Mukund Yadav

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Education

Virginia Tech — Blacksburg, VA
MS in Computer Engineering, GPA: 4.0/4.0 — *Jan 2023 – Dec 2024*
- MS Thesis: Machine Learning and Mathematical Optimization in Biomedical Imaging.
- TA: CS2506 Computer Architecture, ECE2564 Embedded Systems, ECE4525 Video Game Design.
- Courses: Optimization for Machine Learning, Deep Learning, Computer Vision, Computer Architecture.

Purdue University — West Lafayette, IN
BS in Electrical and Electronics Engineering — *Aug 2018 – May 2022*
- Capstone: Industrial Internet of Things Sensors & Devices (C++).
- TA/Tutor: Multivariate Calculus, Linear Algebra, Multivariate Statistics, Differential Equations.

Experience

Computer Vision Researcher — Jan 2024 – Present
Virginia Tech — *Blacksburg, VA*
- Developed a DenseNet and Deconvolution-based Network using PyTorch for enhancing COVID-19 CT images and processed real-world data, leading to a publication in IEEE.
- Enhanced model performance by optimizing multi-level VGG loss functions, improving SSIM and MS-SSIM from 0.707 to 0.9135; further applied transfer learning to reach 0.9914 (40.2% improvement).
- Integrated PyTorch's DDP library for distributed parallel processing, trained on multiple GPU nodes to reduce training time from 42 hours to 23 hours (45.2% reduction).
- Publication: M . Yadav, W. Feng, G. Cao, "Impact of Loss Function on COVID-19 CT Image Denoising," IEEE Transactions on Radiation and Plasma Medical Sciences, 2024.

Wireless Signals AI Researcher — Jan 2023 – Dec 2023
Virginia Tech — *Blacksburg, VA*
- Created a Reinforcement Learning agent for the detection of sinusoidal signals in Additive White Gaussian Noise, increasing SNR from 0.19 to 0.34 (79% increase) over classical methods.
- Engineered a stochastic algorithm leveraging the Generalized Likelihood Ratio Test, successfully reducing false alarm probability by 60%.
- Derived the formula for the threshold of false alarm probability and applied Proximal Policy Optimization, increasing agent's total rewards by 25% and improved detection-to-false alarm ratio by 30%.
- Revamped the PPO training pipeline with C++ multithreading and Eigen library, cutting training time by 45%.

Software Engineering Intern — May 2023 – Aug 2023
Virginia Tech — *Virginia Beach, VA*
- Built a web application for geologists studying shorelines utilizing React, Express, Nodejs and TypeScript and deployed on AWS with Docker and Kubernetes, achieving a 99.9% uptime.
- Architected RESTful APIs with Express and JWT for secure authentication reducing API response time by 33.3%.
- Optimized AWS RDS database performance, reducing query response times by 40% with indexing and normalization.
- Launched the application on AWS, leveraging EKS to manage the Kubernetes workload and Docker containers, supporting rapid growth to over 1,000 active users within the first two months.

Machine Learning Engineering Intern-Natural Language Processing — Aug 2022 – Dec 2022
IUPUI — *Indianapolis, IN*
- Spearheaded the development of a voice assistant to assist senior citizens with their medications using Python and Natural Language Processing, enhancing Automatic Speech Recognition for medical terminology.
- Devised a data-driven solution strategy by increasing training data size by 30% through data augmentation, reducing overfitting by narrowing the training-test accuracy gap by 10%.
- Constructed and trained a deep neural network in PyTorch with NLTK and LSTM architecture, raising accuracy by 22%.
- Pushed the model on AWS (EC2, S3, Lambda), providing accurate and timely medical information to 100+ senior citizens.

Projects

Contradictory, My Dear Watson | *Natural Language Processing/Sentiment Analysis/Python* — Jan 2023 – May 2023
- Developed an NLP-based XLM transformer model for a Kaggle competition using RoBERTa for sentiment analysis.
- Attained the model's accuracy of 93%, ROC-AUC score of 0.95 and finished in the 99th percentile of Kaggle leaderboards.

Technical Skills

Programming Languages: Python, C++, JavaScript, Typescript | **Machine Learning**: PyTorch, TensorFlow, Transformers, Gradient Boosting | **Fullstack Development**: React, NodeJS, ExpressJS, MySQL, Docker, Kubernetes, AWS