Pronoma Banerjee

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EDUCATION

Birla Institute of Technology and Science, Pilani, Goa Aug '19- Present
B.E. Computer Science, Integrated MSc. Mathematics *CGPA: 8.3/10*

Delhi Public School, Ruby Park, Kolkata 2017-2019
Class XII *CBSE: 95.2/100*

PROJECTS

AI Song Contest 2022 Submission
Music Society, BITS Goa [Process document][Appendix] *April 2022 - Present*

- Developing a software called SynthBreeder using C++, which implements the genetic algorithm on various setups of the modular synthesizer, called 'organisms'. Each organism produces a particular kind of sound.
- The organisms evolve by undergoing the graph-based processes of mutation and crossover, and natural selection, resulting in changes in connections and setups, evolving from fragments of sound to a section of a musical piece.
- Worked on creating the animated music video using AI with help of Disco Diffusion.

ABC-GAN
Supervisor: Dr. Snehanshu Saha [Preprint] *November 2021 - Present*

- Working on a generative modelling paradigm called ABC-GAN which combines Generative Adversarial Networks with Approximate Bayesian Computation.
- Comparing the ABC-GAN model with the standard GAN model, Random Forest, Catboost, TabNet, Vanilla Neural Networks and Stats Model, through multiple Scikit Learn regression datasets and the Modified GEO dataset.

Adversarial Deep Learning
Society for AI and Deep Learning (SAiDL), BITS Goa *August 2021*

- Contributed to the open source project for creating a code-base for a book on Adversarial Deep Learning.
- Fine-tuning computer vision models that have been used in adversarial attacks and defences, in particular, the InceptionV3 architecture from scratch, in PyTorch.

Deep Learning in Biomedical Image Processing
Supervisor: Dr. Sukanta Mondal *September 2021 - December 2021*

- Studying the applications of Tensorflow and PyTorch frameworks for object detection and phenotypic classification of biological images in nucleus detection, malaria stage classification and brain tumor classification.
- Trying to implement some deep learning models to get best results in the Kaggle competition.

EXPERIENCE

CVC group, Oden Institute of Computational Sciences, UT Austin Austin, USA
Research Intern, Supervisor: Dr. Chandrajit Bajaj *June 2022 - Present*

- Super resolution for enhanced identification of target regions of interest (TROI) by combining two low resolution multispectral and hyperspectral video streams into a single super-resolution stream.
- Trying to release a streamlit app to enable any user super resolve a hyperspectral and a multispectral image to produce a high resolution super resolution image, with a graph laplacian regularization fusion algorithm.
- Parallelly trying to implement the Stackelberg framework in soft actor-critic algorithms for improved performance by mitigating cycling of the gradient around the optimal solution.

Swecha (Andhra Pradesh Free Software Foundation) Gachibowli, India
Summer Engineering Intern (Remote) *June 2021 - July 2021*

- Contributed to the open source project for building a web-extension for fake news detection.
- Created a database by scraping some trustworthy sites, and implemented a model for doc-to-doc comparison, measuring cosine similarities for classification and textual entailment.
- Extended our model for Hindi news classification and to classify news texts obtained from images and videos.

Graphics Research Group, IIIT Delhi   Delhi, India
Summer Research Intern (Remote), Supervisor: Dr. Ojaswa Sharma [GitHub Link][Report]   *May 2021 - July 2021*

- Prepared 3D volumes from the CT, MRI and cryo-sectioned images obtained from the VKH dataset.
- Performed rigid and deformable volumetric registration of the volumes using SimpleITK, Elastix frameworks in python and 3D Slicer and MIRT softwares. Analysed the differences in results and suggested improvements.
- Performed volumetric segmentation on the dataset to fix the class mismatch obtained in the provided dataset.

Indian Statistical Institute, Kolkata   Kolkata, India
Summer Research Intern (Remote), Supervisor: Dr. Subhamoy Maitra [GitHub Link]   *June 2020 - July 2020*

- Designed a version of Quantum tic-tac-toe using C programming, inspired from this paper.
- Calculated the probabilities of winning, in both quantum and classical systems, when using different states of the board, applying different strategies.
- Studied ways of developing a subgame perfect Nash Equilibrium for the game, and tried to generalize the ideas to other similar dynamic games.

TECHNICAL SKILLS

Languages: Python, C/C++, Java, HTML/CSS, MATLAB
Libraries: Pandas, NumPy, Keras, Tensorflow, PyTorch, SimpleITK, Elastix

COURSEWORK

Computer Programming, Discrete Mathematics, Probability and Statistics, Graphs and Networks, Topology, Applied Statistical Methods, Linear Algebra, Microprocessors and Interfaces, Operations Research, Mathematical Modelling, Optimization, Abstract Algebra, Functional Analysis, Database Systems.

ACHIEVEMENTS

Merit Scholarship and Workshop: by INSPIRE-DST in collaboration with JBNSTS, for being among top 0.5% students of West Bengal in boards examinations.
Award: Highest achievement in Science in ICSE (100/100 PCB).

POSITIONS OF RESPONSIBILITY

Project lead- Practical Implementations of ABC-GAN (ASCII, BITS-Goa).
Teaching Assistant- Graphs and Networks, Computer Programming.
Course Instructor and Project Mentor- Introduction to Data Science (QSTP, BITS Goa).
Academic Mentor- Probability and Statistics (Academic Assistance Program, CTE, BITS Goa.)
Student Coordinator- Student Faculty Committee, Department of Mathematics, BITS Goa.
Project lead- Music Society website, from scratch.

COMMUNITIES

CTE - Member of the Center of Technical Education, BITS Goa.
MuSoc - Lead vocalist at the Music Society, BITS Goa.
Abhigyaan - Volunteer work for the education of mess workers at BITS Goa campus.
Others - Active on multiple platforms as an artist, content writer and vocalist.