Karthikeya Jayarama

jayaramakarthikeya.github.io

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Education

University of Pennsylvania **August 2023 – Present**

Master of Science in Electrical and Systems Engineering, Specialization in Data Science

- **Courses:** Linear Systems Theory, Graph Neural Networks, Principles of Deep Learning
- Teaching Assistant for ESE 3050 - Foundations of Data Science.

PES University **Aug 2019 – May 2023**

*Bachelor of Technology in Electronics and Communication Engineering, GPA - **3.88 / 4.0***

- **Thesis:** Multi-terrain Robot for Identification of White-Stem Borer Disease in Arabica Coffee Plantations
- **Relevant Courses:** Probability and Random Process, Linear Algebra, Control Systems, Pattern Classification, Deep Neural Networks, Robotics Systems, Machine Learning Algorithms, Reinforcement Learning.

Experience

Banyan Intelligence **June 2022 – May 2023**

*Indian Institute of Science, **Software Engineering Internship***

- Collaborated on designing RAN simulator architecture from scratch, connecting open-source simulator, E2 Node-sim, and near-RT RIC.
- Researched and delivered a robust message queuer to connect multiple simulators with near real-time RIC.
- Optimized throughput of radio access network from 42 to 56 percent by obtaining control decisions from xApps.
- Improved response time from 11ms to 1ms between RAN simulator and near-RT RIC.
- Developed a Drive Test tool that optimally collects 3000 packets from more than 20 UEs every second, then decodes, processes, and stores refined data.
- Generated multiple scenarios in network simulator (NS-3) for testing handover algorithms.
- Tech stack: Open-RAN, C, C++, Go, Python, Kotlin, Dart, Docker, Kubernetes

Skills

- Programming Languages: Python, C++, C, Go, Kotlin, JavaScript, MATLAB, Dart, SQL
- Frameworks: PyTorch, SciKit-Learn, Pandas, NumPy, Matplotlib, Seaborn, ROS, OpenCV, Django, React.js, MongoDB, PostgreSQL
- Research Interests: Robotics, Machine Learning Theory (ML) and Applications (Autonomous Vehicles, Natural Language Processing (NLP), Control), Artificial intelligence, Computer Vision, Edge Computing (ML Inference on Hardware Accelerators).
- Other platforms and Skills: Embedded Systems, Software Design, Containerization (Docker, Kubernetes), AWS, Bash/Shell Scripting, Network Programming (Sockets (TCP, UDP, SCTP), ASN.1C Encoder/Decoder), Big Data Analytics, Database Management, Statistics, Optimization, Data Structures and Algorithms, GPU (CUDA) programming, FPGA Development

Projects

NavNBK | Python, ROS, Gazebo, Blender, Pytorch, RayTune

- Modelled nonlinear all-terrain robot dynamics into Bi-linear dynamics using Autoencoders and Koopman theory with validation accuracy around 82 percent (Custom Dataset contains 1.4 million trajectory points).
- Minimized the latency of MPC using bilinear realization by 100 milliseconds compared to the nonlinear realization of system dynamics.
- Conducted hyperparameter search by developing a distributed tuning process using RayTune, which reduced time by 2 hours for each hyperparameter queue.
- Github Link: https://github.com/jayaramakarthikeya/Jackal_MPC

Land Cover | Python, Pytorch, OpenCV

- Designed to predict land cover in the region of satellite images which achieved mean Intersection over Union of 40.2.
- Extended the project to predict cloud cover which achieved pixel accuracy of around 87 percent by using a UNET model with a robust data pipeline for the given segmentation task.
- Github Link: https://github.com/jayaramakarthikeya/land_cover

Research Publications

- Likhitha Sindhu Geddam, Ananya Mungara, Kiriti Kapavari, Karthikeya Jayarama, Shikha Tripathi, **"Detection of White Stem Borer Disease in Coffee Plantation using Autonomous Multi-Terrain Robot"**, 2023 19th IEEE International Colloquium on Signal Processing & Its Applications (CSPA), Langkawi Island, Malaysia, 3 - 4 March 2023 (Best Paper Award).