Bharath Raj Nagoor Kani

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Education

Sri Sivasubramaniya Nadar College of Engineering Affiliated to **Anna University**
B.E. in Electronics and Communication Engineering (ECE) *June 2015 – Apr 2019*

Experience

Siemens Digital Industries Software
Associate ES Engineer *May 2019 – Present*

- Lead the design and development of a fast and robust lane estimation system that can detect and track ego lane lines. Optimized it to handle several non-ideal scenarios.
- Contributed to the architecture design and integration of several ROS nodes into a unified toolchain which can perform several perception tasks for ADAS applications.
- In another project, experimented with several feature extraction methods and fusion strategies to extract lane segment candidates from LIDAR and multiple monocular cameras.
- Created a data pipeline to generate a mid-level representation of the top-view of the scene around an ego-vehicle which was used for training imitation learning algorithms.
- Developed tools for visualizing and interpreting features learnt by the imitation learning algorithms. Helped with experimentation to improve the performance of some of the above algorithms.

Orbuculum
Data Science R&D *Aug 2018 - Apr 2019*
Data Science Intern *Jan 2018 - Apr 2018*

- Explored the usage of several machine learning techniques to classify and identify salient parts of genomic data. Executed tasks during part time while I was an undergraduate student.

Publications

Exploring Techniques to Improve Activity Recognition using Human Pose Skeletons
Bharath Raj N., Anand Subramanian, Kashyap Ravichandran, Venkateswaran N.

- Explored the efficacy of using hand crafted feature extraction techniques and some train-time techniques such as keypoint dropout on improving human pose skeleton based activity recognition performance.
- Published at the HADCV workshop at WACV 2020.

Single Image Haze Removal Using a Generative Adversarial Network
Bharath Raj N., Venkateswaran N.

- Created a conditional GAN based architecture to dehaze images.
- The model uses the 56 Layer Tiramisu as the generator and has a weighted loss function.
- Code and first version of the preprint were launched in 2018. Project currently has more than 60 stars on GitHub.
- Paper published at WiSPNET 2020.

Selected Projects

Deploying Tiny YOLOv2 on Jetson Nano using DeepStream

- Deployed an ONNX model on NVIDIA Jetson Nano using the DeepStream SDK which is built on top of the GStreamer framework.
- Repurposed C++ code to parse the outputs of the TinyYOLOv2 model and to integrate it with DeepStream.
- Blog post is featured in the Jetson Community Resources page in the Deep Learning section (link).

Activity Recognition System based on Human Pose Estimation

- Used OpenPose to extract human pose skeletons. Implemented a custom BRIEF based multi object tracker.
- Enabled the use of multiple LSTMs in different CPU processes to enhance speed of the overall system.
- Created a pipelined system with functionality for stitching output from processed frames in order.
- Overall system obtained around 7FPS.

Pedestrian Detection on Multiple GPUs

- Used the TensorFlow Object Detection API to train models for pedestrian detection.
- Created a script to perform multi-GPU inference using the python multiprocessing package.
- GitHub repository currently has more than 300 stars.

Fill Bot

- Created a python program that can solve puzzles from the android game Fill. The puzzle involves finding a Hamiltonian path in a grid given only the starting node. Destination node is not given by the puzzle.
- Image processing techniques were used to parse the game map into a graph. Rules and multiple DFS searches were then used to solve the problem.

Technical Skills

Languages: Python, C++, C, JavaScript, MATLAB
Frameworks: ROS, TensorFlow, PyTorch, React, Flask
Libraries: PCL, OpenCV, Numba, gym
Developer Tools: Docker, GCP, AWS, GIMP, PostgreSQL

Achievements

Winner | *Motorq Hackathon, MIT (Chennai)* *March 2019*

- Demonstrated a proof of concept of an Android app that could be potentially used to non-intrusively detect potholes using an LSTM that analyzes sensor readings from the mobile phone.

People's Choice Award | *Yet Another Hackathon, SVCE* *August 2018*

- Presented a simple carry-on device created using a Raspberry Pi and an accelerometer sensor that can detect if a person has been assaulted and if so sends SMS alerts.

Runner Up | *Data Science Challenge, IIT Madras* *April 2018*

- A 10 day contest involving a highly skewed dataset to detect debit card fraud.

Runner Up | *AWS Deep Learning Hackathon, IIT Madras* *Jan 2018*

- Trained an object detection algorithm that could detect a few hand signs.

First Place | *Project Presentation, SSNCE* *August 2017*

- Presented a live demonstration of a CNN that could break some simple captcha.

Best Outgoing Boy | *Higher Secondary School, SJBN* *2015*

State 2nd, International 18th | *National Cyber Olympiad, SOF* *2014*

Miscellaneous

Google Code-In Mentor | *CloudCV* *Oct 2018 – Dec 2018*

- Google Code-In is an event where students of the age group 13-17 contribute to open source organizations.
- As a mentor for the project Fabrik, I helped students complete their tasks and provided extensive code reviews and feedback.

Author of Technical Blogs | *Medium*

- Created several technical blogs mostly revolving around machine learning and computer vision concepts.
- Total view count across all articles combined is more than 500k. Medium profile has about 2.6k followers.

Machine Learning Domain Head | *Tech Club SSN*

- Conducted technical classes and events for juniors as the machine learning domain head of Tech Club SSN during my final year of study.
- Created a website for Tech Club SSN.

School Pupil Leader | *Higher Secondary School, SJBN*