Shaghayegh (Shirley) Shajarian

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EDUCATION

North Carolina Agricultural and Technical State University **Jan 2023 – Present**
Ph.D. in Computer Science; GPA: 3.92/4.0. *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.
- Winner of Three Minute Thesis (3MT) Competition
- Ranked 2nd in Cumulative GPA among all the Computer Engineering Students

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**, Sajad Khorsandroo, Mahmoud Abdelsalam. Intelligent Network Management: RAG-Enhanced LLMs for Log Analysis, Troubleshooting, and Documentation, 2024 (Poster in ACM CoNEXT' 24)
- **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam. A Survey on Self-Running Networks: Concepts, Components, Opportunities, and Challenges, 2024 (Preprint Paper)
- Harikha Manthena*, **Shaghayegh Shajarian***, Jeffrey Kimmel, Mahmoud Abdelsalam, Maanak Gupta, Sajad Khorsandroo. Explainable Malware Analysis: Concepts, Approaches and Challenges, 2024 (Preprint Paper)
- Fikirte Demmese, **Shaghayegh Shajarian**, and Sajad Khorsandroo. Transfer learning with ResNet50 for malicious domain classification using image visualization. Discover Artificial Intelligence, 2024 (Paper)

** Equal Contribution*

EXPERIENCE

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

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.

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.

RESEARCH INTEREST

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 outcomes in network management and beyond.

PROJECTS

Retrieval-Augmented Generation System for Document Query Answering **August 2024**

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.

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.

TECHNICAL SKILLS

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 Workbench, LangChain, LlamaIndex, Bootstrap, LaTeX
Networking & SDN Technologies: RYU controller framework, P4, Cisco Packet Tracer, OpenvSwitch, GNS3, Mininet, Scapy