Pranav Mahajan

Pre-final year Undergraduate, BITS Pilani, K.K. Birla Goa Campus.
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Education

May 2021 (Expected) — B.E. (Hons.) in Electronics and Communications Engineering. Birla Institute of Technology and Science, Pilani, Goa (India). **GPA**: 9.2/10

Work Experience

May-July 2019 — abstract

CSIR - Central Electronics Engineering Research Institute

Summer Research Intern, Supervisor: Dr. Sanjay Singh

- Research with a focus on deep learning based Face Anti-spoofing using **auxiliary supervision**.
- Preprocessed and created a pseudo ground truth for Replay Attack database using DeFA techniques and **optimized transforms** and **dataloading** for video datasets.
- Formulated and trained a **novel** video based **depth-estimator** using **3D CNN autoencoder** and experimented with automatic mixed precision to improve training time.
- Working on cross database testing and **rPPG based decoder** to aid inference.

May-June 2018 — github

Mitera Tech, Birmingham

Summer Intern

- 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.
- Implemented K-means clustering to make thermostat smarter by learning from less data and more specific to each user's actions.
- Preprocessed and augmented a dataset of HMI images to improve performance of an existing deep learning implementation.

Selected Projects

July 2019 - Present

Understanding phase-locking in bio-inspired neural networks

Supervisor: Dr. Basabdatta Sen Bhattacharya

- Quanitifying phase locking values using Spectral coherence approaches as well as SSD + Hilbert transforms and plotting Arnold tongues for the same.
- Learning the effects of this synchronization to understand possible stimulus-based therapeutics in brain diseases.

Apr 2019 - Present

Generative latent chaotic timeseries

Course Project for Nonlinear dynamics and chaos under Dr. Chandradew Sharma

- Reproduced this paper, by implementing nonlinear models and bench-marking on Mackey glass equations.
- Future work (beyond the course project premise) includes exploring possibilities in the spectral domain with wavelet convolutional neural networks and formulating VAE based generative latent timeseries models using LSTMs and Neural ODEs.

Dec 2018 — presentation

Reinforcement learning based strategy for Mobility-aware CRN

Supervisor: Dr. Ramesha C.K.

- Studied 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. Exploring the possibility of Multi-agent RL and framing as markov games.

Oct 2018 — github

Twitter based NLP bot for disaster management

Microsoft Codefundo++ Hackathon submission

- Cleaned earthquake related tweets, and trained a vanilla neural net with 89% accuracy to classify them into 4 sets depending on the type of information the tweets offer.
- Summarized each of the 4 sets using **ILP** and **encoder-decoder** architecture to maintain order in the end real-time summary. Built and deployed to Azure in 4 weeks.

Other Projects

Mar 2019	x86 based cash register.	Sep 2018	Touchless 3D tracking interface using capacitive sensing.
Feb 2018	DQN for Ms Pacman AI.	Apr 2015	Android game development using Unity.

Achievements

Scholarships:

2018 **Merit Scholarship** by BITS Pilani for Fall semester.
2018 Udacity - Google India challenge scholarship for Android development.
2015 Merit Scholarship- Class XI-XII..
2013 Maharashtra Talent Search Scholarship (MTSE) by Govt. of India.

Competitions:

2018 Kaggle Elo merchant competition : **Bronze** medal, Top 10%

Relevant Coursework

`Math:` Discrete Mathematics* • Multivariate calculus • Linear algebra and complex analysis • ODE

`EECS:` Computer Programming • Cognitive Neuroscience* • Microprocessors and Interfacing • Digital design • Digital signal processing* • Communication systems* • Signals and systems • Microelectronics • Electronic devices

`Physics:` Nonlinear dynamics and chaos • Electromagnetic theory • Electromagnetic fields and Microwaves*

`Humanities:` Environment development and climate change • Applied Philosophy

`External:` Network management • Reinforcement learning
* = *ongoing coursework*

Technical Skills

Proficient	C, Python, MATLAB
Comfortable	C++, , Shell (Bash), Assembly code, LaTeX
OS	Ubuntu, CentOS, Windows
Tools	Pytorch, Tensorflow, Git, NumPy, Scikit-Learn, ROS, Unity, Android studio, Modelsim, Cadence.

Teaching experience

2019 Co-instructor of Introduction to Machine learning and Deep learning CTE course.
Faculty mentor: Dr. Basabdatta Sen Bhattacharya. Batch strength: 120 students.
2018 Mentor for Data science & Machine learning CTE course.
Designed and evaluated assignments of batch strength 120 students.

Research Interests

• Human-centric ML • Cognitive neuroscience • Deep reinforcement learning • Empathy in language models •

Miscellaneous

Vice President @ Center for Technical Education (CTE), BITS Goa.
Faculty in-charge: Prof. Bharat M. Deshpande. CTE is a student run organisation that provides non-academic skills through courses conducted by seniors based on manual and practical learning usually in the after hours. CTE is involved in various mentoring activities, bi-yearly hackathons and project fundings on campus.

Technical writer @ Towards Data Science. My articles on model free RL

Open source contribution: The-Turing-Way, a lightly opinionated guide to reproducible data science.

Project Mentor: Mentoring student project to reproduce the Rainbow RL algorithm.

Student guide: Mentored 8 freshmen students through their first year.

Hobbies: Swimming, sketching, electronic music production.