VISHAL GUPTA | 15CS30039

COMPUTER SCIENCE & ENGG. (M.Tech Dual 5Y)

EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2020	M.TECH Dual Degree 5Y	IIT Kharagpur	8.53 / 10
2015	AISSCE	Modern International School	94.2%
2013	AISSE	DAV Public School	10 / 10

INTERNSHIPS

Wadhwani AI | Anthropometry - Estimating 3D structure of newborn baby from video | Summer 2019

- Jointly estimated the 3D structure of the baby and the camera parameters using video frames.
- Removed affine ambiguity assuming orthographic projection and scale ambiguity using scale retrieval from 3D reconstructed reference object.
- For moving babies, modelled the SfM problem as affine parametrised reconstruction and recovered the basis shapes and co-efficients for each frame.
- Registered the generated point cloud to a deformable mesh including the optimization of translation and rotation ambiguity resulting from SfM.

Wadhwani AI | Anthropometry - Environment for Synthetic Data generation | Summer 2019

- Used Blender to generate realistic synthetic data of indoor babies.
- Automated the task of aligning and placing babies at desired place with proper physics constraints and realistic view.
- Added support for both static and moving babies and applied realistic lighting using spherical harmonics and texture on the babies based on UV mapping.
- Simulated camera movement around the baby in an arc with a little wobble so as to mimic a human hand motion while taking a video.

IBM Research | Explainability of Deep Learning Models | Summer 2018

- Created a novel pipeline to tackle the Explainability problem in Deep Learning.
- Focused on explaining the neural network implementation of Stanford Co-reference Resolution System.
- Extracted new rules which improves the existing Stanford Deterministic System.

IBM Research | Speech to Code | Hackathon | Summer 2018

- Designed an RNN based speech to code translator.
- Used Reinforcement Learning as the training regime and attention mapping for action selection.

Embibe | Operations and Management | Oct 2016 - Nov 2016

- Led a team of 30 interns for metadata creation on 27000 competitive exam questions.
- Developed baseline model for metadata tagging on questions using generated dataset acheiving 81% classification accuracy.

PROJECTS

Advance Lane Finding | Udacity Self Driving Car | March 2019 - April 2019

- Developed a software pipeline to identify the lane boundaries and calculate its Radius of Curvature in a video.
- Callibrated camera and removed distortion effects from input images.
- Detected lane pixels based on thresholding and sliding window and fit second order polynomials to it.
- Improved robusteness of lane detection based on strong lane points and used the final polynomials for proper ROI identification and Radius of Curvature clculation.
- Optimized the performance for videos so that the next frame lanes build up on the previous frame rather than from scratch.

Behavioural Cloning | Udacity Self Driving Car | March 2019 - May 2019

- Developed a pipeline for Behavioural Cloning of a vehicle in a simulated environment.
- Used "NVIDIA End to End Learning" CNN architecture to train the autonomous vehicle.
- Generalised the model on previously unseen and very complex tracks to achieve an autonomy score of 83.33% (scoring method described in paper).

Extended Kalman Filter | Udacity Self Driving Car | Jun 2019 - July 2019

- Developed a pipeline to estimate the state of a moving object using Kalman Filters.
- The Kalman Filter operated on Sensor Fusion data coming from noisy LIDAR and RADAR measurements generating measurement and its uncertainity as output at each step.

Implementation of Deep RL Algorithms | Udacity Deep Reinforcement Learning | Oct 2018 - Nov 2018

- Implemented various Deep RL Value based Algorithms like DQN, Double DQN, Duelling DQN.
- Trained agents for "Atari games (particularly Pong)" based on the above value based algorithms.
- Implemented various Deep RL Policy based Algorithms like PPO, REINFORCE and D4PG.
- Trained agent for "Unity Reacher Task" based on the above policy based algorithms.

Distributed Directory Service | Distributed Systems | Feb 2019 - April 2019

- Implemented a Distributed Directory Service in Python based on OSI LDAP Protocol.
- Used rpyc library for Remote Procedural Calls and ensured One Crash Fault Tolerance and Sequential Consistency.

!self declaration by the student

Text Prediction | Deep Learning | March 2019

- The task consisted of two subtasks of predicting nth word in a sentence based on previous n-1 words, and predicting second half of the sentence based on the first half.
- Used a GRU network to accomplish the above tasks. (The noteable feature of this project is the self-implementation of forward and backward passes of a GRU net solely in numpy without using any previously defined APIs).

Human Activity Recognition | IIT Kharagpur | March 2018

- Collected accelerometer and gyroscopic data for various human activities like walking, running, cycling etc. and processed it to form a clean dataset.
- Used an LSTM based deep classifier to categorize the dataset into the aforesaid activities.

Memory Resident File System | Operating Systems Lab | March 2018

- Implemented a memory resident FAT32-like file system in C++.
- Divided the FS heiracrchy into superblocks and inodes and incorporated all the useful functionalities like ls, cp, rm, cd, read, write etc.

QUIC Protocol | Networks Lab | March 2018

- Implemented a QUIC like multiplexed connection protocol over UDP with TCP Tahoe-like congestion and flow control.
- Implemented multithreading with server and client side features rolled into a single application.

Protect Our Planet | Intelligent Game Design | Sep 2017 - Nov 2017

- Designed and developed a *serious game* on Biodiversity Conservation using PyGame, incorporating various artificially intelligent NPCs.

Employee Management System | Aug 2016 - Nov 2016

- Used Java (AWT and Mysql) to design and implement a full stack structure of an Employee Management System.

CERTIFICATIONS

IEEE Certified Image Processing Workshop | Technology Robotix Society | IIT Kharagpur | December, 2016

- Created a face detection and smile capture utility for images and videos using OpenCV in C++ .
- Created a paint bucket tool using OpenCV.
- Extracted information from static map to apply path planning algorithms.

COURSEWORK INFORMATION

• Udacity Self Driving Car Nanodegree* • Udacity Deep Reinforcement Learning Nanodegree • Machine Learning • Deep Learning(CS231n) • Probability &Statistics • Algorithms I &II • Artificial Intelligence • Matrix Algebra • Intelligent Game Design • Image Procressing • Computer Networks • Operating Systems • Computer Architecture &Organization • Software Engineering • Computational Neuroscience • Parallel &Distributed Algorithms • Large Scale Search Engines • Operation Research • Information Retrieval • Distributed Systems • High Performance Parallel Programming • Advances in Operating Systems* • Algorithmic Game Theory*

(* denotes ongoing courses)

AWARDS AND ACHIEVEMENTS

2018 - Achieved a rank of 421 in **Google Kickstart** Round H.
2015 - Awardee of **Kishore Vaigyanik Protsahan Yojana (KVPY)** scholarship.
2015 - Ranked intop 1.2% in **JEE Advance** (1.25L participants) and top 0.1 % in **JEE Mains** (13L participants).
2013 - Awardee of **National Talent Search Examination (NTSE)** scholarship.

SKILLS AND EXPERTISE

Proficient : C, C++, Python, PyTorch, Numpy, OpenCV
Familiar : Java, Tensorflow, Scikit-learn, git, Keras, NItk, Stanford Core-NLP, Linux

POSITIONS OF RESPONSIBILITY

Mess Co-ordinator | LBS Hall

- Managed food budget of 2.1 crores for 1800 students.
- Improved accountability in mess functioning resulting in 9% improvement in budget utilization.

EXTRA CURRICULAR ACTIVITIES

- Loves to paint and have participated in various painting competitions.
- Took part in various mathematics olympiads conducted by different societies within college.
- A member of PRAVAH (Hindi technology Dramatics Society) and have performed various plays and nukkads.
- Finalist of **Source Code,** a competiton where you get to reverse engineer the code based on the output of the program.

!self declaration by the student