Shrikant Arvavasu

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

Summary

Computer Vision Engineer with 2 years of experience in 3D perception, LiDAR-based sensor fusion, and deep learning using PyTorch at Kim's Lab. Experienced in solving scalable perception problems in both research and startup environments. Currently on STEM OPT, open to full-time industry roles in Computer Vision/Machine Learning.

Education

University of Michigan **Aug 2022 – Present**
Master of Science in Electrical and Computer Engineering *Ann Arbor, Michigan*
Specialization: Machine Learning and Computer Vision *GPA: 3.97/4.0*

National Institute of Technology Karnataka **Aug 2018 – April 2022**
Bachelor of Technology in Electronics and Communication Engineering *Karnataka, India*
Honors: Signal Processing and Machine Learning *GPA: 3.87/4.0*

Experience

Kim's Lab, University of Michigan **Ann Arbor, Michigan**
Research Assistant *May 2023 - Present*

- Proposed and implemented improvements to the diffusion sampling algorithms for inverse imaging problems, enhancing the quality and fidelity of the samples of **latent diffusion models**, achieving an FID score of 0.04, **an improvement of 20%** over the baseline model.
- Implemented a novel channel-aware decoding algorithm using latent diffusion, leveraging the noisy codewords for improved sampling, resulting in a reconstruction PSNR of 24.4 dB for a single-path AWGN channel with 0 dB SNR.
- Working on 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 **Dover, Delaware**
Machine Learning Intern *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 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 **Ann Arbor, Michigan**
Research Assistant *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 **Singapore**
Computer Vision Intern *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%.

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.

Technical Skills

Languages: Python, C, C++, MATLAB, Julia, Shell Scripting
Core Skills: 3D Perception, LiDAR Processing, Sensor Fusion, Deep Learning, Diffusion Models
Machine Learning Tools: Pytorch, Pytorch-Lightning, MMDetection3D, Pandas, OpenCV, Open3d
Soft Skills: Team Oriented, Professional Communication