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Beichen Xu

Education

2023–2024 **MRes Machine Learning and Big Data in the Physical Sciences**, *Imperial College London*, Department of Physics
Skills and Modules: Time Series Analysis, Accelerated Data Processing, Field-Programmable Gate Arrays (FPGA), Machine Learning, Statistical Methods for Experimental Physics

2020–2023 **B.Sc. Physics**, *University of Birmingham*, School of Physics and Astronomy, First Class Honours
Skills and Modules: Lagrangian and Hamiltonian Mechanics, Eigen Physics, Linear Algebra, Relativity, Quantum Mechenics, Statistics, Complex Analysis

Work Experience

Internships

2022 **Summer Intern**, Kavli Institute of Cosmology Cambridge, Cambridge
- Conducted research on machine learning-enhanced Bayesian inference, utilizing nested sampling to train cosmology data and masked aggressive flow for posterior generation of different parameters.
- Developed and trained machine learning models to enhance data analysis accuracy, and created visualizations such as 2D plots and GIFs to illustrate AI training processes.
- Contributed to the "margarine" Python package on GitHub by adding a new objective function, showcasing proficiency in computing tools like Linux, vim, vimteractive, ssh, tmux, tqdm, and TensorFlow, and studied state of art Python packages like margarine and anesthetic.
- Collaborated closely with a PhD student, engaging in regular discussions to refine research approaches, resulting in improved methodology and outcomes.
- Participated in an academic club, enhancing technical knowledge and communication skills by reading and discussing cutting-edge research papers with colleagues.

2021 **Summer Intern**, Purple Mountain Observatory, Nanjing
- Analyzed Gamma Ray Burst (GRB) data to investigate their causes and mechanisms, utilizing Python for data fitting and analysis with a focus on Swift GRB data.
- Applied statistical methods to improve the accuracy of GRB parameter estimation, gaining proficiency in the iminuit library for minimization and error analysis.
- Conducted a comprehensive literature review on GRB phenomena, integrating new insights into the research process.
- Developed communication skills by writing detailed reports summarizing research progress and results, and delivering presentations to the research team.
- Improved organizational skills by managing data collection and analysis processes efficiently, ensuring timely completion of project tasks.

Project Experience

Academic

2024 **MRes Project**, Imperial College London, London

- Simulated multi-source gravitational wave time-series data, and developed and trained WGAN models to analyze these signals.
- Utilized Imperial College London's HPC for model training and data visualization, employing tools such as PyTorch, PyTorch Lightning, and GetDist for development, training, and analysis.
- Debugged neural networks to enhance performance and accuracy, implementing techniques such as early stopping and adaptive training to optimize the training process.
- Participated in weekly group meetings with my supervisor and a PhD colleague to discuss project progress and troubleshoot challenges, fostering collaborative problem-solving and improving project outcomes.

Awards

2018 18th Award Program for Future Scientists – Second Prize

2019 Physics Olympiad in Jiangsu Province, China – First prize

Languages

Chinese Native

English Intermediate *Conversational fluency*

Publications

1 Xu, Beichen, Jun Su, and Weiguo Wang. "An expanding balloon: a small universe." *Physics Education* 53.6 (2018): 065005.

Interests

- Anime & Comics
- Reading
- Hiking
- Strategy Gaming