Prateeth Rao

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About

I am an MS scholar in the Data Science domain at IIIT-B, working in Machine Perception, Deep Learning, and 3D Graphics. Recently, I have developed a fascination for research involving the intersection of 3D Computer Vision, 3D Graphics, and Diffusion Models. My active research focuses on the Visual Odometry and Mapping pipeline of Visual SLAM, particularly for textureless environments.

Education

- **M.S in Data Science** 2023 – 2025
  IIIT-B, Bengaluru, Karnataka, India
  GPA: 3.5/4.0
- **B.Tech in ECE** 2019 – 2023
  PES University, Bengaluru, Karnataka, India
  GPA: 8.5/10.0

Experience

- **Project Intern** Feb 2023 – Jul 2023
  COMET IIIT-B, Bengaluru, Karnataka, India
  - Developed few components of 5G NR transmitter for PDCCH stack.
  - Conducted research on the deep learning implementation of CSI and successfully developed a model trained on CSI receiver channel parameters, achieving performance that surpasses existing methods.
  - Published a paper under the guidance of Dr. Satish Kumar at IEEE GCITC 2023.
- **Senior Intern** Sept 2022 – Jan 2023
  MedInn TechLab @ PESU, Bengaluru, Karnataka, India
  - Worked on the implementation of capstone project "Video Analytics for User identification in Hospitals".
  - Team leader and Lab Mentor for young researchers working in the field of Medical Informatics.
  - Published 6 papers under the guidance of Prof. Lakshmeesha Shastry in the domain of Deep Learning and Medical Imaging.
- **Core Team IoT** Oct 2020 – Jan 2022
  C.O.D.S, Bengaluru, Karnataka, India
  - A team or club under PES University.
  - Worked on developing ADAS through sensors and IoT cloud.
- **Intern** Jun 2019 – Jul 2019
  Cuspera, Bengaluru, Karnataka, India
  - Analyze web traffic using Linux.

Skills

- Programming Languages: Python, C++, Embedded C, OverLeaf Latex.
- Python Tools: Numpy, OpenCV, Scipy, Tensorflow, Pytorch and Kornia.
- Other Tools: Git, ROS2, GEE, GRASS GIS, AWS.

Projects

- **Building Python V-SLAM algorithm (ongoing)**
  - Decomposed the Visual SLAM algorithm into its core components: Visual Odometry, Mapping, and Loop Closure Detection.
  - Researched a wide range of papers and techniques in Visual SLAM, from MonoSLAM to SplatAM.
  - Integrated various techniques to gain a comprehensive understanding of the V-SLAM algorithm.
  - Currently Improving relative pose estimation pipeline of the VO algorithm.
- **Python SFM algorithm (Private)**
  - Understood the basic working of the SFM pipeline as described in the paper "SFM revisited", implemented the same in python with Standard datasets provided by COLMAP.
  - "SFM revisted" uses a MVS algorithm to compute matches between multiple frames, the algorithm created in this repo uses a DVS.
  - The repo can be used for the basic understanding of SFM methods.
- **Dynamic Mobile Robot Navigation in ROS using Monocular Camera**
  - The project entailed simulating a mobile robot navigating through a scanned 2D map populated with static and dynamic obstacles. It required expertise in robotics frameworks such as ROS for robot control and Gazebo for physics-based simulation. Additionally, the project incorporated advanced deep learning techniques, including semantic segmentation for environment understanding and keypoint estimation for feature detection and tracking. The research outcomes were formalized in a paper published at IEEE CONECCT 2024, hosted at IISc Bangalore.
- **Precise Road Width Estimation using GEE and deep Learning**
  - Collected geospatial data along a national highway using Google Earth Engine (GEE) for road estimation. The dataset was manually annotated with semantic segmentation masks and bounding boxes, tailored to the specific spatial resolution of the imagery. A deep residual neural network architecture was trained to perform precise road segmentation and accurately estimate road width, leveraging advanced geospatial analysis and deep learning techniques.
- **Deep Residual Learning for mmWave MIMO channel vector**
  - Developed a deep learning architecture over the improvement of simple vanilla CNN architecture to minimize the MSE loss for channel vector estimation according to a set of user vectors. The model was trained and segregated according to fixed SNR values.
- **Links to other Projects** "https://prateeth2012.wixsite.com/prateeth-rao-info/projects"

Achievements

- M.S Second Sem highest score in GIS (4.0)
- B.Tech Last Sem highest GPA (10.0)
- MRD scholarship B.Tech (5th, 6th, 7th sem)
- Best Paper Award at IEEE CENTCON 2023.

Research Papers

- "Intelligent Navigation Tactics for Differential Drive Robots: Expanding Boundaries" published at IEEE CONECCT 2024.
- "Channel Estimation for mmWave MIMO using Deep Residual Learning" published at IEEE GCITC 2023.
- "Advancements in Semantic Skin Lesion Segmentation: A Comparative Study with YOLOv8 for Accurate Skin Lesion Segmentation" published at IEEE GCITC 2023.
- "Exploring FMU-NET: A Comprehensive Study on Person Identification Through Novel Semantic Segmentation Techniques" published at IEEE EASCT 2023.
- "TMV-NET: Regression approach for the quantification of Tympanic Membrane" published at IEEE CENTCON 2023.
- "Real Time Face classification and Shape based feature extraction with Deep Neural networks" published at IEEE I4C 2022.
- "YOLOv7 based face extraction and novel Eye feature extraction with EYENET" published at IEEE I4C 2022.
- "Vasculature Detection in Tympanic Membrane" published at IEEE I4C 2022

Volunteer Work

- Volunteering and presenting poster for RISE 2025 at IIIT-B.
- Volunteered as Sponsor SPOC for conference ICVGIP-24.
- Part of TPC for IEEE CONECCT 2024.
- Volunteered for the IEEE CSS Workshop 2024 at IIIT-B.
- Volunteered for conference organized by C.O.D.S at PES University.