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.** Brooklyn, NY
  Senior Associate - Model Risk Quant *July 2023 - Present*
  - The Model Risk Governance and Review (MRGR) division supervises model risk, conducts independent assessments, and offers guidance on appropriate model usage.
  - MRGR's main function is to critically assess and enhance existing methodologies employed throughout the organization, scrutinizing the accuracy and robustness of financial algorithms.
  - Our team evaluates AI, ML, and various statistical models utilized in anti-money laundering and KYC applications within the organization. Models under review encompass XGBoost and NLP algorithms, necessitating proficiency in Python libraries like XGBoost, Transformers, Pandas, scikit-learn, and PyTorch.
  - Additional duties involve addressing inquiries from federal regulatory bodies such as the Federal Reserve Board and the Office of the Comptroller of the Currency on model risk.
- **Amazon Web Services** 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]
  - 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]
- First-ever successful classification of 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]
- P. Bonasso, K. Sexton, **M. A. Hayat**, et. al., "Venous Physiology Predicts Dehydration in the Pediatric Population," Journal of Surgical Research, March 2019. [Journal]

Grants & Scholarships

- Graduate student ambassador (EE), University of Arkansas — Spring 2023, Fall 2022
- Porter W. Stone scholarship, University of Arkansas — May 2022
- Bangladesh-Sweden trust fund travel grant, Govt. of the People's Republic of Bangladesh — February 2019
- Full undergraduate tuition-waiver with scholarship, Govt. of the People's Republic of Bangladesh — May 2010

Awards & Honours

- Outstanding Graduate Teaching Assistant — Fall 2022
- Research Affiliate, Lawrence Berkeley National Laboratory — September 2020 - August 2021
- Runner-up, 'Cadence India Xtensa Design Contest - Adaptive Beamforming with Microphone Array' [Certificate] — 2015
- 11th, National Undergraduate Mathematics Olympiad (Dhaka chapter) — 2013
- Second Runner-up, Bangladesh Mathematical Olympiad (Rajshahi chapter) — 2006, 2008

Teaching Experience

- ELEG 2103 (Electric Circuits I) - Primary Instructor — Summer, Spring 2023
- ELEG 3124 (Systems & Signals) - Lab Instructor — Fall 2022, 2021, 2020, 2019
- ELEG 3214 (Electronics I) - Lab Instructor — Spring 2020

Research Interest

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

Visa & Employment Authorization

Status: F1. EAD: Post-completion OPT. No sponsorship is required.