Diwakar Vikram Singh

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RESEARCH INTEREST

• Computer Vision • Machine Learning
• Artificial Intelligence • Robotics

EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY

M.S. in Electrical and Computer Engineering
May 2021 | Atlanta, GA
GPA: 4.0/4.0

GEORGIA INSTITUTE OF TECHNOLOGY

M.S. in Civil Engineering
December 2018 | Atlanta, GA
GPA: 4.0/4.0

INDIAN INSTITUTE OF TECHNOLOGY, DELHI

B.Tech in Civil Engineering
May 2017 | Delhi, India

SIDE PROJECTS

• **Anomaly Detection** in Image Dataset using Deep Learning
• Convolutional **Variational Autoencoder (VAE)** with Tensorflow
• Scene Recognition with **Bag of Words**
• Design and Training of Convolutional Neural Networks for **Scene Recognition**
• Control of an Inverted Pendulum Cart System using **Reinforcement Learning**.

LINKS

Github: **diwakar-vsingh**
LinkedIn: **diwakar-gatech**

COURSEWORK

GRADUATE

Computer **Vision** | **Statistical** Machine Learning| **Deep** Learning | **Probabilistic Graphical** Models in ML | **Mathematical Foundations of** ML | **Machine** Learning | Digital **Image Processing**

SKILLS

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

EXPERIENCE

GRADUATE RESEARCH ASSISTANT

MonoSLAM using EKF Filtering for Wheeled Mobile Robot
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 neural network by combining a semantic segmentator, variatonal autoenconder, and triplet embedding network to extract semantic, appearance, and geometric features from images.
- 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 homework, lab assignments 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 the 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.
- Developed a tunable algorithm which utilizes learned latent variables to mitigate the hidden and unknown biases within training data.
- Demonstrated increased overall performance as well as decreased categorical bias with this debiasing approach.

Music Generation with Recurrent Neural Network

- Designed and trained a Recurrent Neural Network (RNN) model based on LSTM architecture to learn patterns in ABC music dataset.
- Utilized the trained RNN model to generate a new piece of music by iteratively predicting each successive characters.

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.
- Integrated multi-modal sensing and navigation into the Turtlebot robot to complete a scavenger hunt within a set time limit.