Shaghayegh (Shirley) Shajarian

sshajarian@aggies.ncat.edu | (984) 330-0339 | Raleigh, NC | Website: shajarian.github.io

RESEARCH INTERESTS

My research interests lie in the intersection of **Large Language Models**, **Retrieval-Augmented Generation**, and **Autonomous Network Management**. I explore the integration of LLMs and external data through RAG in developing AI-driven autonomous systems to optimize network operations. I aim to create intelligent systems that automate network tasks and minimize human intervention while ensuring efficiency and scalability in network management and beyond.

EDUCATION

North Carolina Agricultural and Technical State University **Jan 2023 – Present**
Ph.D. in Computer Science; GPA: 3.93/4.0. *Greensboro, NC*
- Advised By: Dr. Sajad Khorsandroo and Dr. Mahmoud Abdelsalam
- Courses: Deep Learning, AI-Assisted Malware Analysis, Security of Emergent Networks, Big Data, Machine Learning.

Science and Research Branch of Azad University **Sep 2016 – Aug 2019**
Master of Computer Software Engineering; GPA: 4.0/4.0 *Tehran, Iran*
- Advised By: Dr. Ali Movaghar and Dr. Ali Rezaee
- Courses: Data Mining, Big Data Analytics, Advanced Software Engineering, Software Architecture.

University of Mazandaran **Sep 2011 –Feb 2016**
Bachelor of Computer Software Engineering *Babolsar, Iran*
- Courses: Artificial Intelligence, Data Structures, Network Engineering, Internet Engineering, Software Engineering.

PUBLICATIONS AND PREPRINTS

- **Shaghayegh Shajarian**.
  Towards Autonomous Network Management: AI-Driven Framework for Intelligent Log Analysis, Troubleshooting and Documentation.
  The 39th Annual AAAI Conference on Artificial Intelligence (AAAI 2025)

- **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam.
  Intelligent Network Management: RAG-Enhanced LLMs for Log Analysis, Troubleshooting, and Documentation.
  The 20th International Conference on emerging Networking EXperiments and Technologies (ACM CoNEXT' 24)

- **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam.
  A Survey on Self-Running Networks: Concepts, Components, Opportunities, and Challenges,
  (Preprint Paper 2024)

- Harikha Manthena*, **Shaghayegh Shajarian***, Jeffrey Kimmel, Mahmoud Abdelsalam, Maanak Gupta, Sajad Khorsandroo.
  Explainable Malware Analysis: Concepts, Approaches, and Challenges.
  (Preprint Paper, submitted to IEEE Access)

- Fikirte Demmese, **Shaghayegh Shajarian**, and Sajad Khorsandroo.
  Transfer learning with ResNet50 for malicious domain classification using image visualization.
  Discover Artificial Intelligence Journal, 2024 (Paper)

** Equal Contribution*

EXPERIENCE

Instructor, *North Carolina A&T State University, Greensboro, NC* **Jan 2025 – Present**
Artificial Intelligence & Machine Learning Course (COMP 365)
- Teaching a class of 55 students, focusing on the theory and applications of artificial intelligence and machine learning.
- Developing and delivering comprehensive lectures, hands-on labs, and project-based learning activities.
- Evaluating assignments, projects, and exams to assess student performance and understanding.
- Fostering a dynamic and interactive learning environment to encourage critical thinking and problem-solving.

Graduate Research Assistant, *North Carolina A&T State University, Greensboro, NC* **Jan 2023 – Present**
Autonomous Cybersecurity and Resilience Lab, Self-Running Networks Group

- Developed research for a doctoral proposal on an AI-driven framework for autonomous networks using Generative AI.
- Led research on an AI-driven framework integrating Retrieval-Augmented Generation (RAG) with Large Language Models (LLMs) to automate network log analysis, troubleshooting, and documentation;
- Conducted a survey of self-running networks by reviewing 112 recent papers, analyzing opportunities and challenges, and identifying key research directions to advance the field.
- Collaborated with a team to review 127 relevant research papers on ML-based detection techniques and XAI approaches, analyzing current trends and providing key insights to guide future research in explainable malware analysis.
- Contributed to the classification of malicious DNS using transfer learning with ResNet50, achieving 98.67% testing accuracy.

Graduate Teaching Assistant, *North Carolina A&T State University, Greensboro, NC* **Jan 2023 – Dec 2024**
Security of Emergent Networks and Artificial Intelligence/Machine Learning Courses
- Led biweekly recitation sessions, developed course assignments, graded assignments, and provided personalized support to ensure students' comprehension of complex topics.

Graduate Research Assistant, *Science and Research Branch of Azad University, Iran* **Dec 2017 – Sep 2019**
Distributed System Lab
- Led weekly group discussions and presentations, mentored students on research methodologies, and regularly reviewed their reports to monitor progress and provide targeted feedback.

Full Stack Web Developer, *Freelance, Iran* **May 2014 –March 2015**
- Built and maintained responsive websites using HTML, CSS, Bootstrap, and PHP to create user-friendly and visually appealing interfaces.

Undergraduate Internship, *Hashemi Health Center, Iran* **Jun 2014 – Sep 2014**
Data Analytics Team
- Automated patient data analysis using R with the data analytics team, utilizing data visualization techniques with Matplotlib to present health trends, reducing reporting time by 40% and improving data accuracy.

PROJECTS

Retrieval-Augmented Generation System for Document Query Answering **August 2024 – Present**
Research Project
- Developed a RAG-based system to answer natural language queries from large document repositories.
- Implemented a two-stage pipeline: a retriever leveraging vector similarity search (FAISS) to fetch relevant documents, followed by a generator using a Hugging Face Transformer to produce context-aware responses.
- Utilized cosine similarity to calculate the relevance score between user queries and document embeddings, improving precision in information retrieval.

Human Activity Recognition Using CNN **Dec 2024**
Data Mining and Machine Learning Course
- Preprocessed raw inertial sensor data and applied standardization techniques.
- Built and fine-tuned a 1D CNN model with Batch Normalization and Dropout layers to enhance generalization.
- Achieved a test accuracy of 93.21% with robust performance across multiple activity classes.
- Conducted performance evaluation using precision, recall, F1-score, and confusion matrix visualizations while analyzing training progress, per-class accuracies, and misclassification patterns to derive actionable insights.

Predictive Analysis of Hospital Ratings **May 2024**
Fundamentals of Big Data Analysis Course
- Provided the assessment of hospital performance using PySpark through data-driven approaches.
- Handled missing values on a large, complex dataset.
- Implemented different machine learning techniques, including Gradient Boosting using Scikit-learn, achieving an R^2 score of 0.87 in predicting hospital ratings.

Network Security and Simulation Project **May 2024**
Security of Emergent Networks Course
- Developed network attack simulations, including ARP poisoning, man-in-the-middle, IP fragmentation, and UDP ping-pong.
- Executed and tested these attacks in a software-defined network (SDN) environment to understand vulnerabilities and exploit network traffic.
- Evaluated attack outcomes and explored countermeasures to improve network resilience.

Malware Detection Using Convolutional Neural Networks **Dec 2023**

AI-Assisted Malware Detection and Classification Course

- Applied CNNs with Keras and Tensorflow, leveraging batch normalization and dropout techniques to achieve 0.92 accuracy in a malware detection task.
- Extracted features from Cuckoo reports and training decision tree model for malware classification in the Cuckoo sandbox.
- Implemented an adversarial attack using the Fast Gradient Sign Method (FGSM) against CNN, resulting in a 25% drop in accuracy.

Hint Generation System for Programming Coursework Question Assistance **May 2023**

Deep Learning Course

- Conducted a study on Self-Attention Mechanism and Transformers.
- Developed a system using BERT for multi-label classification on the Stack Overflow Code Corpus to provide relevant hints for programming questions
- Evaluated the system using Scikit-learn, achieving 92% accuracy in identifying relevant topics.

MENTORING EXPERIENCE

- Kennedy Marsh (CS Master Student, North Carolina Agricultural and Technical State University, Fall 2024 and Spring 2025)

INVITED TALKS

- The 20th International Conference on emerging Networking EXperiments and Technologies, December 2024

AWARDS

2025	AAAI 2025 Student Travel Grant
2024	CoNEXT 2024 NSF Student Travel Grant
2019	Winner of Three Minute Thesis (3MT) Competition
2019	Ranked 2nd in Cumulative GPA among all the Computer Engineering Students

TECHNICAL STRENGTHS

Skills	Machine Learning, Large Language Models, Natural Language Processing, Deep Learning, Data Mining, Generative AI
Languages	Python, C++, R, HTML, CSS, PHP, Java, SQL, MATLAB
Machine Learning Libraries & Packages	Keras, PyTorch, Tensorflow, PySpark, Matplotlib, Scikit-learn, HuggingFace Transformers
Tools	GIT, MySQL, LangChain, LlamaIndex, Bootstrap, LaTeX
Networking & SDN Technologies	RYU Controller Framework, P4, Cisco Packet Tracer, OpenvSwitch, GNS3, Mininet, Scapy