

Shrikant Arvvasu

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Interests: Generative Vision, Diffusion Models, Image Segmentation, 3D Object Detection, Deep Learning, Lidar-based Object Detection

Education

University of Michigan

Master of Science in Electrical and Computer Engineering
Specialization: Machine Learning and Computer Vision

Aug 2022 – May 2024

Ann Arbor, Michigan
GPA: 3.97/4.0

National Institute of Technology Karnataka

Bachelor of Technology in Electronics and Communication Engineering
Honors: Machine Learning and Signal Processing

Aug 2018 – April 2022

Karnataka, India
GPA: 3.87/4.0

Experience

Kim's Lab, University of Michigan

Research Assistant (Computer Vision and GenAI)

Ann Arbor, Michigan

May 2023 - Present

- Developed novel diffusion sampling algorithms for inverse imaging problems, enhancing the quality and fidelity of the samples of **latent diffusion models**, achieving an FID score of 37.2, **an improvement of 17.2%** over the baseline model.
- Implemented a unique channel-aware decoding algorithm using latent diffusion, leveraging noisy codewords for improved sampling, resulting in a reconstruction **PSNR of 24.4 dB** for a single-path AWGN channel with **0 dB SNR**.
- Researching state-based algorithms for sparse lidar point cloud completion using **sensor fusion** and **Latent Diffusion**, aimed at enhancing the performance on 3D object detection in the **Nuscenes** and **Waymo** datasets.

Skylark Labs

Machine Learning Intern (Representation Learning and Computer Vision)

Dover, Delaware

June 2023 – August 2023

- Designed a framework using a pre-trained RegNet model to achieve a **recall of 65% in self-learning** new categories by storing **multi-scale quantized features** to recognize pre-trained classes.
- Trained the neural network with a vector-quantized feature extractor to learn efficient multi-scale features of objects in natural scenes, enhancing the accuracy of the model by **12%** to detect objects from newly learned classes.
- Implemented the system to work on a **single core of a CPU** to run at about **3 fps** while storing features of new classes encountered.

Burris' Lab, University of Michigan

Research Assistant (Computer Vision and Medical Imaging)

Ann Arbor, Michigan

August 2022 – April 2023

- Trained an **attention-UNET**-based model for aortic segmentation, enhancing the accuracy and efficiency of the Vascular Deformation Mapping pipeline, resulting in an **improvement of 3%** in the F1-score, particularly around aortic walls.
- Implemented corrections to an Elastix-based CT **Registration Pipeline**, improving the elastic registration performance of the pipeline for large deformations in the aortic walls. The corrections resulted in the detection of tissue growth by an improved **recall of 8%**.

SixSense Corporation

Computer Vision Intern (Automatic Augmentation and Multiclass Classification)

Jalan Besar, Singapore

January 2022 – April 2022

- Worked on detecting and classifying defects in semiconductor chips using Faster RCNN.
- Trained a stochastic **automatic augmentation** framework based on **Fast AutoAugment** on a ResNet50 model to techniques for several public datasets like CIFAR-100 and in-house datasets which improved the average accuracy by 2.3%. Integrated the automatic augmentation to the defect detection pipeline, improving the **accuracy by 1.4%**.

PLRI Lab, TU Braunschweig

Research Intern (Image Segmentation)

Braunschweig, Germany

May 2021 – October 2021

- Developed an efficient codebase for training and testing for semantic segmentation of sclera regions in the eye images.
- Acquired partial annotations using a game where the partial masks are saved as players competed for scoring regions.
- Trained a deep neural UNET model for the segmentation task, acquiring an average F1 score of 0.94 on the test segmentation set using multiple partial annotations.

Projects

Translating Cartoon to Natural Images using Stable Diffusion

November 2023

- Implemented an image-to-image translation system from cartoon Tom and Jerry images to real cat and mouse images using diffusion models.
- Implemented a Stable Diffusion utilizing BLIP-based text guidance to translate cartoon images to real-like images, achieving an FID score of 0.4632 comparing the real-ness of the images generated.

Block-Based Compressed Sensing for Natural Images and Videos

January 2023

- Innovated a block-based compressed sensing approach for natural images and videos, leveraging deep learning inspired by the insights from the paper "Video Compressed Sensing Using a Convolutional Neural Network."
- Trained the model and achieved a compression factor of 0.1 on non-keyframes of videos of KITTI Dataset.

Automatic Stroke Lesion Identification

November 2021

- Developed a method for segmenting stroke lesions in brain MRI volumes, utilizing deep 3-D convolutional networks (Residual-UNETs). This approach aimed to enhance the accuracy of stroke risk assessment in patients.
- Improved the lesion segmentation F1-score from 51.7% to 56.3% by incorporating brain parcellations into Grey Matter (GM) and White Matter (WM), improving the precision of diagnosis.

Publications

- A Chanchal, S Lal, D Barnwal, P Sinha, **S Arvvasu**, and J Kini. *Evolution of LiverNet 2.x: Architectures for automated liver cancer grade classification from HE stained liver histopathological images*. Multimedia Tools and Applications (2024), 83(1), 2791-2821.

Technical Skills

Languages: Python, C, C++, MATLAB, Julia, Shell Scripting

Developer Tools: OpenCV, ITK, SLURM, Git

Machine Learning Tools: Pytorch, Pytorch-Lightning, MMDetection3D, Pandas

Technologies/Concepts: Deep Learning, Computer Vision, Generative AI, Diffusion Models, Inverse Imaging, MR Imaging, Statistical Learning

Soft Skills: Professional Communication, Collaborative Working, Interpersonal Communication