Rachel Teo Si Yan

CONTACT INFORMATION

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https://rachtsy.github.io/

WORK

Murata Electronics Singapore
2021–2023

- Position: Full-time Industrial Engineer
- Duties: Perform data analysis for the cost management of the manufacturing of ceramic capacitors. Innovate new methods to understand the cost structure and effectively manage profit/loss statements. Present and explain to management the linkage of profit/loss statements to production operations. Improve efficiency and productivity of analysis through programming.

Axis Capital
Aug 2019 to Dec 2019

- Position: Intern
- Duties: Worked full-time under the Catastrophe Modelling (CAT) team in re-insurance. Ran Catastrophe models and performed preliminary analytical reports using industry-specific software. Used various internal tools to assist the pricing process within the CAT team. Created tools and scripts with python to ease the process of data extraction for use in the model and analysis.

DBS Bank
Jun 2019 to Jul 2019

- Position: Intern
- Duties: Contributed to the building of an acquisition model for Paylah! customers in the Consumer Banking Analytics department. Used SAS and SQL to extract and create the variables discussed from the DBS database.

SINAPSE
May 2018 to Nov 2018

- Position: Intern
- Duties: Used Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA) in matlab to reduce dimensions of large datasets and perform classification analysis. Datasets consisted of spike trains of neurons in monkeys' brains that were recorded as they performed a working memory task. Simple classification analysis was used to understand the mechanism of neurons during the engagement of working memory.

EDUCATION

National University of Singapore

PhD, 2023–*present*

- Machine Learning

National University of Singapore

B.S. in Applied Mathematics, 2017–2021

- Highest Distinction
- Specialisation in Mathematical Modelling and Data Analytics

Research Interests

My research is in the field of deep learning and forming a bridge between that and mathematics. I have experience working with transformers, mixture of experts and parameter efficient fine-tuning methods in both vision and language. My current interest is in finding simple and effective solutions to improve model architectures in leveraging pre-trained models for downstream tasks.

Conference Publications

Rachel S.Y. Teo, Tan M. Nguyen. "MoLEx: Mixture of Layer Experts for Fine-tuning with Sparse Upcycling". *International Conference on Learning Representations (ICLR), 2025 (journal-quality, acceptance rate: 32.1%).*

Stefan Nielsen*, **Rachel S.Y. Teo***, Laziz Abdullaev, Tan M. Nguyen. "Tight Clusters Make Specialized Experts". *International Conference on Learning Representations (ICLR), 2025 (journal-quality, acceptance rate: 32.1%).*

Viet Dung Nguyen, Minh Nguyen Hoang, **Rachel S.Y. Teo**, Luc Nguyen, Tan Minh Nguyen, Linh Duy Tran. "CAMEx: Curvature-aware Merging of Experts". *International Conference on Learning Representations (ICLR), 2025 (journal-quality, acceptance rate: 32.1%).*

Rachel S.Y. Teo, Tan M. Nguyen. "MomentumSMoE: Integrating Momentum into Sparse Mixture of Experts". *Conference on Neural Information Processing Systems (NeurIPS), 2024 (journal-quality, acceptance rate: 25.8%).*

Rachel S.Y. Teo, Tan M. Nguyen. "Unveiling the Hidden Structure of Self-Attention via Kernel Principal Component Analysis". *Conference on Neural Information Processing Systems (NeurIPS), 2024 (journal-quality, acceptance rate: 25.8%).*

Stefan Nielsen*, Laziz Abdullaev*, **Rachel S.Y. Teo**, Tan M. Nguyen. "Elliptical Attention". *Conference on Neural Information Processing Systems (NeurIPS), 2024 (journal-quality, acceptance rate: 25.8%).*

Computer skills

- Programming Languages: Python (PyTorch, JAX, Tensorflow), C/ C++
- Softwares: Matlab, R, SQL/SAS
- Microsoft: Excel, Powerpoint, Word

Honors and Awards

Dean's List (Top 5% of the cohort), May 2021.

Dean's List (Top 5% of the cohort), Dec 2018.

Professional services

Conference reviewing

- International Conference on Learning Representations (ICLR)

*: co-first authors