DEVESH WALAWALKAR

926 Ivy Street Apt 104, Pittsburgh, PA USA 15232 | devwalkar64@gmail.com | +1 412 313 4125

Website | LinkedIn | Github

Bio

I am an engineer and avid researcher in field of Artificial Intelligence, Deep Learning and Computer Vision. My research interests include Object Detection, 2D/3D Instance Segmentation, Deep Learning Model Compression, Self-Supervised Learning, AI Model Evolution and Scene Understanding. I hold a Master's degree in ECE from Carnegie Mellon University and I am currently working full time as a ML research engineer at Honeywell. Currently, I spend my time researching and building AI based perception systems for robotics applications as well as working on personal Computer Vision Research Projects.

Education

Carnegie Mellon University   Pittsburgh, USA
Master of Science in Electrical and Computer Engineering GPA: 3.58/4 (Major) 3.48/4 (Overall)   May 2019
Significant Courses: Introduction to Machine Learning (PhD level), Advanced Topics in Deep learning, Computer Vision, Algorithms and data structures, Statistical Techniques in Robotics

Veermata Jijabai Technological Institute   Mumbai, India
Bachelor of Technology in Electronics Engineering GPA: 8.96/10, Department Rank: 5th   May 2017
Significant Courses: Signal Processing, Image processing, Linear algebra, Probability theory, Introduction to Robotics

Work Experiences

Honeywell Robotics   Pittsburgh, USA
Machine Learning Research Engineer   Jan 20 – Ongoing

- Researching on novel Deep Learning based models for various 2D and 3D Computer Vision tasks.
- Incorporating AI inference systems across various Honeywell warehouse automation projects.
- Facilitating AI application knowledge across various Honeywell Robotics teams.
- Developing complex Robotics AI based Perception system software with emphasis on compute efficiency.

Cylab, Carnegie Mellon University   Pittsburgh, USA
Summer Research Intern   June 18 - Aug 18
Research team Lead   Sept 18 – Dec 19

- Led a team of Deep learning researchers and iOS app developers to create a proprietary iOS application for driver drowsiness detection.
- Researched on computationally efficient yet accurate Computer Vision architectures for performing various facial biometrics tasks which include face detection, face landmarking and face pose estimation.
- Conceptualized and managed the creation of a proprietary dataset having more than 300 subjects (as part of CMU research study) to train Deep Learning models for human driver drowsy face detection.

Carnegie Mellon University   Pittsburgh, USA
Graduate Research Assistant   Jan 18 – May 18

- Researched on novel active machine learning techniques being applied for medical imaging analysis.
- Invented a new active machine learning technique to query the most important unlabeled images that the trained model is uncertain about. Technique was developed in context of training CNN models to detect diabetic retinopathy in eye color fundus images. These images are very costly to label in terms of expert supervision required and hence it is critical to optimize the number of labelled images to train the model on.
- Won the Best Paper Award for this work at IEEE ICMLA 2018.

Research Projects

Self-Supervision based model evolution   May 20 – Ongoing
- Researching on a novel model evolution-based concept which aims to learn features without any task labels. This work is aimed at solving some of the core limitations of current Deep learning techniques, specifically requirement of large amount of labelled data, figuring out optimal model architecture for a given data distribution and reducing learned feature redundancy among model filters.

Online Ensemble Model Compression using Knowledge Distillation   Dec 19 - Mar 20
- Invented a novel ensemble model compression framework which provides multiple replicas of a given model architecture compressed to varying degrees, with each being trained in an online ensemble training scheme.
- Benchmarked framework performance across all major academic datasets and CNN model architecture families.
- Work accepted at European Conference on Computer Vision (ECCV) 2020.

Object detection DL model inference on Nvidia AGX Xavier   Oct 18 - Feb 19
- Conducted research on highly efficient Object Detection models (both in terms of accuracy and computational cost) than the ones in current literature.
- Successfully implemented the researched models on the Xavier module using Nvidia TensorRT and achieved real time performance given the Xavier's limited computational capacity.
- Conducted this research as part of proprietary work for the US Department of Defense (DTRA).

Combined audio-visual models for Speech Recognition   Sept 18 - Dec 18
- Invented a novel attention-based mechanism for learning features extracted from both audio and visual information provided by video clips to learn the pronounced word.
- Achieved state-of-the-art results on the BBC LRW [Lip reading words] dataset.

Publications

- Walawalkar, Devesh, Zhiqiang Shen, and Marios Savvides. "Online Ensemble Model Compression using Knowledge Distillation." In *2020 16th European Conference on Computer Vision (ECCV)* [Link]

- Walawalkar, Devesh, Zhiqiang Shen, Zechun Liu, and Marios Savvides. "Attentive Cutmix: An Enhanced Data Augmentation Approach for Deep Learning Based Image Classification." In *ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 3642-3646. IEEE, 2020. [Link]

- Smailagic, Asim, Pedro Costa, Hae Young Noh, Devesh Walawalkar, Kartik Khandelwal, Adrian Galdran, Mostafa Mirshekari et al. "MedAL: Accurate and robust deep active learning for medical image analysis." In *2018 17th IEEE International Conference on Machine Learning and Applications (ICMLA)*, pp. 481-488. IEEE, 2018. [**Best Paper Award**][Link]

- Smailagic, Asim, Pedro Costa, Alex Gaudio, Kartik Khandelwal, Mostafa Mirshekari, Jonathon Fagert, Devesh Walawalkar et al. "O-MedAL: Online active deep learning for medical image analysis." *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery* 10, no. 4 (2020): e1353. [Link]

Awards and Recognition

- Best Research Paper Award at IEEE International Conference on Machine Learning and Applications 2018.
- Award in recognition of securing overall academic rank fifth within ECE Department for undergraduate studies.
- Award in recognition of securing academic rank first for senior year of undergraduate studies.
- Merit-based Scholarship Award for exceptional academic performance in High School.

Technical Skills

Languages: Python, MATLAB, C++ , R   **Deep learning frameworks**: Tensorflow, Keras, Caffe, PyTorch, CoreML