Samrat Nath

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SUMMARY

- 10 years of combined multi-disciplinary experience in industry and academy as a data scientist with hands-on skills in machine learning, optimization, reinforcement learning, and deep learning.
- Effective project management, innovative idea generation, strong communication skills, and research oriented mindset led to 1 US Patent, 6 journals, 10 conference proceedings, and 1 book chapter.

EDUCATION

Doctor of Philosophy (Ph.D.) in Electrical Engineering May 2020
University of Arkansas *Fayetteville, AR, USA*
Dissertation: Low Latency Anomaly Detection with Imperfect Models

Bachelor of Science (B.Sc.) in in Electrical and Electronic Engineering Jul. 2014
Bangladesh University of Engineering and Technology (BUET) *Dhaka, Bangladesh*
Thesis: Spatio-Temporal Feature Extraction Scheme for Human Action Recognition

RELEVANT COURSEWORKS

- Intro to Deep Learning
- Machine Learning
- Statistical Inference
- Computational Statistics
- Regression Analysis
- Time Series Analysis
- Detection & Estimation
- Probability & Statistics
- Random Signals & Process

TECHNICAL SKILLS

- **Programming Languages**: Python, R, Matlab, SQL, C++
- **ML Libraries & Frameworks**: Scikit-learn, Keras, TensorFlow, PyTorch, PySpark, Azure
- **Tools**: VS Code, Jupyter, Tableau, Alteryx, Git, Jira, Confluence, LaTeX, MS Office

EXPERIENCE

Walmart Inc. *Bentonville, AR, USA*
Senior Data Scientist May 2022 – Present
- Serving as technical lead for Energy Transformation projects with focus on developing algorithms for estimating the potential of solar and energy storage to provide cost-effective energy management.
- Filed 1 US Patent and published 1 conference paper and 2 medium blogs.

Data Scientist Jun. 2020 – May 2022
- Played an instrumental role in 4 key projects across Real Estate and Manufacturing domain.
- Demonstrated operational excellence by auditing and streamlining 7,000 lines of code and 43 Python scripts which allowed developing enhancements faster.

Data Analyst Intern Jun. 2019 – Aug. 2019
- Developed regression and optimization models in R for respectively estimating & allocating maintenance budget for HVAC & refrigeration equipment in stores and deployed a POC app using Alteryx.

University of Arkansas *Fayetteville, AR, USA*
Graduate Research and Teaching Assistant Jan. 2016 – May 2020
- Published 6 journal papers, 6 conference papers, and 1 book chapter as a result of researching in the field of Optimization, Statistical Signal Processing, Deep Reinforcement Learning, and Wireless Communication with simulations conducted in Matlab & Python.
- Assisted in grading of undergraduate courses such as Systems and Signals, Probability and Stochastic Process, Communication Theory and instructed 50 undergraduate students on average each year.

PROJECTS

Optimization | *Walmart Inc.* Jun. 2020 - Present

- Formulated the optimal battery management problem for energy arbitrage and peak demand shaving in behind-the-meter energy systems and solved it using Linear Programming.
- Developed a solution for optimal store space allocation strategy with respect to linear footage for maximizing store sales and deployed a self-service analytics app using R Shiny.
- Formulated an optimization problem using genetic algorithm to solve the production scheduling of a beef manufacturing plant given resource, time, demand, and capacity constraints.

Mobile Edge Computing | *University of Arkansas* May 2019 – May 2020

- Presented a deep reinforcement learning- based approach for dynamic computation offloading and resource allocation in multi-user mobile edge computing systems with Deep Deterministic Policy Gradient algorithm.

Low-latency Anomaly Detection | *University of Arkansas* May 2018 – May 2020

- Developed a real-time algorithm for detecting false data injection attacks and state estimation in smart grid with dynamic models and evaluated the analytical performance of the algorithm using Markov-chain.
- Formulated a low-latency algorithm for detecting bearing faults of direct-drive wind turbines utilizing the statistical distribution of stator currents at a given frequency.

Optimized Scheduling | *University of Arkansas* Jan. 2017 – May 2019

- Formulated a scheduling strategy for information pushing system based on optimal stopping time theory to optimize the delay and energy efficiency.
- Designed Markov decision process (MDP) based multicast scheduling scheme in delay-constrained content-centric wireless networks while optimizing overall system cost.

Image Processing and Pattern Recognition | *BUET* Mar. 2013 – Jul. 2014

- Developed algorithms for human action recognition based on spatio-temporal variations of human silhouette while applying classification methods such as kNN and SVM.
- Designed schemes for lip contour extraction using morphological reconstruction based segmentation approach with k-means clustering.

SELECTED PUBLICATIONS

- [J1] **S. Nath** and J. Wu, "Deep Reinforcement Learning for Dynamic Computation Offloading and Resource Allocation in Cache-assisted Mobile Edge Computing Systems" in *Intelligent and Converged Networks*, , vol. 1(2), pp. 181-198, Sep. 2020.
- [J2] **S. Nath**, J. Wu, Y. Zhao, and W. Qiao, "Low Latency Bearing Fault Detection of Direct-drive Wind Turbines Using Stator Current," in *IEEE Access*, vol. 8, pp. 44163–44174, Mar. 2020.
- [J3] **S. Nath**, I. Akingeneye, J. Wu, and Z. Han, "Quickest Detection of False Data Injection Attacks in Smart Grid with Dynamic Models," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 10(1), pp. 1292–1302, Aug. 2019.
- [C1] **S. Nath**, J. Wu, and J. Yang,"Optimum energy efficiency and Age-of-Information tradeoff in multicast scheduling," in *Proc. Intern. Conf. on Communications (ICC)*, Kansas City, MO, U.S.A., May 2018.
- [C2] F. S. Rahman, R. Nath, **S. Nath**, S. Basak, S. I. Audin, and S. A. Fattah, "Lip contour extraction scheme based on K-means clustering in different color planes", in *Proc. Intern. Conf. on Informatics, Electronics & Vision (ICIEV)*, Dhaka, Bangladesh, May 2014.

CERTIFICATIONS & AWARDS

- Completed Deep Learning Specialization in Coursera (Verfication Link) Oct. 2023
- Completed Dale Carnegie Course: Skills for Success Nov. 2021
- Dean's List Award for maintaining honors grade point in junior and senior years, *BUET* 2012-2014
- Ranked in top 1% among 7000+ applicants in undergraduate admission test, *BUET* Oct. 2009