

Aditya Wagh

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EDUCATION

- New York University** **New York City, NY**
Master of Science in Mechatronics and Robotics; GPA: 3.667/4 Sep 2021 – May 2023
- Birla Institute of Technology and Science, Pilani** **Pilani, India**
Bachelor of Engineering in Electronics and Instrumentation Aug 2015 – May 2019

EXPERIENCE

- Central Electronics Engineering Research Institute** **Pilani, India**
Deep Learning Intern Jul 2018 - Dec 2018
 - Data Annotation:** Contributed to the development of a software pipeline for pixel wise annotation of a novel data set consisting of 6000+ Infrared and RGB aerial images of power cables
 - Mask RCNN:** Fine-tuned a pre-trained Mask-RCNN model for panoptic segmentation of power cables on this new dataset and achieved a validation accuracy of approximately 70%

TECHNICAL SKILLS

- Languages:** Python, C++, CUDA, Bash, MATLAB, HTML, CSS
- Frameworks:** PyTorch, Keras, TensorFlow, OpenCV, Open3D
- Tools & Platforms:** VSCode, Vim, Git, GitHub, HPC Clusters
- Operating Systems:** Linux, MacOS, Windows

RELEVANT COURSEWORK

- Robotics:** Foundations of Robotics, Robot Perception, Robot Localization and Navigation
- Machine Learning:** High Performance Machine Learning, Deep Learning, Mathematics for ML, Introduction to Tensorflow Neural Networks & Deep Learning, CNNs in Tensorflow,

PROJECTS

- Post-Earthquake Damage Assessment using Fully Convolutional Networks** Tensorflow, Keras | GitHub
 - Designed multi-task fully convolutional networks for semantic segmentation of building components and their damage state
 - Implemented batch normalization layers to enable faster convergence and better generalization over real data since the data used for the project was synthetically generated using physics based graphical models
 - Achieved a mAP of 83% over 5 component classes and mAP of 70% for 5 damage state classes
- Dimensionality Reduction using Convolutional Autoencoders** PyTorch | GitHub
 - Developed a deep convolutional autoencoder to reduce the dimensions of 28x28 sized Fashion MNIST images
 - Designed an encoder-decoder network with latent space dimension of 64 to guarantee proper reconstruction of input
 - Implemented batch normalization layers, learning rate decay and exponential scaling for faster convergence
 - Further reduced dimensions of the latent space to 2 dimensions using t-SNE to visualise the reduced dimensions
- Visual Place Recognition using Bag of Visual Words** Tensorflow, Keras | GitHub
 - Computed SIFT features for each image in database and queries using OpenCV's built-in SIFT feature extractor
 - Employed the k-means clustering algorithm to compute 800 cluster centroids to be used as visual words to generate a histogram of visual words in each image
 - Computed histograms of visual words for all the query images and database images using OpenCV's histogram generator and extracted similar images from the database by using the k-nearest neighbours algorithm on the generated histograms
- Two-View Geometry based Relative Pose Estimation** OpenCV | GitHub
 - Calibrated a camera using a calibration rig and removed radial distortion from the input images using the obtained camera matrix and distortion coefficient
 - Computed the fundamental matrix using the normalized 8 point algorithm and obtained the essential matrix using the fundamental matrix and camera matrix
 - Decomposed the essential matrix to obtain the orientation and translation vectors between the images
- Marker based Augmented Reality** OpenCV | GitHub
 - Obtained interest points to compute the epipolar geometry by detecting the corners of an AprilTag fiducial marker
 - Solved a PnP problem to compute 3D to 2D correspondence between the marker corners and face of a cube in 3D space
 - Projected 8 corners of the cube on the image and constructed a cube in 2D by joining the points.
- 3D Plane fitting in Point Cloud Data** Open3D, Plotly | GitHub
 - Implemented the RANSAC algorithm to remove outlier data points which do not lie on a plane in the 3D point cloud data
 - Randomly selected 3 points in data and computed plane parameters using parametric equation of a plane
 - Computed the best plane parameters by minimizing perpendicular distance of each point in data from the plane