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, variatonal autoenconder (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.