Aditya Bhat

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SUMMARY

Computer Vision and Deep Learning Engineer with 3+ years of industry and research experience, adept in **Python, C++, C#**, with practical expertise in **3D/2D** detection, tracking, segmentation, sensor fusion, camera calibration, and game development.

EDUCATION

MSc In Computer Science(Specializing in Computer Vision) | Rutgers University, New Brunswick, NJ | CGPA: 4.0 **Sep 2021 - May 2023**

BE In Information Science| BMS Institute of Technology Bangalore, India **Aug 2013 - Jun 2017**

SKILLS

Language: Python, C++, SQL. |***Frameworks:*** PyTorch, Tensorflow, Open3D, Point Cloud Library(PCL)**,** OpenCV, Numpy, scikit-learn, PIL.

Models: Detectron 2, Complex Yolov4, SFA3D, YOLOv5, Mask RCNN, SORT, DeepSORT | ***Tools***: Unity 3D, Git, VSCode.

PROJECTS

3D Object Detection Using SFA3D (*Language and libraries used: Python, Pytorch, OpenCV)*

- Used Waymo Open Dataset and extracted **LiDAR Point Clouds** from range images. Converted point clouds to 2D bird's-eye view, trained SFA3D for 200 epochs, and visualized the results.

Sensor Fusion and Object Tracking (*Language and libraries used: Python)*

- Implemented an **Extended Kalman filter** and track management system with track state and score, initialization and deletion. Applied sensor fusion via the nonlinear camera measurement model and a sensor visibility check.

Motion Planning and Decision Making for Autonomous Vehicles(*Language used: C++)*

- Created a Behavior and Motion Planner to avoid collisions and navigate intersections. Used **Finite State Machines**, collision checking, and cost function to select the best trajectory.

Object Detection in an Urban Environment (*Language and libraries used: Python, Pytorch)*

- Trained the **YOLOv5** model to recognize and classify object categories such as 'cars', 'buses', 'trucks', and 'pedestrians'. Implemented **DeepSORT** to accurately track the detected objects.

WORK EXPERIENCE

Nokia Bell Labs **New Jersey, US**

Applied AI/ML Machine Vision Intern **Jun 2022 - Aug 2022**

- Computed homography matrices to **Calibrate the on-site Cameras** and checked the performance of the resultant estimation.
- Developed a custom lightweight classification model to detect the occlusions in the robots with a test accuracy of 95%.
- Implemented a Keypoint Detection model on over 2000 images to **reconstruct** the occluded bot using **Detectron2**. This process also facilitated in determining the occlusion level.
- Worked on an **Object Tracking System** that combines the localized estimates of objects from multiple cameras using a scoring system.

Thinking Stack **Bangalore, India**

AI/ML Engineer **Oct 2020 - Jun 2021**

- Developed 5 custom **YOLOv5 models** for detecting safety PPE kit, and trained with up to 4 augmentation techniques achieving an overall mAP(.50) value of 0.81.
- Built an image augmentation pipeline that enhanced model performance through data processing and increased lower-class image counts, resulting in a 10% accuracy boost.
- Researched and prototyped a drowsiness detection system using dlib library for **eye-tracking** and extracting facial features.

DHS Informatics **Bangalore, India**

Machine Learning Intern **Feb 2020 - Jul 2020**

- Utilized **Unity3d and ARCore** to create a Furniture Selection app to instantiate **3D models** of furniture. Extended functionalities to an AR Home application that enables architects to envision the appearance of housing plans in an empty area upon construction.
- Implemented a Content-Based Image Retrieval system, utilizing image histograms as feature descriptors to retrieve similar images as the query image.
- Developed and prototyped a **Facial Recognition system** with MediaPipe, and an attendance tracking system to record in-and-out times. Conducted experiments on facial recognition algorithms, including Local Binary Patterns Histograms and FisherFaces Recognizer.

Oracle Financial Service Software **Bangalore, India**

Technical Analyst **Jun 2017 - Mar 2019**

- Automated and installed Crime and Compliance Management tool, identified bugs using SQL and PL/SQL, coordinated with Product Development and Management Teams to resolve bugs, and ensured client satisfaction by heading meetings and providing fixes.

RESEARCH EXPERIENCE

INTELLIGENT VISUAL INTERFACES LAB, Rutgers University **New Jersey, US**

Human Group Activity Recognition Using Synthetic Data. **Aug 2022 - Current**

- Achieved 91% accuracy by training a **custom Mask RCNN** model on the Hieve dataset to detect and estimate the pose of 'person' class.
- Trained a **Siamese network** using 'Triplet loss' on a dataset to track people for the **DeepSort** algorithm and successfully tested synthetically generated datasets using this pipeline.