K PRANATH REDDY

Undergraduate Student

f20160572@hyderabad.bits-pilani.ac.in | pranath.mail@gmail.com | Hyderabad, India
linkedin.com/in/pranath-reddy | github.com/PyJedi

EDUCATION

Bachelor of Engineering (Hons.) - Electrical and Electronics Engineering

Birla Institute of Technology & Science, Pilani

2016 – 2021

Master of Science (Hons.) - Physics

Birla Institute of Technology & Science, Pilani

2016 – 2021

Telangana State Board of Intermediate Education (96.7%)

Narayana Junior college

2016

Telangana Board of secondary education (9.8/10)

Narayana Olympiad School

2014

EXPERIENCE

Research Intern

BARC (Bhabha Atomic Research Centre)

May 2018 – August 2018 India

- Characterized materials using Rutherford Backscattering Spectrometry and analyzed the Compton effect using Gamma-ray Spectrometry.
- Collected and visualized data from cutting edge NaI and HPGe detectors and analyzed the spectra of Cs-137, Ba-133, and Co-60.

RESEARCH PROJECTS

A Hybrid Quantum Regression Model for the prediction of Molecular Atomization Energies

January 2020 – Present

- Under Dr. Aranya Bhuti Bhattacharjee, Professor, Department of Physics.
- This project deals with the design and implementation of a quantum machine learning methodology, where we use a classical unsupervised model such as deep convolutional auto-encoder for the feature extraction of data constructed from the eigenvalues and eigenvector Centralities of the pairwise distance matrix calculated from atomic positions and the unrolled upper triangle of each Coulomb Matrix calculated form nuclear charges. Then, Quantum regression models such as quantum linear regression, quantum radial basis function neural network (Q-RBFNN) and, a quantum neural network will be used for the prediction of Molecular Atomization Energies.

RESEARCH INTEREST

Machine Learning | Deep Learning | Computer Vision | Computational Cosmology | Quantum Machine Learning | Medical Image Processing | Time-Frequency Analysis

SKILLS

Python | C/C++ | Java | Swift | MATLAB

Machine Learning | Deep Learning | Computer Vision | Data Science | Keras | Tensorflow | PyTorch | OpenCV | Signal Processing | Image Processing

Computational Cosmology | Astronomy | Quantum Machine Learning | QuTip | Qiskit

Graphic Design

RELEVANT SUBJECTS

Computer Programming
CS F111

Object Oriented Programming
CS F213

Operating Systems
CS F372

Machine Learning
BITS F464

Neural Network and Fuzzy Logic
BITS F312

Probability & Statistics
MATH F113

Multichannel convolutional auto-encoder driven random forest network for the detection of cardiac ailments from multi-lead ECG signals

January 2020 – Present

- Under Dr. Rajesh Kumar Tripathy, Department of Electrical and Electronics Engineering.
- In this project, we have developed a novel approach for automated detection of cardiac ailments such as myocardial infarction, Bundle branch block, and, Hyaline Membrane Disease. Firstly, a deep convolutional auto-encoder was used to extract features from the ECG data, and then various supervised learning algorithms such as random forests, LSTM, SVM, and KNN were used for multi-class classification.

Application of Deep Learning for the detection of cardiac ailments from Time-Frequency spectrograms of multi-lead ECG signals

January 2020 – Present

- Under Dr. Rajesh Kumar Tripathy, Department of Electrical and Electronics Engineering.
- Applied a Gaussian window and kaiser window-based Stockwell transform for constructing a dataset of time-frequency spectrograms of multi-channel and multi-segment ECG data, which was used for tensor decomposition and multi-class classification using machine learning and deep learning models such as random forests, LSTM and SVM. A deep convolutional auto-encoder was also implemented for the feature extraction of the time-frequency spectrograms.

Application of Machine Learning for autonomous navigation of an experimental UAV

January 2020 – Present

- Under Dr. Sudha Radhika, Department of Electrical and Electronics Engineering.
- The navigation of an unmanned aerial vehicle (UAV) is subject to airflow and other external disturbances. This project deals with the implementation of a Machine Learning model such as gradient-boosted trees for autonomous navigation of a UAV using GPS based navigation and data from onboard electronic sensors.

Software fault prediction using Deep neural networks

December 2019 – Present

- Under Dr. Lov Kumar, Department of Computer Science and Information Systems.
- A considerable amount of development time is spent on identification and fixing of faults using manual testing of the source code. Automated fault detection can save valuable development costs and time. This project deals with the implementation of deep learning models such as multi-layer perceptrons for fault detection. We have used Synthetic Minority Oversampling Technique (SMOTE) for balancing 56 different highly unbalanced datasets. Subset and ranking based feature selection methods such as Information Gain, Gain Ratio, and CFS have been implemented for preparing the training data.

Transient Classification in low SNR Gravitational Wave data using Deep Learning

August 2019 – December 2019

- Under Dr. Rahul Nigam, Professor, Department of Physics.

Cosmology

MATH F456

Quantum Mechanics - I

PHY F242

Quantum Mechanics - II

PHY F311

COMPETITIONS

Flipkart GRiD – AI/ML Challenge

2019

- Successfully reached Level 3 (Qualifier/Pre-Finals) of the National level Machine learning competition organized by Flipkart
- Competed against students from the top 40 universities of India and stood in the top 200/7000 teams
- Trained a highly complex object detection dataset using the ResNet implementation of Faster-RCNN and achieved a score (IoU) of 0.83

eYantra Robotics Competition | eYRC

2017

- Successfully designed and created a Harvester Bot in the national level robotics competition organized by IIT-B/MHRD and reached pre-finals.
- Designed and developed a fruit detection algorithm using the computer vision library OpenCV without the use of any annotated data

INJSO | HBCSE

2014

- Qualified for INJSO 2014.
- One among the 306 students across the country to clear NSEJS and qualify for INJSO organized by HBCSE.

INTERNATIONAL MATHEMATICS OLYMPIAD

2012

- Secured an International Rank of 808 in the 6th IMO held in 14 different countries across Asia and organized by SOF.

EXTRA CURRICULAR

Graphic Designing

- Worked as a graphic designer at Designers Anonymous (DA), Department of Technical Arts (DOTA) and Nirmaan Organisation at BITS, Pilani.
- Behance Profile: behance.net/pranathreddy

- Solved a Time series classification problem on noisy streams of gravitational wave data using deep learning. For this, nine different ML/Deep learning algorithms such as CNN, RNN, Random Forest, SVM, and Stacked auto-encoder were implemented. A deep convolutional auto encoder was also implemented for the feature extraction of Binary black hole merger waveforms.

CMB-GAN: Fast Simulations of Cosmic Microwave background Anisotropy maps using Deep Learning (arXiv:1908.04682)

January 2019 – May 2019

- Paper Under Review
- Under Dr. Rahul Nigam, Professor, Department of Physics.
- Successfully presented an alternative methodology for the simulation of CMB data. Implemented Generative Adversarial Networks for CMB data generation and presented a viable method of CMB data generation that can be used for cosmological analysis. The results obtained using various diagnostic metrics are in agreement with the limits of high-precision physics.

Baryon density extraction and isotropy analysis of Cosmic Microwave Background using Deep Learning (arXiv:1903.12253)

August 2018 – December 2018

- Paper Under Review
- Under Dr. Rahul Nigam, Professor, Department of Physics.
- The aim is to predict the baryon density of a given CMB distribution and analyze the isotropy of CMB by comparing the results of models trained on data collected over various galactic co-ordinates. For this, the Cosmic Microwave Background data was generated using the CAMB package and trained a CNN, and MLP based regression models and achieved accuracy which is on par with well established statistical methods.