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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, Univerisity of Cambridge, Cambeidge

- 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, 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.

Computer Skills

Programming	Python, C++, Mathematica, PyTorch, TensorFlow, SQL
Computing	Unix, Bash, vim, git, LaTeX, FPGA (VHDL/Verilog)
OS	Linux, Windows

Awards

2018 18th Award Program for Future Scientists – Silver medal

2019 Physics Olympiad in Jiangsu Province, China – First prize

Languages

Chinese	Native	
English	Fluent	*Conversational and written fluency*
Japanese	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