Dr. Ayushi Mandlik

Data Scientist | ML Engineer | Data analyst
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Professional summary

★ Completed **PhD** in Astrophysics from the **Centre for Astrophysics and Supercomputing**, Swinburne University of Technology, Melbourne.

★ Experienced in using tools for data analysis such as **pandas** and **SQL**.

★ Experienced in creating Forecasting flows using **Dataiku DSS**.

★ Experienced in data visualizations in **python** and **Tableau**.

★ Experienced in building **machine learning models for real-time classification** tasks in python, **Keras** and **Tensorflow**.

★ Deployed python-based pipeline on **GPUs**.

★ Experienced in writing readable concise reports in **Latex**.

Over the course of my research, I have cultivated a strong foundation in Python. My academic background has equipped me with a rigorous approach to problem-solving and a deep appreciation for data analysis. My greatest strength lies in communicating complex problems with clarity and my dedication to foster a collaborative team environment.

Skills

★ *Languages:* Python, Bash, SQL, Latex

★ *Packages:* Pandas, Numpy, Sci-Kit Learn, Matplotlib, Scipy, Keras, StatsForecast.

★ *Tools:* Git, HPC/Cloud computing, Jupyter, Slurm, Tableau.

★ *OS:* Ubuntu, Mac OS, Windows.

★ *Areas of expertise:* Data science, data analysis, data visualization, data mining, data engineering, statistics, machine learning.

Relevant experience

Jan 2024-April 2024 | Data Science Intern | Australia Post Melbourne, Australia

★ Implemented Hierarchical forecast reconciliation techniques based on recent relevant research work on Australia Post parcel volume data.

★ Created streamlined data flows within Dataiku DSS to efficiently analyze parcel volume data and obtain reconciled forecasts.

★ Presented competence of the implemented techniques to the team using visualizations made using Tableau.

★ Utilized Google Cloud Platform, including BigQuery, to analyze and derive insights from large datasets.

Oct 2019- Jan 2024 | PhD researcher | Centre for Astrophysics and Supercomputing, Australia

★ Developed an end-to-end state-of-the-art Machine Learning (Convolutional Neural Network) based detection pipeline for the UTMOST radio telescope in python using Keras and TensorFlow.

★ Statistical analysis of results for varying distributions of properties of input simulation parameters for optimal performance estimations using tools such as pandas.

★ Conducted training and model development on the Ozstar Supercomputer which uses Slurm. Deployed batch jobs on the Supercomputer with optimal resource requests and optimized codes.

★ Modeling the detections from the pipeline and using statistical tests such as chi-square and Akaike Information Criterion to determine the best-fit parameters.

★ Code optimization to enable pre-processing and detection onto available GPU memory in real-time.

★ Pipeline works with low latency such that pre-processing of data and classification take place in real-time with a false positive rate of one per week, improving on the existing system 10-fold. Injection of simulated true positive candidates in real-time to perform sanity checks of the telescope, with pipeline working with a recall rate of 96.5%.

★ Linear regression modeling of temperature dependence on phasing solutions for improvement in telescope performance.

★ Collaborated with large-scale and multi-disciplinary research teams.

2017-2018 (1 year) | Masters researcher | Max Planck Institute for Radio Astronomy, Germany

★ Applied signal processing algorithms on radio frequency astronomy image on ~100 TB sized datasets to visualize galaxies.

★ Performed imaging and data analysis on the JURECA HPC cluster.

★ Post imaging analysis involved noise mitigation and convolution algorithms to obtain clearer images.

★ Developed python based post-processing methods of scientific images.

★ Analyzed the Faraday depth of point sources in the images with the help of 3D imaging of the magnetic fields in python.

2017-2017 (8 months) | Research assistant | Max Planck Institute for Radio Astronomy, Germany

★ Using python, created 3D visualizations to help expose underlying trends in the dataset of star forming regions in our galaxy.

★ Drew data from multiple sources to reach more nuanced conclusions on distance estimations.

★ Reported the conclusions of the research in a succinct report.

Publications

★ "The UTMOST-NS: A fully digital, wide-field transient search facility operating at a central frequency of 831 MHz," MNRAS, 2023: First author.

★ "Unearthing Fast Radio Bursts using Machine Learning (in prep)" : First author.

★ "First results from the UTMOST-NS pulsar timing programme (in prep.)": Co-author.

★ ""Estimating fast transient detection pipeline efficiencies at UTMOST via real-time injection of mock FRBs", MNRAS, 2020: Co-author.

Leadership and Extracurricular activities

Machine Learning Journal Club coordinator | Swinburne University of Technology Responsibilities: Curating and selecting research papers for bi-weekly discussions in the field of machine learning (with an emphasis on use cases in astronomy), along with presenting and leading some of the discussions.

UTMOST facility student operator | University of Sydney

Responsibilities: Troubleshooting and ensuring day-to-day workings of the [UTMOST](#) facility. Calibrating the telescope to ensure optimal telescope performance.

Astronomy Journal Club coordinator | Swinburne University of Technology

Responsibilities: Facilitating discussions and encouraging active participation among members, creating a dynamic learning environment, and co-ordinating the event online such that the participation remained the same even during COVID.

Team Lead | Gravitational Wave Data Centre Machine Learning Hackathon

Entrusted with the role of Team Lead by my peers based on aptitude in machine learning and data analysis.

Responsibilities: Organizing and directing the efforts of a cross-functional team, managing technical aspects of the project, including setting up a collaborative work environment on the supercomputer and addressing challenges and resolving issues to keep project on track within the limited timeframe; presenting our project to the judges to showcase our solutions and results.

Education

2019-2023 | PhD in Astrophysics | Swinburne University of Technology, Australia

2015-2018 | Masters in Astrophysics | University of Bonn, Germany

2012-2015 | Bachelors in Physics, Math and Electronics | Christ University, India

Awards and scholarships

2019-2023: PhD in Astrophysics | Centre for Supercomputing and Astrophysics Scholarship for thesis project

2017-2018: Master thesis | Max Planck Institute for Radio astronomy Stipend for thesis project

2015: Bachelors | Christ University Scholarship for being in top three students