Kundan Kumar

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OBJECTIVE

PhD candidate in Computer Science and Minor in Statistics with 5 years of Professional software development and deep knowledge in algorithms, data structure, Machine/Deep Learning, and high-scale applications and able to perform advanced statistical analysis and predictive modeling. My research focuses on reinforcement learning and DRL cybersecurity for cyber-physical systems, smart grid, seeking an internship opportunity for Summer 2024.

EDUCATION

Doctor of Philosophy (PhD), Computer Science (Major) & Statistics (Minor) 2020 - May 2025(tentative)
Iowa State University, Ames, Iowa

- **Relevant Coursework:** *Machine Learning, Deep Learning, Natural Language Processing, Computational Perception, Data technology for Statistical Analysis, Experimental Design , Statistical Theory and methods for Research Distributed Development of Software, Gerontology in Smart Home Environments, Computer Networks, Robotics motion algorithm.*

M.S. Computer Science
Iowa State University, Ames, IA

- **Relevant Coursework:** *Theory of Computation, Design and Analysis of Algorithms, Advanced Topics in Machine Learning, Database Design and Research, Empirical Methods for the Computational Science, Principles of Artificial Intelligence, Introduction of Network Programming and Cloud Computing, Network Protocol and Security, Information Warfare.*

RESEARCH EXPERIENCE

Graduate Research Assistant, Iowa State University, Ames: 08/2022 – Present
Supervisor: Dr. Gelli Ravi Kumar
Research on Deep Reinforcement Learning and cybersecurity for Power System Applications, Integration and control of Distributed Energy Resources (DER) into Smart Grids.

- Applied ~10 computational deep reinforcement learning in a Volt-Var application to analyze power simulation data to minimize voltage violations, power loss, and control errors.
- Applied attacks and mitigation techniques on deep reinforcement learning models to protect the power system against potential threat and ensure the resilience against adversarial actions.
- Transfer Learning in deep reinforcement learning models with varying distribution grid size and dynamics of the smart grid models.
- Working on integration and control of DERs in distribution grids using OpenDSS and OPAL-RT using python API for smart grid applications.

PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant, Iowa State University, Ames: 08/2020 – 12/2023
Course: COMS-309, COMS-362 and COMS-319 Software Development Practices, Object Oriented Design and User Interface

- Assisted in conducting labs and supported students through office hours, clarifying concepts, and assisting with assignments and graded assignments and exams, providing constructive feedback to enhance student learning.
- Conducted a few classes on software development and industry practices on development and deployment.
- Mentored and supervised 60 students in managing collaborative code development, designing mobile and web apps and game development and deployment with agile methodology.

Comcast- Centennial, CO. **Software Engineer** 06/2019 – 02/2022

- Analyzed and visualized large datasets using Python (Pandas, Matplotlib, Seaborn) for critical insights.
- Contributed to the development and implementation of machine learning models using Pandas, Scikit-learn, and relevant libraries.
- Developed data pipelines using Amazon Kinesis and RabbitMQ, and a Spring Boot application for the Comcast system.
- Created Dashboards with Presto DB and conducted data analysis to identify and address fraudulent activities.

IBM- Austin, TX. **Software Engineer** 01/2019 – 06/2019

- Analyzed and visualized large datasets using Python tools (Pandas, Matplotlib, Seaborn).
- Worked on Cloud development (Soft layer) for vertical and horizontal scaling with OpenShift.
- Integrated Grafana and developed Flask applications for monitoring server statuses on the cloud platform.

Hewlett Packard (HP) - Boise, Idaho **Software Engineer** 04/2017 – 12/2018

- Analyzed and visualized large datasets using Python (Pandas, Matplotlib, Seaborn).
- Contributed to machine learning model development using Pandas, Scikit-learn, and relevant libraries.
- Migrated applications and servers from HPI domain to HPE domain, implementing security patches on the new application. Developed OAuth 2.0 authentication and Java Spring Boot application with REST API on Apache/WebLogic Servers.

Tata Consultancy Services (TCS) - Mumbai, India **System Engineer** 06/2012 – 12/2014

- Developed and created ETL tools for data integration and migration into the data warehouse.
- Achieved cost savings of ~$100k through database tuning, optimizing SQL queries, and implementing indexing.
- Received an excellence award for outstanding performance in database tuning.

SKILLS

Programming Languages: Python, R, JAVA, SAS, HTML/HTML5, MATLAB, SQL, Javascript, Nodejs and reactJs.
Machine Learning and Data Analysis: Scikit-Learn, TensorFlow, Pandas, Matplotlib, OpenGym, LLMs, Generative AI
Big Data and Visualization : ArcGIS, Hadoop, Hive & Pig, Spark, Tableau , Leaflet
Power System Analysis and Simulation: Opal-RT, OpenDSS
Operating Systems: Linux, Windows
Tools & other software: RStudio, Anaconda, Visual Studio, Eclipse, Gurobi-optimization
Cloud Services and deployment : Amazon Web Services (AWS), Elastic, Rest API/SoapUI, Docker, Kubernetes, Git, Amazon Kinesis and kafka

PUBLICATIONS

- K. Kumar and G. Ravikumar, "Deep RL-based Volt-VAR Control and Attack Resiliency for DER-integrated Distribution Grids," in Proceedings of the 2024 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT), Washington, DC, USA, 2024(accepted).
- K. Kumar, A. A. Mantha, and G. Ravikumar, " Bayesian Optimization for Deep Reinforcement Learning for Robust Volt-Var Control," in Proceedings of the 2024 IEEE Power & Energy Society General Meeting (PESGM), Seattle, Washington, USA, 2024(accepted).
- K. Kumar, A. Yadav, and G. Ravikumar, " Transfer Learning in Deep-RL for Scalable Volt-VAR Control of Distribution Grids," in IEEE Transaction of Industrial Cyber Physical System(submitted).
- K. Kumar, A. Yadav, and G. Ravikumar, "Physics-based Deep Reinforcement Learning for Grid-Resilient Volt-VAR Control" in IEEE Transaction of Smart Grid, 2024 (submitted)
- J. K. Francis, C. Kumar, J. Herrera-Gerena, K. Kumar and M. J. Darr, "Deep Learning and Pattern-based Methodology for Multivariable Sensor Data Regression," 2022 21st IEEE International Conference on Machine Learning and Applications (ICMLA), Nassau, Bahamas, 2022, pp. 748-753, doi: 10.1109/ICMLA55696.2022.00125.
- K. G. Lore, N. Sweet, K. Kumar, N. Ahmed and S. Sarkar, "Deep Value of Information Estimators for Collaborative Human-Machine Information Gathering," 2016 ACM/IEEE 7th International Conference on Cyber-Physical Systems (ICCPS), Vienna, Austria, 2016, pp. 1-10, doi: 10.1109/ICCPS.2016.7479095.

ACADEMIC PROJECTS

Motion Prediction for Autonomous Vehicle, *Design and implementation Project* 08/2022 – 12/2022

- Developed a robust system for motion prediction and object detection in autonomous vehicles using Kaggle Lyft datasets, employing YOLO for object detection and RESNET for motion planning.
- YOLOv5 demonstrated accurate detection of cars and traffic lights, while the RESNET model, though with room for improvement, was used for motion planning and trajectory prediction.

Face Generation : Generative adversarial networks(GAN) to generate new images of faces.

- Build generator and discriminator for Generative to generate a new set of images from face.
- Used CelebA datasets to generate new faces and compare the model loss.

ACHIEVEMENT

- Selected and attended the Oxford Machine Learning Summer School 2022.
- Received an excellence award for outstanding performance in database tuning.
- Won 2nd Prize in BAJA SAE all over India in the safest terrain vehicle category.