Md Abul Hayat

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Education

- **University of Arkansas** — Fayetteville, AR
  PhD, Electrical Engineering — *July 2023*
- **University of Arkansas** — Fayetteville, AR
  MS, Statistics & Analytics — *May 2021*
- **Bangladesh University of Engineering & Technology (BUET)** — Dhaka, Bangladesh
  BS, Electrical & Electronic Engineering — *September 2015*

Technical Skills

- **Languages**: Python, MATLAB, R, SQL, C++, C
- **ML Frameworks**: PyTorch, Transformers, XGBoost, scikit-learn, pandas, GluonTS, TensorFlow-Keras
- **Others**: Git, LaTeX, Jupyter, AMPL, Bash, Slurm, High-Performance Computing

Experience

- **JPMorgan Chase & Co.** — Manhattan, NY
  Senior Associate - Model Risk Quant — *July 2023 - Present*
  - Responsible for developing benchmarks, reviewing, and assessing the risk of anti-money laundering models.
  - Models: Gradient boosting (XGBoost, LightGBM, CatBoost), LLM/Generative AI (fine-tuning, zero-shot learning), Sampling/Ranking (false positive reduction, stratified random sampling, risk ranking).
- **Amazon Web Services (AWS)** — Seattle, WA
  Applied Scientist Intern — *May 2021 - August 2021*
  - Feasibility testing of MQ-RNN algorithm in anomaly detection for different types of univariate time-series.
  - Framework: GluonTS, Platform: AWS EC2, Service: Amazon Lookout for Metrics.
- **Lawrence Berkeley National Laboratory** — Berkeley, CA
  Summer Intern — *May 2020 - August 2020*
  - Lead developer of contrastive self-supervised representation learning for galactic images. This approach outperformed state-of-the-art on several relevant tasks. [Journal][Github][Website][YouTube]
  - Dataset size: 300 GB (1.3 million images), Model: Momentum Contrast for Unsupervised Visual Representation Learning (MoCo), Framework: PyTorch with "DistributedDataParallel", Mentor: Mustafa Mustafa, Ph.D.
- **Nokia Bell Labs** — Murray Hill, NJ
  Summer Intern — *June 2019 - August 2019*
  - Implemented U-Net and DenseNet-based deep learning segmentation algorithms for OCT images using Keras.
- **University of Arkansas** — Fayetteville, AR
  Graduate Assistant — *August 2017 - July 2023*
  - Proposed a novel integral pulse frequency modulation-based modeling of peripheral arterial (PAP) and venous pressure (PVP) signals to extract respiratory rate and heart rate variability using MATLAB. [Journal][Github]
  - Developed first-ever Kalman filter and hidden Markov model-based unsupervised anomaly detection algorithm for PVP signals under Gaussian mixture assumption. Languages: R, MATLAB. [Journal][Github]
  - Proposed a Gaussian mixture model-based Bayesian unsupervised algorithm for rice panicle segmentation with Markov chain Monte Carlo techniques using drone images. This outperformed the then state-of-the-art algorithm. Language: MATLAB. [Journal][Github]
  - Successfully classified hydrated and dehydrated patients using PVP signals with GLM with LASSO (Sensitivity $> 96\%$ and Specificity $> 93\%$). Language: MATLAB. [Journal]
- **Grameenphone - Telenor Bangladesh** — Dhaka, Bangladesh
  System Engineer — *October 2015 - August 2017*
  - Lead planning and operations engineer executing radio diversity and aggregation techniques for 400+ BTS/nodeBs.

Selected Publications [Google Scholar Link]

- **M. A. Hayat**, Jingxian Wu, et.al., "Modeling Peripheral Arterial and Venous Pressure Signals with Integral Pulse Frequency Modulation," Biomedical Signal Processing & Control, September 2023. [Journal][Github]
- **M. A. Hayat***, George Stein*, et. al., "Self-Supervised Representation Learning for Astronomical Images," The Astrophysical Journal Letters, December 2020. [Journal][arXiv][Media][Github][Website][YouTube] {*Equal contributions}
- **M. A. Hayat**, et.al., "Estimating Galactic Distances From Images Using Self-supervised Representation Learning," Machine Learning and the Physical Sciences Workshop, 34th Conference on Neural Information Processing Systems (NeurIPS), December 2020. [Paper][arXiv][Poster]
- **M. A. Hayat**, Jingxian Wu, et.al., "Unsupervised Anomaly Detection in Peripheral Venous Pressure Signals with Hidden Markov Models," Biomedical Signal Processing & Control, September 2020. [Journal][Github]
- **M. A. Hayat**, Jingxian Wu, et.al., "Unsupervised Bayesian Learning for Rice Panicle Segmentation with UAV Images," Plant Methods, February 2020. [Journal][Github]

Research Interest

Deep Learning, Data Science, Bayesian Statistics, Mathematical Finance, Signal Processing