VIGNESH SUNDARARAJAN

+1-(765)-775-7397 sundar18@purdue.edu sundararajan-vignesh vigneshsundararajan vigneshsundararajan.github.io

Education

Purdue University - West Lafayette, USA | Master of Science - Aeronautics and Astronautics Engineering **2021 - Present**
Extra Curricular Work: Research Lead - Space & Earth Analogs Research Chapter of Purdue | **Social Media Link**
Climate Committee Member - Purdue Student Sustainability Council | **Social Media Link**

SRM University - Chennai, India | Bachelor of Technology - Mechanical Engineering **2016 - 2020**
Extra Curricular Work: Design Lead and Team Vice Captain - Hawkz Racing FSAE Team

Skills

Programming: C++, Python, MATLAB, SQL, R, Lua, HTML, CSS, Javascript, LaTeX | **Project Management:** Confluence, Jira, Agile, Git
Frameworks/Libraries: Tensorflow/Keras, PyTorch, Scikit-Learn, Numpy, Eigen, openCV, Matplotlib, Pandas, Dask, Plotly, Folium, Flask
Cloud/DevOps/Big Data: AWS, Google Cloud, Docker, Kubernetes, Spark, HDFS, Parquet | **Robotics Stack:** ROS, Gazebo, CMake, Linux
Competencies: Machine Learning, Deep Learning, ML Operations, Data Engineering, Scientific Computing, Systems Engineering
Mathematical Core: Linear Algebra, Multivariate Calculus, Optimization, Probability and Statistical Methods

Experience

Data Science Research Team Lead | The Purdue Data Mine + John Deere **August 2022 - Present**
- Leading a team of 13 students as the Technical Project Manager. Leveraging Agile Methodology to maximize value output.
- Developing an automated, large scale geospatial analysis tool for the Pheasant and Quail Foundation(PQF) by taking raster satellite data as input and using machine learning models to predict land candidates that are ideal for wildlife conservation use.

Data Scientist | Dauch Center for the Management of Manufacturing Enterprises **June 2022 - August 2022**
- Performed a univariate exploratory data analysis to study sensor ping frequency of the client's nationwide fleet of trucks.
- Achieved a 60× speed improvement and 85% storage use reduction by implementing a parallelized data ingestion and cleaning pipeline to handle raw Telematics data.
- Implemented K-Means Clustering to identify high-traffic regions and presented findings to the business end of the organization

Aerodynamicist | Purdue Electric Racing | Team Website Link **August 2021 - August 2022**
- Designed a correlation study to validate feasibility of Front Wing CFD simulation results with data obtained from the Boeing Wind Tunnel at the Aerospace Sciences Laboratory at Purdue. Achieved a 7% margin of error.
- Designed an underbody duct cooling system for the motor controllers. Parametrized the CFD study by adding duct angle as a tunable parameter. Analyzed airflow interaction with the Front Wing and determined the mass flow rate for a series of velocities to identify optimal duct angle.

Projects

Object tracking and following Robot in Gazebo | Github Link **April 2022**
- Implemented image masking on an RGB video stream and computed distance to object using the centroid method.
- Developed a proportional velocity controller to check for the object in robot's field of view before following it.

Monocular Vision based Navigation of a 4-wheeled robot | Github Link **March 2022 - April 2022**
- Calibrated a monocular camera interfaced with a Raspberry Pi. Performed 3D localization using the Fiducials ROS package.
- Implemented a PID controller to navigate the robot towards an Aruco marker placed in the environment.
- Developed a line follower mechanism by using infrared sensors as a fallback in case the vision system fails.

Image Super-Resolution using a Generative Adversarial Network | Github Link **August 2021 - December 2021**
- Implemented SRGAN, based on the ResNet architecture(16 Residual Blocks with skip connections), with a perceptual loss function that uses high level feature maps of the VGG network
- Trained the neural network for 50,000 steps on the DIV2K data set and visualized the 4× upsampled images using matplotlib

CNN Autoencoder for Image Denoising | Github Link **October 2021**
- Performed data augmentation on the MNIST dataset by adding a Gaussian Noise with $\mu = 0$ and $\sigma = 0.5$
- Built a network with Convolution and Transpose Convolution layers with Pooling and achieved average loss of 17.33 after 10 epochs

KNN Classifier to detect potential Credit Card fraud | Blog Link **September 2021**
- Built a predictive model to identify fraudulent transactions and achieved 95.468% training accuracy and 90.625% test accuracy.
- Employed K-Nearest Neighbors algorithm and used 5-fold cross validation for optimizing the hyperparameters.

Portfolio Website Development | Github Link **December 2021 - Present**
- Developed a portfolio website using the Hugo static site generator framework to prioritize fast client-side rendering.
- Maintained version controlled repository of codebase and used CI/CD principles for deployment.