Vihang Agarwal

Machine Learning Engineer

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/in/vihangagarwal/

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Education

MS, Electrical Engineering and Computer Science (GPA: 3.82)
Specialization: Computer Vision
University of Michigan
May 2020 | Ann Arbor, MI, USA

BTech, Mechanical Engineering
Minor: Computer Science
Indian Institute of Technology, Kanpur
2014 - 2018 | Kanpur, India

Certifications

Robotics Mobility
University of Pennsylvania

Robotics Computational Motion Planning
University of Pennsylvania

Technical Skills

- C++ • C • Python • Matlab • Julia
- Pytorch • TensorFlow • SQL • Java
- OpenCV • Scikit-learn • Pandas
- keras • scipy • NumPy • Jupyter
- Docker • git • ROS • Simulink
- AutoCAD • Mathematica • Flask

Course Work

Deep Learning and Neural Networks

Advanced Machine Learning

Computer Vision

Natural Language Processing

Probabilistic Mobile Robotics

Approximation Algorithms

Human-AI Interaction/Crowdsourcing

Continous Optimization Methods

Data Structures and Algorithms

Fundamentals of Computing

Probability and Random Processes

Experience

May 2019 - Aug 2019 — **Amazon Go** — Boston, MA
Applied Scientist | **Computer Vision, C++, Pytorch**
- Improved **Image Classification** by utilizing temporal constraints. The designed algorithm (C++) was implemented in product lifecycle and improved system accuracy by **over 2**%
- Implemented quantization-aware training of **Object Detection** algorithms to leverage 16Bit mixed-precision quantization while minimizing potential quality degradation.

Sep 2019 - Present — **University of Michigan, Medicine** — Ann Arbor, MI
Research Assistant | **Computer Vision, Medical Imaging**
- Implemented computationally efficient **Sparse Attention** for high resolution MRI reconstruction in **Pytorch**
- Proposed Cascaded Attention Unet for reconstruction of undersampled MRI and reduced scan times **upto 10x**

Sep 2019 - Apr 2019 — **Amazon Alexa Prize Challenge 2020** — Ann Arbor, MI
Research Assistant | **NLP, Conversational AI, Python**
- Executed **Batch RL** based policy learning for effective topic transitions and dialogue flow as a Docker container [Link]
- Designed a Heirarchical response generator with **GPT-2** (finetuned on topical dataset) achieving a Perplexity of 18.02

Apr 2018 - Jul 2018 — **Transpacks Technologies** — Kanpur, India
Software Engineer | **Image Reconstruction, Python**
- Worked on restoration of distorted QR code images. Used an ensemble of Denoising **Auto-encoder** based neural network and gradient based Image Processing in **Pytorch**
- Improved model True Positive rate by $\sim 20\%$ over conventional QR readers while maintaining robustness under extreme lighting conditions, distortions, different surface geometries and noise

Research

May 2017 - Jul 2017 — **Semantic Segmentation guided SLAM** — New York University
Mentored by Prof. Farshad Khorrami, Robotics Research Lab
- Implemented **Fast SLAM** based on **Semantic Segmentation** (ENet) to obtain robust robot paths in **C++**
- Fused sensor data from LIDAR, Odometry, and Camera to alleviate drifts due to translation and rotation errors

Sep 2019 - Dec 2019 — **3D Visual Scene Understanding** — University of Michigan
Mentored by Prof. David Fouhey, Fouhey AI Lab
- Implemented **ResNet-DenseNet** network for Depth, Normal and Occlusion Edge estimation on NYUv2 dataset
- Explored task dependencies and analyzed learnt feature representations for efficient transfer learning in **Pytorch**

Select Projects

- **PawPal:** Developed a Virtual Pet-Sitter with multi pet localization and activity surveillance in **Tensorflow**. Features Object Detection (YOLO) and Activity Recognition (C3D) augmented with geometrical relationships [git] [Link]
- **Improving Traffic Flow with Deep RL:** Implemented Action-specific **DQN** and Recurrent **DRQN** to drive vehicles in the Deep Traffic Simulator [git] [Link]
- **Large scale Video Classification:** Used two-stream network with pre-trained Inception-Resnet and Xception module for activity recognition. Achieved Top-1/Top-5 accuracy of 73.1%/88.8% on Kinetics-400 dataset
- **Neural Algorithm for Artistic Style Transfer:** Used Deep Convolution Networks (AlexNet and VGG-19) to fuse artistic styles and content from images