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MAKUN SINGH MADAR

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A quantitively skilled, enthusiastic individual who completed a PhD in Computational Astronomy with 18 months in industry. 6 years of high-level Python experience in data-driven positions, software engineering projects and model simulations. Strong understanding of machine learning concepts including neural networks for regression and classification tasks. Successful creation and implementation of a computer vision algorithm within the security sector to identify threats with a 0% false negative rate. Creator of an innovative regression neural network model to emulate a semi-analytical galaxy formation model which, when paired with Bayesian Inference parameter search, cuts down the galaxy formation model calibration time from months to hours compared to traditional methods. I am eager to use my unique experience and communication skills to work in a Machine Learning Engineer role within a leading technology company to gain a competitive edge over the competition and grow my portfolio

SKILLS

Programming and Development: Python, Fortran, C shell, Dart, MATLAB, LaTeX

Software Tools and Frameworks: Tensorflow and Keras, Scikit-learn, Numpy, Pandas, Git, Linux OS

Quantitative Research: ML, model optimisation, Bayesian statistics, computer vision, data visualisation, HPC

Communication: Academic presentations, research publications, science outreach

EXPERIENCE

Sept 2019 – Dec 2023 — **PhD Research Student,** ***Institute of Computational Cosmology, Durham University***

- Sole creator of an accurate machine learning (ML) emulator reproducing full semi-analytical model outputs. This included research, development and testing before applying the emulator to a Bayesian inference framework
- Using high-performance computing (HPC) to generate 3,000 unique universe simulations each containing roughly 50,000 individual galaxy data files for training and testing of the regression neural network emulator
- Achieved a 100x increase in model optimisation speed compared to traditional methods. Work is currently being written up for submission to an esteemed astronomical journal, but it is already being used for research in wider astronomical projects
- Confident in communicating data and findings effectively using multiple platforms, tailoring verbal and written communication skills to a wide variety of audiences regularly

Mar 2020 - Sept 2021 — **Industrial PhD Student,** ***Kromek Group plc***

- Collaborated with the AI team researching and utilising ML computer vision methods for classification tasks in several projects in the security and medical imaging sectors.
- Strong understanding of Convolutional Neural Networks (CNNs)
- Developed an object detection algorithm for aviation security which has been successfully implemented in the field accomplishing a 0% false negative rate
- Abided by proper coding practice and version control enforced by Kromek. Thrived in a high-pressure environment, completing projects to a high standard within tight deadlines including collaborating with clients to satisfy specifications

Oct 2021 - Mar 2022 — **Postdoctoral Research Associate,** ***Institute of Computational Cosmology, Durham University***

- Working on postdoctoral projects alongside my PhD for 6 months is an example of my standout time management skills and drive to achieve
- Generating and analysing 100,000 galaxy data outputs using HPC against real observations. Utilising Python data visualisation and statistical analysis methods
- Excellent collaboration skills, working in conjunction with other members of an astronomical consortium for an upcoming large sky survey. The results I presented provided essential predictions for calibration purposes

EDUCATION

2019 - 2023 — **Doctor of Philosophy, Computational Astrophysics,** ***Durham University***

Sept 2022 — **ICIC Data Analysis Workshop,** ***Imperial College London***

Jul – Aug 2018 — **Summer Internship,** ***Cambridge University***

2015 - 2019 — **Masters of Physics (MSci),** ***University of Nottingham***
Grade achieved: First class honours

PUBLICATIONS

H. R. Russell et al., *Monthly Notices of the Royal Astronomical Society,* 490, 3, 2019, 3025-3045

PERSONAL ACHIEVEMENTS

Leadership: Elected University of Nottingham Athletics and Cross Country Track and Field Captain (2017/18) and President (2018/19). Managing both committees, organising coaching across the many disciplines, leading and collaborating with students to improve the team rankings

Outreach: Winner of the 2023 Ogden Outreach Award for postgraduate student ambassador. I was nominated for the copious time and effort dedicated to outreach at Durham University

OTHER SKILLS

Experienced at public speaking. I have given multiple conference and seminar talks to present my research to a large audience

Capable of working remotely in large international collaborations such as the Physics of the Accelerating Universe Survey

PERSONAL INTERESTS

Technical: App building, co-director of development company Everyday Studios. Introduction to coding for app building, client outreach, business concepts, and project management

Personal: Athletics and fitness, cooking and baking, tutoring