

# VARUN SREENIVASAN

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## EDUCATION

**M.S. Computer Science, University of Wisconsin-Madison** (December 2021)

G.P.A: **4.00/4.00**

**B.S. Computer Science (Minor: Mathematics), University of Wisconsin-Madison** (May 2020)

G.P.A: **3.90/4.00** "Distinction in the Major", and Dean's List

## LICENSES & CERTIFICATIONS

**Certified Cloud Practitioner – Amazon Web Services** (September 2021)

## RELEVANT COURSEWORK

Artificial Intelligence, Machine Learning, Deep Learning, Computer Vision, Data Science, Matrix Methods in Machine Learning, Computer Networks, Mobile & Wireless Networks, Operating Systems, Algorithms, Data Structures, Combinatorial Optimization, Cryptography, Combinatorics, Machine Organization & Programming, Spatial Web & Mobile Programming.

## EXPERIENCE

**National Science Foundation – IRIS HEP**

**Berkeley, CA**

Fellow – Graph Methods for Particle Tracking (High Luminosity Large Hadron Collider)

**May 2021 - August 2021**

- Performed feature engineering in the processing stage to select cluster features to construct events from TrackML dataset.
- Developed the Embedding pipeline involving graph construction, in which the objective is to find a good distance metric between pairs of 3D hit measurements wherein pairs belonging to same particles are nearby and further apart for different particles.
- Achieved significant speedup by replacing Facebook's Faiss with Fixed Radius Nearest Neighbors (FRNN) on CUDA.
- Generated the optimal PyTorch based embedding model with 99% efficiency and 1% purity through hyperparameter scanning.

**University of Wisconsin-Madison**

**Madison, WI**

*Master's Research – Autonomous RC Car*

**September 2020 - April 2021**

- Created custom dataset and developed pipeline to transform dataset into annotations compliant with Pascal VOC format.
- Generated an efficient PyTorch based SSD Mobilenet object detection model to do live detection of traffic signs.
- Deployed the model on Nvidia's Jetson Xavier NX.

**Citrine Informatics**

**Redwood City, CA**

NextGen-Fellow – Computational Materials Science

**May 2018 - August 2018**

- Multi-university research project: Competitively selected, successfully completed bootcamp & workshop at Stanford University.
- Utilized a Keras implementation of RetinaNet object detection model to identify defects in metals.
- Developed evaluation pipeline to determine recall and precision metrics. Obtained a model with 85% precision and 68% recall on the test set through hyperparameter optimization. Performed analysis to determine the reason for high false negative rate.
- Presented the results at NextGen Research Symposium in Golden, CO and co-authored a [paper](#).

## SOFTWARE PROJECTS

**Business Success/Viability Forecast**

**Machine Learning Project**

Developed multiple M.L. models (Logistic Regression, Random Forest, KNN, Naïve Bayes, SVM, and Neural Net) using the Yelp dataset to predict whether businesses will survive the impacts of COVID-19. Performed feature engineering to obtain a final parsed dataset, created a training and validation pipeline that integrates SMOTE (address class imbalance) to guide parameter selection, evaluated models on unseen test data with multiple metrics, and determined the vital features using the Permutation Importance algorithm.

**Instance Segmentation App**

**Computer Vision Project**

Built an exciting app that people can use for their instance segmentation tasks. Users can upload their own images and obtain the annotated image. The Mask-RCNN model is implemented using the Detectron2 package from Facebook AI Research. App has multiple modes that allows users to specify the type of objects they are interested in. This is achieved by making use of multiple models trained (both fine-tuned and pre-trained) on different datasets such as COCO, LVIS, Cityscapes, etc. Furthermore, the interactive functionality powered by GrabCut allows users to iteratively refine the segmented results. This is implemented using Open-CV.

**World Safety Portal**

**Spatial Web & Mobile Prog. Project**

Created a complex web & mobile app on Google maps for users to submit, query, track & visualize natural event reports & to make donations. Implemented two AJAX functions to interact with the server via web client -- one to create database reports and the other to query them. Built using Java, AJAX, JSP, JavaScript, Google Map JavaScript API, CSS, Bootstrap, jQuery, HTML, PostGIS & PSQl.

## LANGUAGES & TECHNOLOGY SKILLSETS

**Proficient:** Java, Python, C, Matlab, PyTorch, Scikit-learn, Pandas, Numpy, Jupyter Notebook, Unix & Windows

**Working Knowledge:** AWS, C++, CUDA, SQL, Javascript, TensorFlow, Visual Studio Code, Git, Docker, Hadoop, Spark