

Shanmugha Balan

M.Sc. Physics and B.E. Electrical and Electronics Engineering
Birla Institute of Technology and Science, Pilani

Passionate about Astronomy and Machine Learning. Avid blogger, loves to teach and share knowledge!

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EXPERIENCE

Undergraduate Research Scholar

 Astrophysics and Cosmology Research Group, Dept of Physics  Dec 2020 – present  BITS Pilani, Rajasthan

- Working on data about the star clusters in our galaxy from the Gaia Mission by the European Space Agency, queried through VizieR, a database maintained by the University of Strasbourg
- Studying the structural properties and dynamical stability of clusters using K-means clustering and Gaussian Mixture Models to identify member stars and determined the presence of tidal tails

Summer SDE Intern

 Army Base Workshop  May – Jul 2021  Pitharogarh, Uttarakhand

- Built a machine learning model to determine servicing status of army equipment and added location visualization
- Integrated the above with a Flutter interface to make a highly user friendly UI

Junior Research Scholar

 Raman Lab, Computational Systems Biology Lab  Apr – Jun 2018  IIT Madras, Chennai

- Analysed protein networks for the bacterium *E. coli* using data from the STRING database and made a network graph with NetworkX, a python package to visualize graph structures
- Used the interactions to identify potential target proteins for novel drugs to act upon

PERSONAL PROJECTS

SEU Detection for CASSIOPE

Trained a random forest model on a highly unbalanced dataset of solar data to predict disruptive magnetic events for the satellite CASSIOPE and got 87.6% accuracy

Traffic Sign Classifier

Trained a custom CNN on the German Traffic Sign Benchmark dataset of around 50000 images with 92% accuracy and made a GUI to deploy the model

SKILLS

Machine Learning

TensorFlow, PyTorch, Scikit-Learn

Data Science

Numpy, Pandas, Matplotlib

Scientific Computing

C/C++, MATLAB, Python (Anaconda)

COURSES

University Courses

Math 1 (Calculus) | Math 2 (Linear Algebra+Complex Analysis) | Math 3 (Differential Equations) | Probability and Statistics | Classical Mechanics | Electromagnetic Theory | Optics | Quantum Mechanics | Nonlinear Dynamics and Chaos

MOOCs (Certified)

Deep Learning Specialization (5 courses, deeplearning.ai) | TensorFlow in Practice (4 courses, deeplearning.ai)

MOOCs (Audited)

Intro to DL (MIT OCW) | CNNs for Visual Recognition (Stanford Online) | Deep Reinforcement Learning (UC Berkeley) | Data Driven Astronomy (University of Sydney)

RESPONSIBILITIES

Microsoft Learn Student Ambassador - Team Lead

Managing all club events, conducted fests and paper discussions with the ML student interest group

Computer Vision Research Society - Research Student

Working on computer vision with video related models in a research environment

The Radio Astronomy Club - Chief Coordinator

Managing the blog and performing data analysis of gravitational wave signals and radio astronomy data

Physics Association - Chief Editor & Webmaster

Managing the website and blog, made educational posts and conducted talk series to promote physics