
Project: Sentiment analysis on real-life Digikala comments.

Languages

Native **Persian**

Proficient **English** *TOEFL iBT 101*

Beginner **Japanese, Arabic, Gilaki. French** *Can understand and make simple sentences*

Basic **German, Turkish, Norwegian, Chinese, Spanish, Esperanto, Kurdish, Ukrainian, etc**.
I like studying language structures a lot. Nothing is more fascinating than finding out how similar and yet different they are and how they trace back to the human mind, history, and culture.

Other Awards and Certificates

IFIA Inventor Title

FIDE Rating of 1595 (Standard) *Since 13 years old*

Membership in Professional Basketball Team *The city's nominated team*

Top Student Award (Ranked 3rd out of 97) *SUT Chemical Engineering Department*

Other Interest Fields & Hobbies

Learning New Languages, Chemistry, Fluid Mechanics, Cognitive Science, Neuroscience, Psychology, Basketball, Yoga, Swimming, Playing Musical Instruments, Chess, Board/Video games, Cooking

Other Projects

2021 **HTTP Server**, *Computer Networks Course*, Dr. Laleh Arshadi, SUT.
Implemented an HTTP server from scratch using Python (and also in C, as a hobby project).

2021 **OS Project (Blitz System)**, *Operating Systems Course*, Dr. Hadi Foroughmand, SUT.
Implemented OS kernel features using a Java-like language. Project Description

2021 **Mercury**, *Open-source Hobby Project*.
Worked on a personal project, an app in which you could make video calls and chat, adopting microservice architecture and software design patterns, using different programming languages, including C, in a team of 3. This experience led me to study video telephony protocols.

2020 **Game Server**, *Advanced Programming Course*, Mr. Hosein Boomeri, SUT.
A multi-threaded online game server written in Java using software design patterns containing game logic and database.

References

Prof. Mojtaba Tefagh.
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