Raja Sunkara
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Summary

I am looking for a Machine Learning/ Deep Learning/ Computer Vision researcher and engineering role. I have over 4 years of experience in training and deploying machine learning/deep learning models, and am proficient in using PyTorch to quickly implement research paper ideas. My background in mathematics and research, as well as my experience publishing at machine learning conferences, makes me well-suited for a role in research and development of machine learning models. My ultimate goal is to bring these models to mainstream applications through productionization.

Education

Missouri University of Science & Technology Rolla, MO
Master of Science in Computer Science (thesis); GPA: 4.0/4.0 *Aug 2021 - May 2023*
Thesis Title: *Computer Vision in Adverse Conditions: Small Objects, Low-Resolution Images, and Edge Deployment*

Indian Institute of Technology Madras Chennai, India
Bachelors in Aerospace Engineering, Minor: Systems Engineering; GPA: 3.56/4.0 *Jun 2013 - May 2017*

Technical Skills

Languages: Python, C/C++, SQL, R, MATLAB
Frameworks/Libraries: PyTorch, MXNet, Numpy, OpenCV, Pandas, Scikit-Learn, MLOps (WandB)
Deep Learning Architectures: CNNs, RNNs, VAEs, GANs, Transformers, Diffusion models
Machine Learning Algorithms: Logistic Regression, SVM, KNN, Naive Bayes, Random Forest, Gradient Boosting, XGBoost, K-Means, K-Means++, Iterative PCA, Kernel PCA, Dual PCA

Research Experience

Statistical Machine Learning Lab, Dr. Ardhendu Tripathy: *Missouri S&T: Rolla, MO:*Dec 2022 - Present

- Working on black-box optimization methods with applications in both neural networks (e.g., hyper-parameter tuning and neural architecture search) and engineering applications (e.g., optimal designs through physical simulation experiments)

Securing AI and IoT Lab, Dr. Tony Luo: *Missouri S&T: Rolla, MO* Aug 2021 - Dec 2022

- ***R. Sunkara*** *and T. Luo, No More Strided Convolutions or Pooling: A New CNN Building Block for Low-Resolution Images and Small Objects* in **Proceedings of ECML PKDD 2022**
- ***R. Sunkara*** *and T. Luo, YOGA: Deep Object Detection in the Wild with Lightweight Feature Learning and Multiscale Attention* in **Pattern Recognition Journal**

Industry Experience

R&D Data Scientist Intern: *Alcon: Fort Worth, TX* May 2022 - Aug 2022

- Developed an image registration algorithm using CNN architecture and semi-supervised learning. Successfully trained an end-to-end model with a 95% registration rate
- Implemented FP32, FP16, and INT-8 quantization for TensorRT engines, resulting in a 50% reduction in memory usage and a 77% improvement in inference time

Research Engineer(AI/CV): *Matdun Labs: Hyderabad, India* Oct 2020 - Jul 2021

- Implemented a novel object detection model to locate the delivery package in an image and reduced the false positive rate to 4% using an ensemble of models
- Built a novel anti-spoofing model using ResNet architecture and IR dot projector hardware. Deplyed this model on Jetson Nano edge device
- Developed TensortRT optimized engines to reduce the RAM consumption and increase the inference time of deep learning models by 20% and 16% respectively on Jetson Nano edge device

Data Scientist: *Agrometrics: Hyderabad, India* Jun 2018- Oct 2020

- Designed and implemented a relational database schema for a Farm Management (FM) and Quality Assessment (QA) software. Utilized this schema to build a business intelligence system by identifying crucial key performance indicators (KPIs) such as sales/purchasing, packing, farm, transportation, QA/QC, and shipping receiving KPIs
- Trained an anomaly detection model using Sentinel-2 and Landsat-8 multispectral satellite images

Data Analyst: *Enfrien Innovations: Bengaluru, India*Aug 2017 - Jun 2018

- Developed a CART (Classification and Regression Trees) model to identify the most feasible area for solar power plants, minimize the number of trees to be cut, and optimize inverter positioning using data collected across a canal

Projects

Dynamics and Control of Autonomous Tilt Rotor: *Matlab, Control theory*

- Developed control equations for tilt rotor hover and cruise mode using Linear Quadratic Gaussian and Model Predictive Control principles, based on flight dynamics. Implemented Kalman filter to improve the accuracy of the system state by analyzing inputs and outputs of linear dynamical systems.
- Simulated LQG, MPC controller model and demonstrative simulation results are obtained under the MATLAB/Simulink environment to show the effectiveness of the proposed LQG controller.

Abnormalities in Lung X-Ray: *Object detection, PyTorch*

- Trained a CNN model using NIH X-ray dataset to diagnose and locate diseases in lung X-ray images, using techniques like Grad-CAM, Grad-CAM++, YOLO and achieve the highest level of accuracy in mean average precision (mAP).

Multivariable Data Analysis for Process Modeling: *IPCA, Kernal PCA, NMF, NCA, Matlab*

- Developed a solution for blind source separation using Non-Negative matrix factorization technique on absorbance spectral data of Cobalt, Nickel, and Copper
- Used Network component Analysis to construct the network topology of a water pipe system with partial information about the network

Applied Time -Series Analysis: *Signal processing, Real analysis*

- Investigated theoretical foundations of linear systems analysis and applied them to model Swiss Bank share market index data using an ARIMA model
- Utilized spectral decomposition techniques to detect periodicity in time series data, specifically studying the Fast Fourier Transform of random discrete signals. Implemented this method on Electrocardiogram data to analyze the presence of periodic components

Signboard Translation from Vernacular Languages: *PyTorch, Deep learning architectures*

- Trained a machine learning system using VGG16, RCNN Encoder-Decoder, and RNN with attention mechanism to identify and translate text on Hindi signboards to English

Relevant Courses

Mathematics of Medical Imaging, Theory of Reinforcement Learning, Machine Learning in Computer Vision, Advanced topics in AI, Analysis of Algorithms, Convex Optimization, Applied Time-Series Analysis, Probability, Statistics and Stochastic Process, Numerical Analysis, Process Optimization, Multivariate Data Analysis for Process Modeling