Manjunath D

[GitHub] [manjuphoenix.github.io]

Email: manjunath1055@gmail.com
Mobile: +91-9066601383

Education

- **Atria Institute of Technology** — Bengaluru, India
  Bachelor of Technology - Information Science and Engineering; CGPA: 7.52/10.0 — Aug 2018 - Aug 2022
  Courses: Linear Algebra, Machine Learning, Data Structures, Analysis of Algorithms, Operating Systems, DBMS

Experience

- **Artificial Intelligence and Robotics Lab, Indian Institute of Science (IISc)** — Bengaluru (Full-time)
  Research Assistant - Advisor: Prof. Suresh Sundaram — Jan 2023 - Present
  - Research papers: Published **two papers** on domain adaptation & continual learning at **CVPR-W** 2025
  - Resource Person / Speaker: Faculty Development Program on Deep Learning for Various Institutions 2024-2025
    Delivered 5+ **FDP** sessions on Deep Learning to faculty from various institutions across India.
    Topics included **CNNs, change detection, vision language models (VLM)**, and AI in education and research.
    Conducted hands-on workshops using pytorch, and Keras for practical implementation on colab notebooks.
    Institutions include: RVCE, PES and Atria Institute of Technology, Bangalore
  - Lead organizer: Drone based EO-IR object detection challenge at **"IEEE ETAAV 2025 conference"**
- **Energy and Wetlands Research Group, Indian Institute of Science (IISc)** — Bengaluru (Full-time)
  Project Assistant; **Advisor: Prof. T V Ramachandra** — Jan 2022 - Dec 2022
  - Maintaining Research Archives: Developed a full-stack web application with the **Django** framework to manage and publicly share information on biodiversity, energy, and the environment.
  - Biennial Lake-symposium - Lake 2022: Designed and developed a web portal prototype to store and visualize raster data as dynamic overlays on **Satellite imagery** using GeoServer, PostgreSQL, phpMyAdmin, and Tomcat.

Research Outputs / Publications

- **Manjunath D**, Aniruddh Sikdar, Prajwal Gurunath, Sumanth Udupa, Suresh Sundaram. "**SAGA: Semantic-Aware Gray color Augmentation for Visible-to-Thermal Domain Adaptation across Multi-View Drone and Ground-Based Vision Systems**", **IEEE/CVF CVPR 2025 Perception Beyond Visible Spectrum Workshop (PBVS) - Oral presentation** [Code] [Project page]
- **Manjunath D**, Shrikar Madhu, Aniruddh Sikdar, Suresh Sundaram. "**VISTA-CLIP: Visual Incremental Self-Tuned Adaptation for Efficient Continual Panoptic Segmentation**", **IEEE/CVF CVPR 2025 Domain Generalization: Evolution, Breakthroughs and Future Horizon Workshop.**

Research Projects

Open Vocabulary Semantic Segmentation with Test Time Adaptation (OVSS-TTA) for multi-sensor data:
- Implemented recent work on (OVSS-TTA) that was published at CVPR-25 that focused on domain shifts that is seen in RGB domain using datasets such as ACDC, MUSES, CityScapes, Mapillary etc. This is an ongoing project extended to **multi-sensor domain shift** (RGB-IR) for **slant angle drone imagery** using datasets such as IndraEye, MSRS, UAVid, etc
- Outcome: State-of-the-art (SOTA) networks achieve reasonable performance on RGB domain but suffers a huge drop in performance due to slant angle and modality shift.
- Framework and tools: pytorch, detectron2, docker

Grounding DINO and Grounding SAM on Jetson:
- Evaluated model inference across Jetson Xavier NX, Orin NX, and AGX Xavier; identified **Orin NX** as optimal for deployment on drones, achieving around **5 FPS** with **high efficiency**.
- Outcome: Both models shown to have low inference speed on Xavier and Orin NX whereas inference speed is high on AGX but, due to power utilization AGX is unsuitable to deploy on Drones.
- Framework and tools: pytorch, tensorrt, onnx, docker

Semantic Aware Gray color Augmentation for Electro-Optical - Infrared (EO-IR) Domain Adaptation:
- The project aimed to minimize the domain gap that exist due to EO and IR modalities and tackle the scale variations and occlusion problems in aerial imagery. To mitigate this a **novel augmentation strategy** was proposed focusing on visible-to-thermal domain adaptation. This technique is simple, computationally efficient and achieve **0.4% to +7.6% mAP**.
- This project also introduces **EO-IR aerial dataset** i.e. **IndraEye** with diverse backgrounds and illumination conditions.
- Outcome: This augmentation shows a significant performance improvement over the baselines on three SOTA networks.
- Framework and tools: pytorch, detectron2, docker

Continual learning for Panoptic Segmentation:
- The project aimed to minimize the most common problem seen in continual learning i.e. **plasticity and Rigidity** in an efficient manner. Introduced **learnable perturbations** to the encoder to make it more generalized to tackle rigidity and textual perturbation with **visual prompting** to enhance the plasticity of the network.
- Outcome: The proposed methods does not increase the parameter and beats the SOTA network consistently by **2 to 4%**.
- Framework and tools: pytorch, detectron2, docker

Other Projects

Drone detection in low-illumination condition using thermal camera:
- Used single and two stage networks to efficiently identify drones using thermal image during low light condition.
- Outcome: RGB camera fails to capture object information in harsh-weather condition and low-illumination during which thermal camera serve as better alternative. Identifying drone in high slant range is a major issue due to scale variation for which models with **dilated convolutions** work efficiently.
- Framework and tools: yolov8, faster-rcnn, pytorch, onnx

Performance evaluation of SARDet model on UMBRA images:
- This project used the model checkpoints generated by training the ViT network on SARDet-100k dataset and annotated around 30 high resolution SAR images taken from open-source SAR repository (UMBRA) with object covering aircraft, ships, tanks, and bridges to verify the performance of the model and quality of the dataset.
- Outcome: SARDet-100k dataset covers images cropped to size of 512x512 pixels. But the original remote sensing images are high resolution making it harder to process. Results shows that **tiling approach** works better than using the entire image for training and inference
- Framework and tools: openmmlab, pytorch, docker

Change detection using MTP: Advancing Remote Sensing Foundational Model via Multi-Task Pretraining:
- Reproduced the codes and evaluated the model on custom dataset created using unreal engine for change detection task in slant angle and remote sensing images.
- Outcome: This work combines multiple tasks in a single network by using different heads for various tasks like object detection, segmentation and change detection, etc. The pretraining task on different remote sensing datasets such as DOTA, DIOR, and SAMRS
- Framework and tools: openmmlab, pytorch, docker

Benchmarking SOTA algorithms for aerial object detection on remote sensing images:
- This work involves benchmarking different object detection networks such as ReDet and ORCNN that were proposed for **oriented bounding box prediction** on DOTA and HRSC2016 dataset. We also evaluate the performance by fine-tuning the network on custom dataset from Google Earth and drone images collected.
- Outcome: The custom evaluation showed that performance of **ReDet** was superior to that of ORCNN on Google earth and other dataset collected using drone.
- Framework and tools: openmmlab, pytorch, docker

2D Lidar SLAM on TurtleBot:
- Implemented 2D LiDAR SLAM with tele-op and frontier exploration in static indoor environments. Simulated **turtleBot3** in **Gazebo** and incorporated **RViz** for real-time visualization of the LiDAR data, robot pose, and the evolving map.
- Outcome: Created a map of the working area and used the map to navigate the bot from point A to point B autonomously.
- Framework and tools: ROS1, rviz

Plant phenotyping using CNNs:
- Implemented a custom neural network to classify different plant diseases that is observed in common crops like tomato, corn, potato, cherry, etc.
- Outcome: Deeper networks like ResNet makes the network overfit on the dataset due to the smaller size of the dataset. **Long-tail** problem of the dataset was addressed by using image **augmentation techniques**.
- Framework and tools: pytorch

Crop monitoring in Hydroponics farming:
- Automated crop monitoring system using **ESP32** and sensors such as temperature, humidity, soil PH, TDS whose values are monitored using **NodeRed** to the master node (deployed on **AWS cloud**) through **mosquitto** to efficiently monitor hydroponics setup.
- Framework and tools: aurdino, node-red, mosquitto, AWS cloud

Teaching Experience

- Delivered a talk on **Target Recognition in aerial imagery** , Faculty Development Program (FDP) for "Drone Perception".
  Location: PES University, Electronic City Campus, Karnataka, Bengaluru (Date: 26/06/2024)
- Delivered a talk on **Deep learning for autonomous navigation**, Industrial workshop for **Ashok Leyland**.
  Location: Dept of Aerospace Engineering, IISc, Bengaluru (Date: 22/02/2024)
- Delivered a talk on **AI perception for Aerial Robotics**, FDP for "Unmanned Aerial Vehicles Technology and its Applications".
  Location: Dept of Aerospace Engineering, IISc, Bengaluru (Date: 16/09/2023)

Skills

- Programming Languages: Python, C++, Java, Robot Operating System (ROS1/ROS2), LaTeX
- Deep Learning Frameworks: PyTorch, Keras, Openmmlab, Detectron2
- Software: Docker, Slurm, Kubernetes, Jenkins, AWS cloud

Others

- **Google Developer Student Clubs Lead** Bengaluru, India
  Conducted technical skill development sessions for about **700** students. Aug 2020 - Aug 2021