Yogesh Sanat Gajjar

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Education

M.S. Electrical and Computer Engineering December 2020
University of Southern California GPA: 3.57/4.0
Coursework: *Self-Driving Fundamentals, Machine Learning, Pattern Recognition, AI for Robotics, Computer Vision, Linear Algebra, Probability for Engineers, Robot Kinematics and Dynamics, State Estimation and Motion Planning, Image Processing, Introduction to ROS.*

B.S. Instrumentation and Control Engineering May 2015
Institute of Technology, Nirma University GPA: 8.02/10.0

Technical Skills

Languages: C, C++, Python, Matlab
CNN Architecture: LeNet-5, ResNet-50, VGG-16, EfficientNet - Keras, PyTorch Version
Object Detection/Segmentation: Faster-RCNN, YOLOv3, RetinaNet, Mask-RCNN, DeepLab
Fusion Algorithms: Kalman Filter, Extended and Unscented Kalman Filter, Particle Filter
Other: Git/GitHub, ROS, OpenCV, Flask, PCL, GCP, Azure, AWS, Arduino, Raspberry Pi, Nvidia Jetson SoC

Experience

Computer Vision Intern (Frenzy Labs, Inc) Summer 2020
- Proposed and developed a network architecture by integrating state-of-the-art R-CNN object detection and H-CNN classification network, which improved apparel classification/detection performance by 5%.
- Built an end-to-end testing pipeline with RESTful request dispatching using Flask framework to accelerate model evaluation and deployment with reproducibility and traceability.

Graduate Researcher (USC CPS - VIDA Group) August 2019 - Ongoing
- Develop perception, sensor fusion and localization software stack for F-1/10^{th} scale autonomous car.
- Integrate 2D SLAM with ROS Navigation node to enable fully autonomous driving mode.
- Incorporate Signal Temporal (STL) monitoring, and vision based Timed Quality Temporal (TQTL) monitoring algorithms for ROS to spot perception robustness.

Projects

F-1/10^{th} Self-Driving Car **C++, ROS, Jetson Xavier**
- Built a $1/10^{\text{th}}$ scale autonomous vehicle prototype for outdoor environment with Perception (Yolov3), Localization (Cartographer), and Path Planning (ROS Navigation) software stack.
- Designed to perform online STL monitoring and TQTL based perception prediction to ensure safe autonomy.

Yolov3 Road 2D Objects Detection **C++, ROS, Darknet, Jetson Xavier**
- Trained Yolov3 object detection algorithm on Berkeley DeepDrive 100k images with transfer learning.
- Deployed the trained weights on the f1-tenth vehicle for a real time road object detection.

Intelligent Drivers Enhanced Assistance System **Python, OpenCV, Google Cloud API**
- Programmed a platform to detect drowsiness and emotions of driver using OpenCV's pre-trained face recognition libraries and Google Cloud API's. Incorporated it with the infotainment system to initiate voice assistance to alert drivers.
- Designed the working platform in **36 hours** and secured **Ford** sponsor award at Cal Hacks 6.0 Hackathon.

Distracted Driver Detection **Python, Keras**
- Predicted the state of the driver from 45,000 images falling under 10 classes with a vanilla CNN architecture and pre-trained ResNet-50 architecture. Achieved a robust 98% accuracy.

Vehicle and Lane Detection **Python, OpenCV, Scikit-Learn**
- Implemented machine learning and Histogram of Gradient(HOG) feature extraction method to detect and track vehicles on a road captured with dash cam video. Used Canny Edge and Hough Transform to identify lane lines.
- Explored other edge detectors such as Structural Edge and Sobel operator to compare performance results.

Achievements

- Secured **Ford** sponsor award out of the top 300 teams at UC Berkeley Cal Hacks 6.0 Hackathon 2019 for building a platform called IDEAS (Intelligent Drivers Enhanced Assistance System).