Aditya Senthilnathan

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Academic Details

Year	Degree	Institute	CGPA/Percentage
2017-2022 **(Current)**	Integrated B.Tech and M.Tech in Computer Science and Engineering	Indian Institute of Technology (IIT) Delhi	8.03
2017	Class XII, CBSE	Maharishi International Residential School, Sunguvarchatram	95.2%
2015	Class X, ICSE	Vikaasa School, Madurai	92.8%

Scholastic Achievements

- **Publication:** *Towards a Fairness and Diversity Guaranteeing News Aggregator*, under review in RecSys 2020 (Precision Conference)
- **KVPY Scholar 2016**: Awarded the 'Kishore Vaigyanik Protsahan Yojana' Fellowship by Dept of Science and Technology, Govt of India.

Experience

Platonia Labs **(Remote) Cambridge, England**, Apr. 2020 - Jul. 2020
SDE Intern

- Developed iOS App for stealth mode startup, to enable users to share skills by matching users based on interests
- Designed complete frontend of the iOS App using **React Native, Redux & JavaScript**, focusing on speed and reliablity
- Designed numerous reusable components for the app's component library from scratch focusing on intuitive UI/UX

Fairness and Diversity Guaranteeing News Aggregator **IIT Delhi**, Jun. 2019 - Dec. 2019
Undergraduate Research Assistant (Prof. Aaditeshwar Seth)

- Analysed the problem of **bias in coverage of articles in news feeds** by algorithmic auditing of news feeds ensuring short term diversity and long term fairness in selection of articles to be displayed on news feeds
- Researched application of **topic modelling algorithms** like LDA, HDP, etc. to the problem of extracting high quality abstract topics from incoming stream of documents sourced from news media
- Improved performance of topic modeling algorithm by **15%** as measured by the C_V topic coherence score
- Abstract topics extracted by topic modelling algorithms were input to recommendation system which analysed topic coverage and ensured diversity and fairness in news feeds through various heuristics and distribution modelling techniques

Pedestrian Detection in Low Light Conditions **IIT Delhi**, Dec. 2018 - Feb. 2019
Undergraduate Research Assistant (Prof. M. Balakrishnan)

- Explored the problem of **detection of pedestrians in low light conditions** through the use of near **infrared cameras** and **object detection models** like **R-CNN, SSD**, etc. using **Tensorflow**
- Used various techniques for the collection and augmentation of data to prepare custom datasets for the learning task
- Proposed a method to build pedestrian recognition system robust to all lighting conditions especially low light based on collected data and analysis

Other Projects

Cannon playing AI Bot Prof. Mausam, IIT Delhi
Artificial Intelligence Project

Designed agent based on search techniques to play Cannon, a perfect information, 2-player abstract strategy war game whose rules can be found here. The agent was ranked among the **top 8 out of 60 other agents** in the tournaments held among IITians. Implemented **Minimax Search Algorithm** and **Iterative Deepening Depth First Search** with node ordering for agent to decide future moves. Improved search efficiency using **Alpha-Beta Pruning**, **Transposition Tables** using Zobrist hashing to index game states and evaluation function with several pre-defined features and learning algorithm based on backed-up values similar to Samuel's Checker player (**TD-Learning**) to learn coefficients. These functions were implemented as efficiently as possible as bot was allocated no more than 200 seconds to make all moves and win

Hand Gesture Classifier Prof. Chetan Arora, IIT Delhi
Computer Vision Project

Designed **CNN model** with no more than 5 layers using **PyTorch** to detect and classify hand gestures from the following classes: Stop, Next, Previous and Background. Used ADAM Optimiser and L2 Regularization with Cross Entropy Loss to train the model

Muticlass SVM for Fashion MNIST Dataset Prof. Parag Singla, IIT Delhi
Machine Learning Project

Implemented a **one-vs-one SVM classifier** for classification of the fashion MNIST dataset. Implemented the **KKT conditions** and solved the **primal problem via convex optimisation** using the CVXOPT library. Trained the classifier using 10-fold cross validation, and exponential decay learning rate. Tested the architecture using **RBF and linear kernels**. Achieved 84.94% accuracy on the test data

Augmented Reality Application Prof. Chetan Arora, IIT Delhi
Computer Vision Project

Developed application using **Python** and **OpenCV** to project 3D objects onto fiducial markers in scene on continuous live feed from camera. Utilised contour detection and approximation techniques to extract fiducial markers from scene image and feature matching and detection techniques to validate retrieved markers. Designed module to find rotation and translation matrices of the plane of the marker and utilised perspective projection to project 3D model onto scene

Traffic Simulator Prof. Rijurekha Sen, IIT Delhi
Design Principles Project

Designed simulator using **C++** and **OpenGL** to mimic behaviour of vehicles on Indian road traffic intersection with realistic lane changing behaviour, haphazard motorbike movements, etc.

Krivine and SECD Machine Prof. Sanjiva Prasad, IIT Delhi
Programming Languages Project

Implemented a compiler with Krivine and SECD machine in OCaml. A Lex Scanner converted program to tokens which were converted to an Abstract Syntax Tree using Recursive Descent Parser. The AST was type checked and a low level code was generated, which was executed by the machines. Machines also supported features like scoping,recursion etc.

Technical Skills

- **Programming Languages:** C/C++, Python, Ocaml, VHDL, ARM Assembly, Bash, LaTeX, HTML5, CSS, Javascript
- **Frameworks:** OpenCV, PyTorch, Git, OpenGL, Gensim, React Native, Redux, Gatsby
- **Softwares:** AutoDesk, Xilinx ISE, Unity Game Engine

Relevant Courses

- **Computer Science:** Machine Learning, Computer Vision, Artificial Intelligence, Parallel and Distributed Systems, Operating Systems, Automata and Theory of Computation, Computer Networks, Programming Languages, Computer Architecture, Design Practices in Computer Science, Data Structures & Algorithms, Discrete Mathematics, Digital Logic and System Design

- **Electrical:** Signals and Systems, Principles of Electronic Materials
- **Mathematics:** Calculus, Linear Algebra, Differential Equations, Probability and Stochastic Processes, Optimization Methods and Application
- **Online:** Practical Deep Learning for Coders (Fast.ai)

Extra Curricular Activities

Board of Student Publications **IIT Delhi**, Jun. 2018 - Mar. 2019

- Had several articles on Science and Technology published in various student magazines like Inquirer, Inception, Elemental, etc.