Vihang Agarwal

Machine Learning Engineer

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○ vihang-ag

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

Amazon Go — Boston, MA
Applied Scientist | **Computer Vision, C++, Pytorch**
May 2019 - Aug 2019
- Enhanced system accuracy by **over 2%** by improving **Image Classification** through utilizing temporal correlations. The designed algorithm (C++) was implemented in the product life-cycle
- Leveraged quantization-aware training to deploy **Object Detection** models on resource constrained hardware while minimizing potential quality degradation

University of Michigan, Medicine — Ann Arbor, MI
Research Assistant | **Computer Vision, Medical Imaging**
Sep 2019 - Present
- Achieved high resolution MRI reconstruction in **Pytorch** through the use of computationally efficient **Sparse Attention**
- Reduced MRI scan times **upto 10x** by designing and training Cascaded Attention U-net for reconstruction of under-sampled MRI

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

Transpacks Technologies — Kanpur, India
Software Engineer | **Image Reconstruction, Python**
Apr 2018 - Jul 2018
- Employed an ensemble of Denoising **Auto-encoder** based neural network and gradient based Image Processing in **Pytorch** to restore distorted QR code images
- 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

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

3D Visual Scene Understanding — University of Michigan
Mentored by Prof. David Fouhey, Fouhey AI Lab
Sep 2019 - Dec 2019
- Estimated Depth, Normal and Occlusion Edges on NYUv2 dataset by implementing **ResNet-DenseNet** network
- Studied efficient transfer learning in **Pytorch** by exploring task dependencies and analyzing learnt feature representations

Select Projects

- **PawPal:** Developed a Virtual Pet-Sitter with multi pet localization and activity surveillance in **Tensorflow** by feature engineering Object Detection (YOLO) and Activity Recognition (C3D) augmented with geometrical relationships [git] [Link]

- **Improving Traffic Flow with Deep RL:** Autonomous vehicle driving in Deep Traffic Simulator by implementing Action-specific **DQN** and Recurrent **DRQN** [git] [Link]

- **Large scale Video Classification:** Achieved Top-1/Top-5 accuracy of 73.1%/88.8% on Kinetics-400 dataset by using a two-stream network with pre-trained Inception-Resnet and Xception module for activity recognition.

- **Neural Algorithm for Artistic Style Transfer:** Fused artistic styles and content from images by using Deep Convolution Networks (AlexNet and VGG-19)