K VINEET VENKATESH RAO

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OBJECTIVE

Seeking Spring-23 Co-op and Fall-23 full time Applied Scientist/Research Scientist opportunities to work in the field of Machine Learning, Computer Vision and Deep Learning. Specifically keen to work in Self-Supervised Learning, using Language Pre-trained models to solve downstream vision tasks of Classification and Detection.

EDUCATION

University of Michigan Ann-Arbor MI,USA
Graduate Student in EECS Dept, Signal, Image Processing and Machine Learning. *Aug. 2021 – Apr. 2023 (expected)*

Relevant Coursework: Deep Learning for Computer Vision (**A**),Machine Learning (**A**), Matrix Methods for Signal Processing and Machine Learning (A^-), Probability and Random Processes (**A**),VLSI for Wireless Communication and Machine Learning (A^-), Natural Language Processing, Science of Deep Learning.

TECHNICAL SKILLS

Machine Learning Platforms : Tensorflow, Pytorch, Numpy, Keras,OpenCV,Tensorflow-Lite,Tensorflow-Micro.
Programming Languages:Python, C, C++, Verilog.
Development Tools:GitHub, Amazon Web Services(AWS), Miscrosoft Azure.

EXPERIENCE

Applied Scientist Intern May. 2022 – ongoing
Amazon Lab 126, **Manager: Prasad Shamain** *Sunnyvale , CA*

- Researched, collaborated and implemented a privacy based Deep Learning based solution for a complex problem involving radar inputs that intersected with a particular Amazon **V0** product, *cannot disclosed due to confidentiality*.
- Designed and implemented a Computer Vision based Ground Truth system, Data-Collection pipeline and synchronization, and also investigated various deep learning methods for the Radar Based System and came up with the data-points in deciding which one to use given the resource constraints.
- Presented the project to the team director and it received a green-light to be continued as a NTI.

Graduate Student Instructor, EECS 452 May. 2022 – ongoing
University of Michiagn, **Supervisor: Prof. Shai Revzen** *Ann Arbor , MI*

- Conducting Labs and Office hours of Digital Signal Processing Lab that includes quantization, sampling, interfacing Raspberry pi, and tiny ML techniques.
- I was also a grader for this course during the W-21 semester under the supervision of Prof. Alfred Hero.

RESEARCH

Research Associate — Prof. Justin Johnson's Lab Aug. 2022 – ongoing
University of Michigan, **Supervisor: Prof. Justin Johnson** *Ann Arbor , MI*

- Researching robustness of contrastive based Self-Supervised methods to their pre-training dataset's class imbalance and random perturbations.

SELECTED PROJECTS

Self-Supervised Object Detection with Multimodal Image Captioning Jan. 2022 – Apr. 2022

- Implemented a novel method that reduces the need of human supervision required for training an Object Detector.
- Leveraged a Language Supervised Pre-trained model that is trained to output diverse captions given an image.
- **Zero Shot transferred** using prompt engineering and NLP techniques like Noun Extraction and Similarity Score Calculation to assign a pseudo class to the input image.
- Localized the pseudo class in an image using **gradcam** technique to generate pseudo bounding boxes.
- Further, trained **FCOS** object detector with a new small modified version of **GioU** loss to account for the noise in the generated bounding boxes and tested it on Pascal-Voc dataset.

Language Supervised Vision Pre-Training for Fine-grained Food Classification. Jan. 2022 – Apr. 2022

- Project aimed to show that Pre-trained Language Supervision works well when transferred for fine grained downstream classification of food task using **Food-101 dataset.**
- We pre-train a bi-captioning model that learns visual-semantic representations (*VirTex-v2*) using *RedCaps dataset* that's sub-sampled to include only food images. Further, using **Prompt Engineering and prompt ensembling** we evaluate Zero-shot performance of the model.
- Given the limited time and hardware resources, our best model achieved **20%** zero shot accuracy on the test-set.