



Pranav Parag Mahajan

Contact Details:

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Education:

2017-Present: Birla Institute of Technology and Science, Pilani.

B.E (Hons.) Electronics and Communication (2021)

CGPA : 9.05

Class XII: PCM, Computer Science. 85.23%

Class X: General. 94.6%

Internship Experience:

Summer Intern @ Mitera Tech, Birmingham.

(May-June 2018)

- Designed and coded a general IOT framework for Home Automation linking Raspberry Pi, Arduino with a real-time database and developed an Android app which used Google Firebase.
<https://github.com/PranavMahajan25/Home-Automation-IOT-Project>
- Implemented unsupervised learning algorithm K-means clustering to make thermostat smarter by learning from less data and more specific to each user's actions.
- Apart from the IOT project, also cleaned, preprocessed and augmented a dataset of HMI images to improve performance of an existing deep learning implementation.

Projects:

1) RL based cooperative sensing strategy for CRNs taking into account impact of mobility:

Supervisor: Dr. C. K. Ramesha

(Dec 2018 - Present)

Studying the impact of mobility of Primary users and Secondary users in Cognitive Radio Ad-hoc Networks on various factors such as probability of detection, false detection, missed detection, correlated measurements. Using a simple energy detector, working towards building a robust co-operative sensing model using model free reinforcement learning methods such as Q-learning and SARSA.

2) Learning agile and robust locomotion in Quadruped robots using Deep RL:

(Jan 2019 - Present)

Using Proximal Policy Optimization to learn trotting and galloping for a custom quadruped from scratch. This includes programming a custom gym environment in PyBullet for any given urdf. Due to the reality gap, robotic controllers learned in simulation usually do not perform well in the real environments. Exploring approaches towards minimising this gap by adding perturbations and studying actuator models.

Relevant paper: <https://arxiv.org/pdf/1804.10332.pdf>

3) Natural Disaster related Tweet Classifier and Summarizer:

(Oct 2018)

Built and deployed to Azure in 4 weeks as a submission to Microsoft Codefundo++ Hackathon. Cleaned earthquake related tweets, and trained a neural net with 89% accuracy to classify them into 4 sets depending on the type of information the tweets offer and then summarizing (using ILP and encoder-decoder network) each of the 4 sets to maintain order in the end real-time summary.

<https://github.com/PranavMahajan25/Disaster-Management->

4) Deep Learning Implementations:

(Sep 2017 – Present)

1. Modelling neural spike trains using Neural Ordinary Differential equations and building a latent time series model.
2. Ms Pacman AI: Implemented Deep Q Learning and CNN in Keras. Investigated impact of learning rate, exploration rate, change in CNN architecture on training speed and agent performance. (used OpenAI gym environment)
3. Character level RNN: Completes given sentence in style of the text data input. (Pytorch)
4. Multi-label Image Classification: Classifier for Amazon Rainforest dataset using Transfer learning.(Pytorch)
5. Exploration and comparison of various model-free RL approaches for solving Blackjack environment.

<https://github.com/PranavMahajan25/Deep-Learning-Implementations>

3) Chaotic time series prediction and system identification:

(Course Project – Nonlinear dynamics and chaos)

(Ongoing)

Sampled data from deterministic non-linear systems may look stochastic when analysed with linear methods. In order to reproduce the paper, I am implementing nonlinear models from scratch such as global polynomials, local polynomials, multi layer perceptrons and semi-local methods including radial basis functions.

Relevant paper: <https://arxiv.org/abs/chao-dyn/9401003>

4) Trotbot Navigation:

(Aug – Dec 2018)

My contribution: Implemented RRT algorithm for obstacle avoidance accounting for polygon obstacles, used shapely library and Python. Odometry sensors give vertices of surrounding obstacles approximated as polygons. Rapidly exploring Random Tree (RRT) algorithm is used to efficiently search non-convex, high dimensional spaces.

<https://github.com/ERC-BPGC/Trotbot>

5) Touchless 3D tracking interface using capacitive sensing:

(Course Project – Electromagnetic theory)

(Aug 2018)

Made a simple distance tracker from aluminium foil, cardboard and Arduino. Measured change in charging time due to change in dielectric medium using MATLAB.

6) Mobile Game Applications:

(Apr-May 2015)

Developed and deployed 2 apps to Playstore: Drunk Ball Pong and Techno-Bounce using Unity game engine.

Kaggle Machine Learning Competitions:

1) Elo Merchant Challenge: Finished in **top 10%** (Bronze medal). Rank : 387 / 4129.

<https://www.kaggle.com/pranavmahajan725>

Positions of Responsibility:

1) Technical writer @ Towards Data Science:

(Jan 2019 - Present)

I've written posts on RL, Neural ODEs which were well received by the community.

2) Centre for Technical Education (CTE):

Finance Head and Schooling Head

(Dec 2017- Present)

A variety of courses conducted by seniors under CTE on-campus (BITS Goa) as well as off-campus at Navy Public School in order to improve technical culture.

3) Peer Mentorship Program (PMP) Mentor:

(Aug 2018 - Present)

PMP helps students reduce the confusion when transitioning to college, discovering new ways to balance class-work and student organisations and empowering interpersonal

leadership experience. Currently mentoring 8 first-year students, recognised by BITS.

4) Data Science and Machine learning CTE course Mentor:

(Aug – Dec 2018)

Designed and graded assignments and solved doubts for a class of 120 students conducted in Semester-1 2018-19 by CTE.

Relevant Courses:

Completed:

Probability and Statistics
Math 1 (Multivariate Calculus)
Math 2 (Linear Algebra and Complex Analysis)
Math 3 (ODE)
Introduction to Computer Programming
Digital Design
Electronic Devices
Environment Development Climate Change

Ongoing:

Nonlinear Dynamics and Chaos
Control Systems
Signals and Systems
Microprocessors and interfacing

Other Certifications:

Network Management
Reinforcement Learning
Advanced Android App Development
Fast AI Deep Learning

Certified by:

Nettech, 2017.
CTE, BITS Goa. (Merit certificate)
CTE, BITS Goa.
Audited.

Technical Skills:

Proficient: Python, C.

Comfortable: C++, Java, Shell (Bash), MATLAB, Verilog, MASM.

Development: Android Studio and Unity engine.

Tools: Pytorch, Keras, Numpy, Sci-kit Learn, Git, NLTK, Spacy.

ROS (Robotics), GNU Radio (Software Defined Radio), Modelsim (Verilog).

Hobbies: Swimming, sketching , producing electronic music.

Other achievements:

1. BITS Pilani Merit Scholarship: Semester 1 2017-18, awarded for excellent academic performance (among top 3%) students.
2. District scholarship rank 8 in Maharashtra State Talent Search Examination, 2013.
3. Participated in Young Change Makers 2.0 for sustainable city, 2012.