Arya Hadizadeh Moghaddam

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Education

Doctorate of Philosophy, Computer Science ***Sep 2022 - Sep 2026***

University of Kansas, Lawrence, Kansas, United States; Ph.D. Candidate; Advisor: Zijun Yao; CGPA: 4.0

Master of Science, Artificial Intelligence and Robotics ***Sep 2018 - May 2021***

Amirkabir University of Technology, Tehran, Iran; Advisor: Saeedeh Momtazi; CGPA: 3.63

Bachelor of Science, Software Engineering ***Sep 2014 - Sep 2018***

Iran University of Science and Technology, Tehran, Iran; CGPA: 3.01

Technical Skills and Interests

Research Interests: Deep Learning, Large Language Models, Time Series Analysis, Recommendation Systems, Health Informatics, Graph Neural Networks
Programming Languages: Python, Java, SQL
Libraries: Pytorch, Tensorflow, Pytorch Geometrics
AI/ML Skills: Transfer-Learning, Meta-Learning, Reinforcement Learning, Large Language Models (Knowledge Extraction, Prompt Engineering, Embedding Extraction), Recommendation Systems (User Intents, Sequential Modeling).

Experience

University of Kansas

∗ **Graduate Research Assistant** ***Sep 2022 - Present***

- Conducted research on sequential prescription recommendation using adaptive attention-based models and Intent-Aware recommendation with Contrastive Learning for medical intent representation. The proposed approach improves the PRAUC metric by 2.3% compared to the best-performing baseline. (**Health Informatics, Recommendation Systems, Time Series Analysis, Contrastive Learning**) | *Paper*
- Developed a novel temporal graph with dynamic adjacency matrix for graph learning based on medical ontology representation. This model constructs a time-aware adjacency matrix to enhance relationship extraction and achieves a 3.8% improvement over the best baseline in the AUCROC metric for acute kidney injury prediction. (**Health Informatics, Graph Neural Networks, Time Series Analysis, Interpretability**) | *Major Revision*
- Applied Meta-Learning to gene expression data, optimizing across datasets to address low data sources. The meta-framework enhances Transformer performance by 5.5% in the cancer prediction task on one of the well-known gene expression datasets. (**Bioinformatics, Meta-Learning**) | *Paper*
- Developing a Meta-Learning approach for cold-start problems through user- and visit-level adaptation to model user behavior with limited visits. The primary contribution is a multi-level meta-learning framework using a novel gradient approximation function to accelerate computational speed. (**Health Informatics, Meta-Learning, Time Series Analysis, Optimization**) | *Current Research*
- Using LLM for medical graph extraction from medical entities to be connected with enriched keywords from patient visit notes for retrieval-augmented generation, integrated with medical ontologies. The novelty of this project lies in uncovering the relationships between various types of medical codes (diagnosis, procedure, and medication) by extracting specific terms used in doctors notes. (**Health Informatics, Large Language Models, Generative AI, Retrieval Augmented Generation, Contrastive Learning, Graph Neural Networks**) | *Current Research*

∗ **Graduate Teaching Assistant** ***Jan 2023 - May 2023 / Jan 2024 - May 2024***

- Course: Machine Learning

Amirkabir University of Technology

∗ **Graduate Research Assistant** ***Sep 2018 - May 2021***

- Investigated the application of Machine Learning in technical price patterns, using sequential learning from stock prices and Image Processing from candlesticks to enhance financial pattern recognition in high-frequency trading. The model improved the moving average crossover strategy, achieving a 6.7% profitability over one month for the EUR/USD forex pair (from non-profitable to profitable). (**Financial Machine Learning, Technical Price Patterns, Image Processing, Time Series Analysis**) | *Paper*
- Conducted research on developing a novel dynamic hierarchical clustering algorithm for social media analysis, using adaptive Autoencoders and BERT-based models. This framework has enhanced the best-performing baseline by over 12.2% in the average topic-recall metric across various ranks. (**Social Media Analysis, Natural Language Processing, Adaptive Clustering**) | *Paper*
- Proposed two Deep Learning-based methods for adaptive readability optimization using deep Reinforcement Learning, tailored for second language learners. One of the models optimizes various well-known readability formulas for text classification, while the other selects the most suitable readability formula for a given text.**(Reinforcement Learning, Natural Language Processing, Computational Linguistics)** | *Paper*

∗ **Graduate Teaching Assistant** ***Jan 2020 - Jun 2020***

- Course: Statistical Natural Language Processing

Related Projects

Content Recommendation using Sequential Modeling (EIDU) *2024*
- Developed a personalized sequential recommendation system for online education in Kenya using an Android mobile application. **(Funded by Gates and Melinda Foundation).**
- The recommendation system is applied to over 400,000 students, predicting outcomes based on their previously watched content and performance scores using an adaptive RNN model (Improved 3.4% in AUROC metric).

Patient-Specific Graph Extraction with LLM for Visit-Level Connections *2024*
- Developed a method to extract visit-specific connections among various medical codes (e.g., diagnosis and medication) using GPT-3 and the codes' description for the absence of standardized ontologies for such connections.
- Proposed a prompt engineering approach to build a graph per patient visit using GAT, which enhances RETAIN model performance by achieving a PRAUC improvement of 1.1% in medication recommendation.

Few-Shot Prescription Recommendation with LLM *2024*
- Analyzed prompt engineering techniques, such as chain of thought, and integrated them with established medication recommendation systems to enhance the accuracy of medication recommendations.
- The recommendation system utilizes historical diagnosis and medication codes as inputs in prompts to predict appropriate medications for the current visit, and achieving AUROC of 0.89%.

Transfer Learning for Hydrogen Storage Capacity Prediction *2023*
- Developed a Graph Neural Network model, with molecular structure as an adjacency matrix, pretraining on four key molecular properties, achieving R-Score of 0.91 for all of the properties.
- Utilized pre-trained GNN layers and embeddings to fine-tune the model for predicting hydrogen storage capacity using additional molecular features with an R-Score of 0.65.

Anomalies Detection in Stock Market *2022*
- Utilized statistical methods and NLP on social media and bid-ask spreads for real-time Anomaly Detection, achieving an accuracy of 63% on profitable position opening.
- A real-time Twitter web crawler extracts and embeds text into vector representations. Based on these embeddings and the detection of abnormal behavior in the bid-ask spread (using the Z-score), a decision is reported to the asset managers as collaborators.

Deep Reinforcement Learning for Trading *2019*
- Applied DeepRL and time series analysis for adaptive decision-making on long and short positions.
- An Actor-Critic model is applied to historical stock prices, utilizing a custom-developed reinforcement learning environment to determine optimal long and short positions, achieving an average monthly profit of 1.21%.

Selected Publications

- Nayebi Kerdabadi, M., **Hadizadeh Moghaddam, A.**, Wang, D., & Yao, Z., (2025). Hierarchical Ontology Graphs Fusion for Augmenting Healthcare Representation, ICLR 2025. | Submitted
- **Hadizadeh Moghaddam, A.**, Nayebi Kerdabadi M., Liu B., Liu M., & Yao Z., (2024). Discovering Time-Aware Dependency in Electronic Health Records through Personalized Hidden Graph Inference, ACM Transactions on Knowledge Discovery from Data | Second Revision.
- **Hadizadeh Moghaddam, A.**, Nayebi Kerdabadi M., Liu M., & Yao Z. (2024). Contrastive Learning on Medical Intents for Sequential Prescription Recommendation, CIKM 2024, Accepted. | Paper
- **Hadizadeh Moghaddam, A.**, Nayebi Kerdabadi M., Zhong C., & Yao Z. (2024). Meta-Learning on Augmented Gene Expression Profiles for Enhanced Lung Cancer Detection," AMIA Annual Symposium 2024, Accepted. | Paper
- **Hadizadeh Moghaddam, A.,** & Momtazi S. (2024). A Semantic Modular Framework for Event Detection in Social Media, Multimedia Tools and Applications. | Paper
- Nayebi Kerdabadi, M., **Hadizadeh Moghaddam, A.**, Liu B., Liu M., & Yao, Z. (2023). Contrastive Learning of Temporality Distinctiveness for Survival Analysis in Electronic Health Records, CIKM 2023 | Paper
- **Hadizadeh Moghaddam, A.,** & Ghayoomi M. (2023). Language independent optimization of text readability formulas with deep reinforcement learning. Information Design Journal. | Paper
- **Hadizadeh Moghaddam, A.,** & Momtazi S. (2021). Image processing meets time series analysis: Predicting Forex profitable technical pattern positions. Applied Soft Computing, 108, 107460. | Paper

Professional Services

Reviewer: KDD 2024, CIKM 2024, Information Design Journal, International Journal of Intelligent Networks, Intelligent Pharmacy, Expert Systems with Applications

Honors and Awards

Earned tuition fee waiver scholarship for Ph.D. admission at the University of Kansas.
Earned first place in the national stock market prediction challenge with Machine Learning.
Earned tuition fee waiver scholarship for MSc admission at the Amirkabir University of Technology.
Earned tuition fee waiver scholarship for BSc admission at the Iran University of Science and Technology.

Volunteer Experience and Leadership

University of Kansas ***Jan 2023 - Present***

Mentor of Final Projects for MSc Students

Amirkabir University of Technology ***Jan 2019 - Apr 2021***

Member of Financial Machine Learning Team