Shreyas Ramesh

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EDUCATION

UNIVERSITY OF PENNSYLVANIA

Master of Science – Robotics Specialization | CGPA 3.7/4

Aug 2021 – May 2023 | Philadelphia, PA

Relevant Coursework:

Advanced Robotics, Learning in Robotics, Machine Perception, Computer Vision, Machine Learning, Deep Learning, Feedback Control

M S RAMAIAH INSTITUTE OF TECHNOLOGY

Bachelor of Science – Mechanical Engineering | CGPA 4/4

Aug 2015 – May 2019 | India

SKILLS

Programming Languages

• Python • C/C++ • MATLAB • SQL

Machine Learning and DL Frameworks

• PyTorch • TensorFlow • SciPy • Pandas • OpenCV • Scikit-Learn

Robotics

• ROS • Gazebo • RViz • Kalman Filter • Docker

Path Planning Algorithms

• A* • Dijkstra • RRT*

PROJECTS

Computer Vision

NeRF: NEURAL RADIANCE FIELDS FOR VIEW SYNTHESIS

- Successfully implemented NeRF (Neural Radiance Fields) for synthesizing photo-realistic images of complex 3D scenes.
- Able to achieve a high PSNR (25) within 3000 iterations (as opposed to 31 at ~100-300k iterations in the original paper)

STEERING AND THROTTLE COMMAND PREDICTION FOR AUTONOMOUS DRIVING

- Developed an end-to-end self-driving neural network architecture, on Udacity's Car simulator, enhanced real-time road detection and improved the manoeuvrability of the car

TWO VIEW AND MULTI VIEW STEREO RECONSTRUCTION

- Implemented a two-view stereo algorithm for dense 3D reconstruction of the scene, including rectification, disparity map computation, and LR consistency check.
- Utilized the plane sweep stereo algorithm for multiview stereo reconstruction, enhancing scene reconstruction accuracy and handling occlusion.

VISUAL ODOMETRY USING RGB-D DATA

- Estimated the pose and orientation of a camera along with trajectory using sparse features from RGB-D Images
- Optimized computational time using Shi Tomasi Feature detector, estimated the transformation using ICP Algorithm and updated using a Kalman Filter.

Object Detection and Segmentation

YOLO

- Performed object detection as a single-stage object detection pipeline, identified location of objects and classified using semantic labels.

SOLO

- Implemented end-to-end instance segmentation pipeline to categorize objects in the scene using the COCO dataset

MASK R-CNN

- Successfully developed a three-stage object detection framework using Mask R-CNN, integrating the RPN (Region Proposal Network) and Object Detector heads.

PROJECTS

Robotics

AUTONOMOUS PICK AND PLACE CHALLENGE

- Autonomously controlled a 7-DOF Robot Arm for picking up for static and dynamic blocks in ROS, Gazebo, and RViz, and integrated with the physical robot.
- Developed an efficient joint-space planner using RRT and A* algorithms, incorporating collision checking to ensure safe and obstacle-free robot motion.

OBSTACLE AVOIDANCE TRAJECTORY PLANNER AND CONTROLLER FOR QUADROTOR

- Implemented a minimum snap trajectory planner for a quadrotor.
- Implemented Visual Inertial Odometry using imu and camera data to estimate quadrotor position and state. Utilized Error State Kalman Filter (ESKF) for accurate estimation.

Machine Learning/DL

AUTOMATIC SPEECH RECOGNITION ERROR CORRECTION USING DL ARCHITECTURES

- Conducted ASR Error Correction as an NLP post-processing task using grammar correction models
- Finetuned HuggingFace grammar correction model and GPT-3 models, with Wav2Letter model as a baseline
- Achieved a reduction of 5% in Word Error Rate using text-to-text Transformer architecture

Other Projects

• Stock Price Prediction using ML Architectures • GANs • VAE • Canny Edge Detection • Unscented Kalman Filter • Age estimation based on images • Image Morphing

WORK EXPERIENCE

Graduate Research Assistant, Rehabilitation Robotics Lab, UPenn

Jun 2022 – Dec 2022

- Worked on autonomous assessment of upper extremity function using Computer Vision
- Analyzed the 2D pose estimation from Camera data using OpenPose and classify the data points into various impairment levels

Graduate Teaching Assistant, UPenn

Jan 2021 - Present

- Assisted Professors in multiple courses by conducting doubt clarification sessions and Assignment walkthroughs for ~600 students
- Courses: Artificial Intelligence, Mathematical Foundations for Computer Science, Statistics for Data Science

Production Planning Engineer, Varman Aviation Pvt. Ltd., India

Aug 2019 – Jun 2021

- Managed a team of 15 members and systematically planned the various processes in engine overhauling projects
- Reviewed spares and consumables requirements for projects and reduced production costs by ~ 10%
- Lowered lead time of overhaul projects by ~ 25% through modularization of tasks

LEADERSHIP SKILLS

- Vice President, Graduate and Professional Student Assembly
- President, Rangoli – South Asian Association at Penn