Ayushi Mandlik

Data Scientist | ML Engineer | Data analyst

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Summary

- **Completed 4 years** of **PhD in Astrophysics** from the **Centre for Astrophysics and Super-computing**, Swinburne University of Technology, Melbourne.
- Experienced in using tools for **data analysis** such as **pandas and SQL**.
- Experienced in **data visualizations in python** for 3D images (galaxies, time-frequency data etc.).
- 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 along with an enthusiasm for continuous learning. 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, Bifrost
Tools	Git, HPC/Cloud computing, Jupyter, Slurm
OS	Ubuntu, Mac OS, Windows
Areas of expertise	Data science, data analysis, data visualization, data mining, data engineering, statistics, machine learning

Relevant Experience

Oct 2019- now (4 years) | 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**.
- Modelling 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.
- Played key role in ***troubleshooting*** and ensuring day-to-day workings of the UTMOST facility.
- ***Managed*** Astronomy Journal Club and Machine Learning Journal Club at Swinburne University.
- ***Presented*** academic research work and impactful papers in the field of machine learning to technical and non-technical audience.
- Collaborated with large-scale and multi-disciplinary research teams.
- Took part the **Gravitational Wave Data Centre Machine Learning Hackathon** 2021.

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 visualisations** 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.

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