# Abrar Zahin

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## Personal Summary

Future-oriented and innovative PhD candidate in Electrical Engineering, specializing in machine learning and data science. Skilled in developing cutting-edge algorithms for networked systems and leveraging deep learning and probabilistic models to solve real-world challenges. Proficient in Python, TensorFlow, and cloud platforms, with hands-on experience in clustering, classification, and large-scale data analysis. Passionate about driving innovation in data-driven solutions, and eager to apply advanced technical skills in a data scientist or machine learning engineer role to create impactful results.

## Skills Summary

**Languages**: Python, MATLAB, SQL, R, and C

**Tools and Office Skills**: Google Cloud, Azure, Git, Microsoft office, Microsoft Excel, Microsoft Power Point

**Operating Systems**: MacOS, Windows, and Linux

**Libraries and Frameworks**: SKLearn, TensorFlow, Keras, SciPy, Pandas, Numpy, and Matplotlib

## Research Expertise

Graph Machine Learning, Statistical Modeling, Large Language Models (LLM), Graph Foundation Models, Causal Inference, Generative Models, Cloud Computing, Inferential Statistics, and Deep Learning

## Education

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| **Arizona State University (ASU):** PhD in Electrical Engineering | Jan 2020 – Current |
| **Utah State University (USU):** MSc in Electrical Engineering | Aug 2017 – Dec 2019 |

## Notable Research Projects

**Robust Model Selection of Gaussian Graphical Models** | *ASU*

- Developed an advanced algorithm for network analysis that recovers complex structures in noisy data, enabling more robust and efficient optimization of telecommunication networks, supply chains, and financial systems.
- Our algorithm transcends the fundamental limitations of current algorithms in learning complex networks.
- Implemented our algorithm on both simulated graphs and **real-world networks**

**Rapid Change Localization in Gaussian Graphical Models** | *ASU*

- Developed a **novel** algorithm for rapid change localization in in large-scale networked systems
- Computationally efficient and performs change localization with **provably low latency**
- Localize changes at least **20% faster** than the traditional algorithms

**Computationally Efficient Active Learning of Gaussian Graphical Models** | *ASU*

- Developed a **novel** computationally efficient algorithm for large-scale networked systems
- Offers a significant **computational boost**: **exponential reduction** in **runtime complexity** relative to the network size

**Semi-supervised Learning of Fall Down Action** | *USU*

- Developed a semi-supervised classifier with **Variational Autoencoder (VAE)** and **Convolutional Neural Network (CNN)**
- **Our classifier** is at least **5% more accurate** in **classifying different fall down actions** from a real-world data set

**Efficient Smart Health Monitoring of Large-scale Networks** | *USU*

- Developed a **novel** algorithm for smart healthcare monitoring, primarily using **Convolutional Autoencoder** and **CNN**
- **Our algorithm** is at least **27% faster** than the current **state-of-the-art framework**

## Notable Projects from Coursework

- **CNN** for real-time speech command recognition for human-computer interaction [Github Link]
- **Denoising Convoulutional Autonencoder** for reconstructing and denoising images, respectively [Github Link].
- **Generative Adversarial Networks (GAN)** for reconstructing images [Github Link]
- Named Entity Recognition, Email Spam Detection, and Text Summarization tool with **pre-trained LLM**
- **Recurrent Neural Network (RNN)** and **Long Short Term Memory (LSTM)** for electric vehicle charging demand prediction [Github Link].
- **Support Vector Machine** for image classification [Girhub Link]
- A technical report exploring the computational statistical tradeoffs in structure learning of graphical models [Github Link].

## Relevant Coursework

Random Signal Theory, Information Theory, Statistical Machine Learning, Mathematical Methods for Signals and Systems, Convex Optimization, Machine Learning for High Dimensions, Reinforcement Learning, Discrete Mathematics and Numerical Analysis, Database Concepts and Programming, Microprocessor and Assembly Language Programming, Digital Signal Processing, Radio Frequency Engineering, Advanced Communication Technique, Wireless & Mobile Networking