Aydin Ayanzadeh

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Technical Summary

Ph.D. student in Computer Science specializing in Medical Image Analysis and AI-driven healthcare solutions. Experienced in developing autoencoder architectures and applying knowledge distillation techniques to healthcare applications and assistive technologies. Current research focuses on integrating Vision-Language Models and optimizing AI models for edge computing platforms to enhance support for individuals with vision impairments.

Education

- **University of Maryland, Baltimore County** — Baltimore, MD
  Ph.D. in Computer Science — GPA: **3.78/4.00** — *Feb 2022 - Present*
- **University of Maryland, Baltimore County** — Baltimore, MD
  M.Sc. in Computer Science — GPA: **3.78/4.00** — *Feb 2022 - May 2025*
  Coursework: Advanced Algorithm, Knowledge Graph, Machine Learning, Computer Vision, Data Privacy
- **Istanbul Technical University** — Istanbul, Turkey
  M.Sc. in Applied Informatics — GPA: **3.75/4.00** — *July 2018 - Sept 2020*
  Coursework: Data Science, Image Processing, Applied Informatics in Structural Biology, Fuzzy Logic
- **University of Tabriz** — Tabriz, Iran
  B.Sc. in Computer Science — *Sept 2011 - Apr 2016*
  Coursework: Computer Architecture, Compiler Design

Research Interests

- Computer Vision
- Medical Image Analysis
- Multimodal Learning
- NLP & Large Language Model

Research Experience

- **CORAL LAB** — *Dec 2022 - Present*

  Researcher - Advisor: Tim Oates — MD, USA

  Project: Multimodal Large Language Model-Based Assistive System for the Safe Navigation of Users with Visual Impairments.
  - Develop an assistive system incorporating Vision-Language Models (VLM), emphasizing the role of human-guided machine learning.
  - Leverage large language models (LLMs) alongside computer vision to enhance safe navigation for individuals with blindness or low vision (BLV) and improve human-computer interaction.

- **SP4CING Lab** — *Sept 2018 – Dec 2021*

  Research Assistant (Unpaid) - Advisor: B.U. Toreyin — Istanbul, Turkey

  Project: Deep Learning-Based Segmentation Pipeline for Label-Free Phase-Contrast Microscopy Images
  - Introduced a novel auto-encoder architecture by applying the modified ResNet-18 as an encoding module.

- **Tubitak 1001 (Grant #119E578)** — *Oct 2020 – Jan 2022*

  Research Assistant - Supervisor: Devrim Unay — Izmir, Turkey

  Project: Development of Image Processing and Machine Learning based Tools for Analysis of Phase-Contrast Optical Microscopy Time Series Images
  - Perform qualitative and quantitative analyses of morphology and movement of cells from phase-contrast optical microscopy time series.

- Improved cell tracking with enhanced training efficiency by designing a novel auto-encoder architecture to elevate training time, resiliency of results in the prediction step, and avoiding overfitting on segmentation and tracking tasks.

- **Vodafone FutureLab (Project # ITUVF20180901P04)** *May 2019 – Jan 2022*

  Research Fellow - Supervisor: Mehmet Basaran Istanbul, Turkey

  Project: Social Context Analysis in Telecommunications

  - Propose the Res-VGAE, a variational graph auto-encoder with a different number of residual connections to alleviate depth problems of graph neural networks and improve the accuracy of the deep graph-based auto-encoders.
  - Develop a dynamic Word2Vec to examine the Vodafone customers' social structure efficiently.

- **Arcelik Global Co.** *Dec 2019 – Dec 2020*

  Researcher - Supervisor: Nazim Kemal Ure Istanbul, Turkey

  Project: Optimization of Multi-Task Network on Surveillance Cameras

  - Proposed an optimized multi-task model compatible with edge devices and accelerated the original architecture by applying the quantization in the cores of the architecture.
  - Accelerated the total inference time of the model from 2 fps to 18 fps.

  Project: Model Compression for Efficient Video Processing on Edge Devices

  - Designed and developed a multi-task network enterprise to perform people monitoring with surveillance cameras on edge devices.
  - Optimized the employed networks by quantization approach, especially with the Intel OpenVINO toolkit.

- **SiMiT Lab** *Apr 2017–June 2018*

  Researcher (Unpaid) - Supervisor: Hazim Kemal Ekenel Istanbul, Turkey

  Project: Kaggle Dog Breeds Identification with the transfer learning approach

  - Leveraged state-of-the-art models on Imagenet data sets. and employed the pre-trained model and learned weights to extract the feature from the Kaggle Dog breed identification dataset.

  Project: Google Cloud YouTube-8M Video Understanding Challenge

  - Examined Deep Neural Networks with skip connections for Video Understanding Challenge on Kaggle
  - Employed optimized parameters for the affection of the method from qualitative and quantitative perspectives.

- **University of Tabriz** *Sept 2015 – Apr 2016*

  Researcher (Unpaid) - Advisor: Habib Izadkhah Tabriz, Iran

  Project: Speed Up Ant Colony Optimization in Image Edge Detection with Parallel Programming

  - Developed a novel heuristic function to improve gradient response in edge detection.
  - Employed the optimized parameters for the affection of the method from qualitative and quantitative perspectives.

Publications

- **Aydin Ayanzadeh**, Tim Oates. "LLM-Based Indoor Navigation System for Individuals with Blindness or Low Vision., "STARS Celebration Conference (2024), CMD-IT/ACM Richard Tapia Conference. [Poster] (**Planned submission to the Neurips 2025/AAAI 2026**)

- **Aydin Ayanzadeh**, Prakhar Dixit, Sadia Kamal, and Milton Halem, "WildfireVLM: AI-Powered Analysis for Early Wildfire Detection and Risk Assessment Using Satellite Imagery" **(Planned submission to the MDP Forest Special Issue)**

- Yusuf Sait Erdem, **Aydin Ayanzadeh**, Berkay Mayalı, Muhammed Balıkçi, Özge Nur Belli, Mahmut Uçar, Özden Yalçın Özyusal et al. "Automated analysis of phase-contrast optical microscopy time-lapse images: application to wound healing and cell motility assays of breast cancer." In Diagnostic Biomedical Signal and Image Processing Applications with Deep Learning Methods, pp. 137-154. Academic Press, 2023. [Paper]

- Reyhan Kevser Keser, **Aydin Ayanzadeh**, Omid Abdollahi Aghdam, Caglar Kilcioglu, Behcet Ugur Toreyin, and Nazim Kemal Ure. "PURSUhInT: In Search of Informative Hint Points Based on Layer Clustering for Knowledge Distillation." Expert Systems with Applications 213 (2023): 119040. [Paper] [Code]

- Nallbani, Indrit, **Aydin Ayanzadeh**, Reyhan Kevser Keser, Nurullah Çalık, and Behçet Uğur Töreyin. "Representation learning using graph autoencoders with residual connections." arXiv preprint arXiv:2105.00695 (2021). [Paper]
- **Aydin Ayanzadeh**, Özden Yalcin Özuysal, Devrim Pesen Okvur, Sevgi Önal, Behçet Uğur Töreyin, and Devrim Ünay. "Improved cell segmentation using deep learning in label-free optical microscopy images." Turkish Journal of Electrical Engineering and Computer Sciences 29, no. 8 (2021): 2855-2868. [Paper]
- **Aydin Ayanzadeh**, Özden Yalçin Özuysal, Devrim Pesen Okvur, Sevgi Önal, Devrim Ünay, Behçet Uğur Töreyin, "Deep Learning based Segmentation Pipeline for Label-Free Phase-Contrast Microscopy Images", In the 28th IEEE Conference on Signal Processing and Communications Applications (SIU), IEEE, 2020. [Paper]
- Reyhan Kevser Keser, Indrit Nallbani, Nurullah Calık, **Aydin Ayanzadeh**, and Behçet Ugur Töreyin. "Graph Embedding For Link Prediction Using Residual Variational Graph Autoencoders." In the 28th IEEE Conference on Signal Processing and Communications Applications (SIU), IEEE, 2020. [Paper]
- **Aydin Ayanzadeh**, Hüseyin Onur Yağar, Özden Yalçin Özuysal, Devrim Pesen Okvur, Behçet Uğur Töreyin, Devrim Ünay, and Sevgi Önal. "Cell Segmentation of 2D Phase-Contrast Microscopy Images with Deep Learning Method. "In the 2019 Medical Technologies Congress (TIPTEKNO), pp. 1-4. IEEE, 2019.[Paper]
- Binici, Rıfkı Can, Umut Şahin, **Aydin Ayanzadeh**, Behçet Uğur Töreyin, Sevgi Önal, Devrim Pesen Okvur, Özden Yalçın Özuysal, and Devrim Ünay. "Automated Segmentation of Cells in Phase Contrast Optical Microscopy Time Series Images." In the 2019 Medical Technologies Congress (TIPTEKNO), pp. 1-4. IEEE, 2019. [Paper]
- **Ayanzadeh, Aydin**, Hossein Pourghaemi, Yousef Seyfari. "A Modified Ant colony Based Approach to Digital Image Edge Detection." In 2015 2nd International Conference on Knowledge-Based Engineering and Innovation (KBEI), pp. 504-509. IEEE, 2015. [Paper][Code]
- **Aydin Ayanzadeh**, Shokoufeh Yazdanian, and Ehsan Shahamatnia. "A New Class of Scaling Matrices for Scaled Trust Region Algorithms." arXiv preprint arXiv:1904.09209 (2019). [Paper]
- **Aydin Ayanzadeh**, and Sahand Vahidnia. "Modified Deep Neural Networks for Dog Breeds Identification." Preprints (2018). [Paper][Code]
- **Aydin Ayanzadeh** "A Study Review: Semantic Segmentation with Deep Neural Networks"(2018). [Paper]
- Irandoust-Pakchin, Safar and **Aydin Ayanzadeh** and Beikzadeh, Siamak,1394, Gaussian Three-Dimensional kernel SVM for Edge Detection Applications, International Conference on New Research Findings in Electrical Engineering and Computer Science, Tehran. [Paper]

Teaching Experience

Teaching Assistant - UMBC (Spring 2022 - Present)

- **Core Responsibilities**
  - Conducting weekly office hours to assist students with their homework
  - Engaging with students during and outside class sessions
  - Overseeing graders in evaluating projects, assignments, and assessments
- **Course History**
  - Computer Organization and Assembly Language Programming (CMSC 313) — Fall 2024 - Spring 2025
    Instructor: Dr. Ivan Sekyonda
  - Problem Solving & Programming (CMSC 104) — Summer 2024 - Session II
    Instructor: Dr. Chris Marron
  - Scripting Languages (CMSC 433) — Summer 2024 - Session I
    Instructor: Dr. Jeremy Dixon
  - Computer Organization and Assembly Language Programming (CMSC 313) — Spring 2024
    Instructor: Dr. Kumaravel Jagasivamani
  - Principles of Artificial Intelligence (CMSC 671) — Fall 2023
    Instructor: Dr. Lara J. Martin
  - Social & Ethical Issues in IT (CMSC 304) — Summer 2023
    Instructor: Dr. Jeremy Dixon

- Introduction to Data Science (CMSC 691) — Fall 2022 - Spring 2023
  Instructor: Dr. Abhijit Dutt
- Data Structures (CMSC 341) — Summer 2022
  Instructor: Dr. Shawn Lupoli
- Computer Organization and Assembly Language Programming (CMSC 313) — Spring 2022
  Instructor: Dr. Jeannette Kartchneri

Technical Skills

- **Languages**: **:** Python, Matlab, C, SQL
- **Python Libraries**: **:** OpenCV, Numpy, Scikit-Learn, Matplotlib, Pandas
- **Deep Learning Frameworks**: **:** PyTorch, Tensorflow, Keras
- **Version Control Systems**: **:** Git, GitHub
- **Tools**: **:** ImageJ/Fiji, Experienced with local Linux servers and remote servers on Google Cloud Platform, AWS

Honors and Awards

- **Awarded International Alumni Endowed Scholarship** — USA
  UMBC — *May 2025*
- **Awarded Research Fellowship** — Turkey
  Vodafone FutureLab — *May 2019*
- **Ranked in the top 1% of more than 500000 students** — Iran
  Nationwide Universities entrance exam — *Sept 2011*

Highlighted Certificates

- **Healthcare AI Specialization**
  - AI for Medicine (3-course specialization) by DeepLearning.AI [Certificate]
- **Advanced AI & Deep Learning**
  - Neural Networks and Deep Learning by DeepLearning.AI [Certificate]
- **Generative AI**
  - Generative Adversarial Networks (GANs) by DeepLearning.AI [Certificate]
- **Computer Vision & Image Processing**
  - Fundamentals of Digital Image and Video Processing [Certificate]
- **Image Processing Applications**
  - Image and Video Processing: From Mars to Hollywood with a Stop at the Hospital [Certificate]

Highlighted Course Projects

- **Advanced Lane Finding System (Computer Vision)** — May 2019
  - Udacity Self-Driving Car Engineer Nanodegree Project
  - Project Repository
- **LinkedGuard: Privacy-Aware Company Verification System (Data Privacy and Security)** — May 2023
  - Developed authentication system for LinkedIn company profiles
  - Project Repository

Service

Journal Reviewer

- Expert Systems with Applications *(Elsevier)* — Jan 2024
- Neurocomputing *(Elsevier)* — Nov 2024
- Scientific Reports *(Nature)* — May 2024
- Multimedia Systems *(Springer Nature)* — May 2024
- International Journal of Machine Learning & Cybernetics *(Springer Nature)* — June 2024
- Signal Processing: Image Communication *(Elsevier)* — June 2024

Professional Involvement

- **Leadership & Organization**
  - Orientation Advisor, UMBC — Present
  - Secretary of Scientific Association, Department of Computer Science
    University of Tabriz — 2014-2015
  - Executive Secretary, Int'l Symposium on CS & Software Engineering (CSSE)
    University of Tabriz — 2015
  - Executive Secretary, Computer Science Conference on IT
    University of Tabriz — 2014
- **Professional Memberships**
  - AccessComputing Member — Since 2023
  - IEEE Graduate Student Member — Since 2022
  - ACM Graduate Student Member — Since 2022

Extracurricular Activities

- **Kaggle Competitions:** Contributor to machine learning and data science challenges, focusing on innovative solutions and collaborative teamwork. [Kaggle]
- Passionate about multiplayer games, fostering strategy development and teamwork.
- **Amateur Singing:** Passionate about performing as a creative outlet and personal expression.
- Photography, Camping, Hiking

Languages

- Azerbaijani (Native)
- Persian (Second Language)
- Turkish (Fluent)
- English (Fluent)

References

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