Pranav Mahajan

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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.

Selected Projects

Sep 2019 - Present

Progression of Alzheimer's Disease using graph theoretical approaches
Supervisor: Dr. Veeky Baths
- Retrieved FMRI data from XNAT, preprocessed, parcelled and converted them into graphs. Used partial correlation and spectral coherence measures to weight the graphs. Similarly constructed graphs from EEG data corresponding to Working memory.
- Studying the relation between various centrality measures and psychometric tests of the subjects from different age groups over the span of 5-10 years.

July '19-Present
📄 presentation

Understanding phase-locking in bio-inspired neural networks
Supervisor: Dr. Basabdatta Sen Bhattacharya
- Quantifying synchronization between Neuron mass models by estimating phase locking values and plotting Arnold tongues for the same. Phases are extracted using Hilbert transform.
- Learning the effects of this synchronization to understand possible stimulus-based therapeutics in brain diseases.

Dec 2019
📄 report

Distributional Successor features
NeurIPS reproducibility challenge 2019
- Partially reproduced and re-implemented baselines from this paper.
- Identified which parts of the contribution could be reproduced at what costs in terms of resources (time, computation, efforts, communication with authors) .

Apr 2019 - May 2019

Generative latent chaotic time series
Course Project for Nonlinear dynamics and chaos under Dr. Chandradew Sharma
- Reproduced this paper, by implementing simpler nonlinear predictive models and benchmarking on Mackey glass equations.
- Compared the implementation of VAE-RNNs, RNN encoder - Neural ODE decoder and ODE-RNNs on irregularly sampled chaotic time series.

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.

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 and designed a Q learning based co-operative sensing model.

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

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

`External:` Network management • Reinforcement learning

Technical Skills

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

Teaching experience

2020	Teaching Assistant for Nonlinear Dynamics and Chaos course. IC Dr. Chandradew Sharma
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.

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

Student volunteer: IEEE ANTS Conference, 2019. Also attended ACCS 2019.

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

Hobbies: Swimming, sketching, electronic music production.