

Diwakar Vikram Singh

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AREA OF INTEREST

- Computer Vision • Machine Learning
- Deep Learning • Robotics

EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY

M.S. IN ELECTRICAL AND COMPUTER ENGINEERING

Jan 2019 - 2021 | Atlanta, GA
GPA: 4.0/4.0

GEORGIA INSTITUTE OF TECHNOLOGY

M.S. IN CIVIL ENGINEERING

Aug 2017 - Dec 2018 | Atlanta, GA
GPA: 4.0/4.0

INDIAN INSTITUTE OF TECHNOLOGY (IIT) DELHI

B.TECH IN CIVIL ENGINEERING

July 2013 - May 2017 | Delhi, India

SIDE PROJECTS

- **Anomaly Detection** in Image Dataset using Deep Learning.
- Music Generation with **Recurrent Neural Network (RNN)**. [[GitHub](#)]
- Convolutional **Variational Autoencoder (VAE)** with Tensorflow. [[GitHub](#)]
- Scene Recognition with **Bag of Words** and **Transfer Learning**. [[GitHub](#)]
- Control of an Inverted Pendulum Cart System using **Reinforcement Learning**.

LINKS

Github: [diwakar-vsingh](#)

LinkedIn: [diwakar-gatech](#)

COURSEWORK

GRADUATE

Computer **Vision** | Digital **Image Processing** | Machine **Learning** | Mathematical Foundations of ML | Statistical Machine Learning | Probabilistic Graphical Models in ML | Introduction to **Robotics Research**

SKILLS

Programming: • Python • Swift
• MATLAB • Latex • Embedded C
Libraries: • Numpy • Scikit • Keras • ROS
• Tensorflow • PyTorch • OpenCV

EXPERIENCE

RESEARCH FELLOW

SWIFT FOR TENSORFLOW: DEEPLABV3 [[GitHub](#)]

Aug 2020 - Present | Prof. Frank Dellaert | Google Brain | Georgia Tech, GA

- Implemented encoder-decoder network with atrous separable convolution and atrous spatial pyramid module for image segmentation task using TF 2.x API.
- Implementing DeepLabV3 and its variant, using Swift for Tensorflow (S4TF) with the aim of contributing to [Model Garden](#).

MONOSLAM USING EKF FILTERING FOR WHEELED MOBILE ROBOT [[GITHUB](#)]

Jan 2019 - May 2020 | Prof. Patricio Vela | Georgia Tech, GA

- Implemented the 1-Point RANSAC for Extended Kalman Filter (EKF) based SLAM operations on monocular image sequences.
- Built a deep convolutional network by combining a semantic segmentator, variational autoencoder (VAE), and triplet embedding network to extract semantic, appearance, and geometric features from images for loop closure.
- Extracted keypoint descriptors from maximally-activated regions of low-level convolutional feature maps in a novel way to match globally for loop closure.

GRADUATE TEACHING ASSISTANT | ARTIFICIAL INTELLIGENCE

May 2020 - Dec 2020 | Prof. Thomas Ploetz | Georgia Tech, GA

- Created and evaluated assignments, exams, and held office hours to help students understand course concepts.

PROJECTS

NEURAL STYLE TRANSFER USING CYCLEGAN [[GitHub](#)] [[PROJECT](#)]

- Performed image-to-image translation by learning the mapping between landscape images and artistic paintings using cycleGAN.
- Investigated the effects of different paddings, normalization types, and generator and discriminator architectures on model performance.

VISUALIZING THE IMPACT OF INTEGRATED GRADIENTS (IG) [[GitHub](#)]

- Implemented IG attribution method on an image classification task using the Inception V1 network and ImageNet dataset.
- Performed a case study to visualize the effect of an important hyperparameter to the IG attribution method: the baseline.

DEBIASING FACIAL DETECTION SYSTEMS [[GitHub](#)]

- Built a semi-supervised model for simultaneously learning a debiased classifier as well as the underlying latent structure using VAE.
- Demonstrated increased overall performance as well as decreased categorical bias with this debiasing approach.

OBSTACLE AVOIDANCE, TRAJECTORY TRACKING, AND NAVIGATION

- Implemented the Bug Algorithm for obstacle avoidance and goal following behavior using Finite State Machine on Turtlebot.
- Estimated pose through dead reckoning and performed obstacle detection based on LIDAR data and camera images.

PUBLICATIONS

- Singh, D.V. and Stewart L., 2019. Potential for Bio-inspired adaptable design. Engineering Mechanics Institute (EMI) Conference, Pasadena, CA.
- Singh, D.V. and Seth, Y., 2017. 3D Modelling of ground surface vibration induced by underground train movement. Procedia Engineering, 173, pp.1580-1586.