Xiaoyu Lu

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About Me

I am a machine learning scientist at Amazon. I have always been passionate about building statistical/machine learning models in a big data/data driven environment. Recently I have been working on explainable models to emulate complicated supply chain systems. I enjoy owning and driving projects forward, from initial scoping to implementation. I am proficient with Python, AWS tools including cloud computing, SageMaker, State Machine etc.. I am also familiar with data analytics tools such as data pipelines and SQL. Prior to Amazon I did my PhD in probabilistic machine learning at University of Oxford, supervised by Prof. Yee Whye Teh in the Machine Learning group at the Department of Statistics, with research experience in generative models, Gaussian Processes, MCMC, Bayesian inference, deep learning and reinforcement learning. Before my PhD, I did my undergraduate in Mathematics and Statistics at University of Oxford with the MMath degree, during which I have topped the department in both the bachelor (3rd year) and the master year (4th year). My fourth year thesis is on Recommender System for movie recommendations using collaborative filtering.

Work Experience

04/2019 - Present, Amazon, Machine Learning Scientist

- I have been working in SCOT (Supply Chain Technology Optimization) Simulation team on building explainable emulators for complex supply chain systems, providing interpretable attribution on key business metrics. My work on the explainable model has been published at ICML 2022. The attribution tool based on the explainable model has been deployed in production since Q4 2022.
- I have experience working with big data and utilising cloud computing. I write production-level Python code and I am proficient at AWS tools, data analytics, SQL and ETL.
- I lead and drive projects from scoping to launching, building technologies that is best suited to the business problems under ambiguous environments. I developed my stakeholder management through regular communications of project progress, proactively pushing projects forward with customer obsession.
- I acquired leadership through supervising and mentoring applied scientist interns and data analysts, continuously developing the business intelligence capabilities of my team.

Internship Experience

07/2018 - 09/2018, Microsoft Research, Research Intern

- I was working on a Reinforcement Learning research project using imitation learning with latent variable models, supervised by Jan Stuehmer and Katja Hofmann. We use a generative model to capture different emergent play styles in an unsupervised manner, enabling the imitation of a diverse range of distinct behaviours in Minecraft.

09/2017 - 11/2017, JP Morgan Chase, Quantitative Research Intern

- Worked on model review on CDS risk that are not captured by VaR (Value at Risk), including restructuring and quanto effect. Frequently delivered high quality model review reports.
- Tested model assumption and data validation using Excel and Python.

06/2017-08/2017, Amazon, Applied Scientist Intern

- Research project in Bayesian Optimization when the input space is non-Euclidean, with an application in automated model selection and natural scene understanding. Successfully implemented the model in Python and published the paper at ICML, 2018.
- Implemented the VAE(Variational Autoencoder) module in a deep learning framework (MxNet) and contributed to the MxNet repository.

07/2015-10/2015, Google, Technical Business Intern

- Created competitive analysis and benchmarking study for account hijacking, recommend strategy adjustments based on findings.
- Analysed hijacking trends within a specific set of products and develop an action plan based on trends and patterns.

- Analysed preventable abuse related issues which impact users, and identify core and common prevention focus areas across Product Quality Operation.
- Partnered with engineering teams to improve our hijacking prevention, detection and recovery systems, acquired SQL skills.

06/2014-08/2014, Credit Suisse, Quantitative Strategies Summer Analyst

- Built pricing models for Calendar Spread Options using Excel and VBA.
- Performed model calibration and validation, as well as hedging simulation for historical data.
- Delivered excellent results and received exceptional feedback from managers and colleagues.

Education

10/2014 - 04/2019, PhD in Statistical Science (CDT), University of Oxford

- I obtained my PhD degree working in the field of machine learning with Prof. Yee Whye Teh. I have research experience in probabilistic generative models, Bayesian inference, Gaussian Process, MCMC, causal inference and reinforcement learning.

10/2010 - 06/2014, MMath in Mathematics and Statistics, University of Oxford

- 1st Class Honour (ranked top 1st in both Bachelor and Master).
- Scored 83% in fourth year thesis on Recommender System for movie recommendations.

Publications

- **X. Lu**, T. Rainforth, T, Y. W. Teh, Daisee: Adaptive Importance Sampling by Balancing Exploration and Exploitation, in Scandinavian Journal of Statistics, 2023.
- **X. Lu**, A. Boukouvalas, J. Hensman, Additive Gaussian Processes Revisited, in International Conference on Machine Learning (ICML), 2022.
- V. Aglietti, **X. Lu**, A. Paleyes, J. González, Causal Bayesian Optimization, in Artificial Intelligence and Statistics (AISTATS), 2020.
- P Pruthi, J González, **X. Lu**, M Fiterau, Structure mapping for transferability of causal models, in Inductive Biases, Invariances and Generalization in Reinforcement Learning Workshop in ICML, 2020.
- B Balaji, P Christodoulou, **X. Lu**, B Jeon and J Bell-Masterson, FactoredRL: Leveraging factored graphs for deep reinforcement learning, in NeurIPS Workshop on Deep Reinforcement Learning, 2020.
- **X. Lu**, Y. W. Teh, On Exploration, Exploitation and Learning in Adaptive Importance Sampling, arXiv preprint arXiv:1810.13296, 2018.
- T. Rainforth, Y. Zhou, **X. Lu**, Y. W. Teh, F. Wood, H. Yang and J. W. Van de Meent, Inference trees: Adaptive inference with exploration, arXiv preprint arXiv:1806.09550, 2018.
- **Lu, X.**, J, González, Z. Dai, N. Lawrence, Structured Variationally Auto-encoded Optimization, in International Conference on Machine Learning (ICML), 2018.
- **X. Lu**, V. Perrone, L. Hasenclever, Y. W. Teh, S. J. Vollmer, Relativistic Monte Carlo, in Artificial Intelligence and Statistics (AISTATS), 2017.
- H. Kim, **X. Lu**, S. Flaxman, Y. W. Teh, Tucker Gaussian Process for Regression and Collaborative Filtering, in Women in Machine Learning Workshop (WiMl), 2016.

Skills

- Python: familiar with data science libraries such as numPy, Pandas, Scikit-learn, TensorFlow, etc., example open sourced code available here.
- AWS: I have experience with EC2, Sagemaker notebooks, state machines, S3 storage, lambda function etc.
- Data analytics: I am Proficient at SQL, ETL and Amazon internal data pipelines.
- Fluent in English and Chinese.

Scholarships and Awards

- Clarendon titular scholarship and PAG Oxford Scholarship.
- 8 academic prizes including Royal Statistical Society Prize 2014, Gibbs Prize 2014, Department of Statistics Prize 2013, 4 Book Prizes and 3 College Scholarships.
- Top ten finalist for the Mathematics, Economics and Finance Undergraduate Of The Year Award, 2013 by TARGETjobs.