BHANU PRATYUSH MANTHA

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EDUCATION

National Institute of Technology, Tiruchirappalli **July 2021 – Present**
Bachelor of Technology in Electronics and Communication Engineering *CGPA : 8.64/10.0*

PUBLICATIONS

- First Author: Affiliated with CMU - SaSi: A Self-augmented and Self-interpreted Deep Learning Approach for Few-shot Cryo-ET Particle Detection
- Co-Author: **CVPR2024**: Muhammad Nawfal Meeran, Gokul Adethya T†, Bhanu Pratyush Mantha†. SAM-PM: Enhancing Video Camouflaged Object Detection using Spatio-Temporal Attention. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 1857–66,2024.
- Co-Author: **IC2E3**: P.V Yeshwanth, Jithin Rajan, Bhanu Pratyush Mantha, Pottabathina Siva, S.Deivalakshmi. Self-Governing Assessment Network (SGAN) Based Super Resolution for CT Chest Images. In 2023 International Conference on Computer, Electronics & Electrical Engineering & their Applications.

TECHNICAL SKILLS

Research Interests: Computer Vision, Generative AI, Multimodality, Deep Learning, Machine Learning
Languages: Python, C++
Machine Learning libraries: PyTorch, Numpy, Pandas, Scikit-Learn, OpenCV, HuggingFace, Tensorflow, Keras
Tools&Frameworks: GitHub, Git, Vim, WandB, Visual Studio Code, Anaconda, LaTex, VastAI, MATLAB

RESEARCH EXPERIENCE

Carnegie Mellon University **May 2023 - Oct 2024**
Xu Labs Research Intern

- Developed **SaSi**, a novel self-augmented **few-shot learning** based framework for Cryo-electron tomography particle detection, achieving significant results with only **5 particles per input class**.
- Implemented techniques such as **Consistency Loss**, **Self-Supervised Learning (SimCLR)**, and **AugMix** to enhance data efficiency, outperforming existing methods in accuracy. Worked on **pretraining a Masked Autoencoder** using denoising & reconstruction tasks.

SLB **May 2023 – July 2023**
Data Science Intern *Pune, Maharashtra*

- Implemented and fine-tuned the **SegFormer** architecture for **Instance Segmentation** tasks and experimented with the adaptation of the **Segment Anything Model** to improve performance on domain-specific datasets.
- Designed a **permutation invariant algorithm** to reconnect curve portions obtained during Raster Curve Segmentation, **reducing turnaround time** for digital extraction from several weeks to **just 2 minutes per raster**.
- Optimized the pipeline with the new optimization objective function leading to a significant reduction of computation time and cost savings of **$70,000** for processing 1000 raster images.

Spider R&D **July 2023 – Nov 2023**
Machine Learning Researcher *Tiruchirappalli, India*

- Developed the **Segment Anything Model (SAM) Propagation Module** to adapt SAM to videos enforcing temporal consistency and domain-specific knowledge.
- Achieved **state-of-the-art performance** for **video camouflaged object detection** task, with the addition of less than 1% of SAM's parameters, keeping the SAM weights frozen. Published as a paper in **CVPR 2024 workshops**.
- Led a team of 3 to plan and manage the execution of research models and maintain a well-documented git repository within a **constrained budget of $250**.

AWARDS AND ACHIEVEMENTS CERTIFICATES

- Achieved **12th position** in Amazon ML Challenge among **75000 people** from across the country
- **Runner Up** of Rajasthan Police Hackathon 1.0, conducted by State Government of Rajasthan
- **Winner** of Smart India Hackathon 2023, conducted by the Government of India
- Achieved **first place** among 1100+ teams from all across the nation at Schlumberger's New Year Hackathon conducted by Shaastra, IIT Madras
- Achieved **first place** among 500+ teams from all across the nation at L&T EduTech Hackathon conducted by Shaastra, IIT Madras

PROJECTS

Nocaine | ***Python, PyTorch,Go,JavaScript*** **Dec 2023 - Jan 2024**
Rajasthan Police Hackathon 1.0

- Developed an intelligent system that monitors, identifies, and investigates illegal activities hosted on the dark web.
- Improved the ML service in the pipeline by integrating **RoBERTa** for context-aware text classification and **CLIP** for image classification, achieving over **90% accuracy** across 10 distinct crime categories.

CASCA | ***Python, PyTorch*** **Oct 2023 - Dec 2023**
Smart India Hackathon

- Developed a novel architecture for **real-time interception** of packets at the **data link layer** that can be directly deployed on routers offering a seamless experience to users.
- Utilized **Zstandard** for efficient data compression and minimizing bandwidth usage.

Quark Gluon Reconstruction | ***Python, PyTorch*** **April 2023 - June 2023**
Spider R&D

- Conducted a study comparing the results of the **Denoising Diffusion Probabilistic Model (DDPM)** and **Denoising Diffusion Implicit Model (DDIM)** research papers for the reconstruction of quark and gluon events.
- Implemented **Graph Autoencoder** using **Graph Convolution Networks** to learn better representations for reconstructing quark and gluon events.

Energy Insights | ***Python, PyTorch, HuggingFace*** **Jan 2023 - Feb 2023**
Schlumberger's New Year Hackathon

- Built web application to scrape data from various energy-related websites in real-time and used the **BRIO model** for abstractive summarization.
- Utilized multithreading to **reduce the response time by 5 times**, making the web app a highly scalable, fast, and efficient solution for gathering and summarizing information.

CrackTrack | ***Python, TensorFlow, Java*** **Jan 2023 - Feb 2023**
L&T EduTech Hackathon

- Designed and deployed an Android application for the accurate detection of cracks in images, using **EfficientNetB0** with transfer learning, achieving **98.90% accuracy**.
- Improved deployment efficiency by optimizing the model with **quantization** that **reduced the size of the model by 4x**.

POSITIONS OF RESPONSIBILITY

Spider R&D **July 2022 – Present**
Machine Learning Researcher

- Mentored over 15 juniors and led multiple R&D machine learning projects including one accepted to **CVPR** workshops and one ongoing for **IJCAI**.
- Conducted a workshop on **Introduction to Machine Learning**, teaching over 80 underprivileged students and introduced **diffusion-based models** and **Text to Image** using **Stable Diffusion** techniques to peers through hands-on coding in PyTorch.