JONATHAN EDWARD TEO

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File Archive and Research Summaries: https://jet-portfolio-files.com

WORK EXPERIENCE

Singapore Management University | School of Computing and Information Systems

Undergraduate Research Programme (Quantum Reinforcement Learning for Neural Combinatorial Optimization)   Aug 2024 – Present

- Increased the maximum number of qubits trainable via QRL from 20 to 55, via exploiting properties of the optimization landscape at Depth 1, this sped up the training process of a Depth 1 ansatz significantly **(A)**
- Discovered a new interpretation for the parameters of a Depth 1 ansatz in the context of the Travelling Salesman Problem, without relying on the present literature of Geometric Quantum Machine Learning **(A)**
- Presented a negative finding: that the policies learnt by the current state of the arts ansatz design does not outperform the best tour *of* a Probabilistic Nearest Neighbour (PNN) algorithm under a finite number of trials **(B)**
- Proposed a minimal modification to the current state of the art ansatz design to improve the ansatz past a PNN algorithm, showing that the current ansatz benefits from global tour information

(A) *Training Optimization for QRL of a Depth 1 ansatz for The Travelling Salesman Problem* – submitted to QTML 2025.
Link: https://jet-portfolio-files.com/qtml2025/training-opt.pdf
(B) *Comparison of a Probabilistic Nearest Neighbour Algorithm with the Depth 1 Ansatz for TSP* – submitted to QTML 2025.
Link: https://jet-portfolio-files.com/qtml2025/comp-with-pnn.pdf

Agency of Science, Technology and Research (A*STAR) | Institute of High Performance Computing

Research Intern (Advancing Quantum Control using Deep Reinforcement Learning)   May 2024 – Aug 2024

- Applied Deep Reinforcement Learning (DRL) as a strategy to find a control pulse that maximizes the fidelity of quantum calculations using a single-qubit gate in two level open quantum systems using PyTorch, Stable Baselines, QuTIP and Qiskit libraries
- Explored and learnt DRL algorithms such as Proximal Policy Optimization, Temporal Difference Learning, and Function Approximation
- Proposed a new action space where the agent learns parameters of different pulse waveforms and pulse durations, reducing total number of updates to the DRL Agent's policy, currently unexplored by existing literature
- Improved learning rate by suggesting different reward designs to penalize longer pulse durations, which has not been explored by existing literature

Research Summary: https://jet-portfolio-files.com/summary/qocdrl2024.pdf

Singapore Management University | School of Computing and Information Systems

Research Assistant (Text to Speech Research)   Aug 2023 – Dec 2024

- Developed a Singaporean-sounding Text-to-Speech model by finetuning Microsoft's SpeechT5 model in PyTorch
- Processed IMDA National Speech Corpus audio files and stored dataset in HuggingFace Hub
- Containerised working directory using Docker and trained model using GPUs on AWS Elastic Compute Cloud

Research Summary: https://jet-portfolio-files.com/summary/tts2023.pdf

Research Assistant (Social Network Analysis)   Apr 2023 – Jun 2023

- Co-authored a research publication on peer helping behaviour of students with Associate Professors Manoj Thulasidas and Kyong Jin Shim, received the best paper award at IEEE TALE 2023
- Conducted Social Network Analysis for a research project to investigate variations in peer-helping behaviour and how it impacts academic performance using Python NetworkX and Gephi
- Modelled peer-helping behaviour of students in a class as a weighted directed social network
- Spearheaded analysis of cluster-level peer helping, with clusters computed from community-detection algorithms

Publication: https://ink.library.smu.edu.sg/sis_research/8505
Research Summary: https://jet-portfolio-files.com/summary/sna2023.pdf

BOSCH South East Asia | Corporate Research

Data Science Intern   Dec 2021 – Jul 2022

- Developed machine learning models to detect clogging status of car air-conditioning filters
- Experimented with multiple regression, ensemble regressions, data-compression techniques for model selection in Scikit-Learn
- Conducted lab experiments for training data collection

Research Summary: https://jet-portfolio-files.com/summary/bosch2022.pdf

EDUCATION

Singapore Management University (SMU)

BSc (Computer Science): IT Solution Development (Artificial Intelligence)   Aug 2022 – Jun 2026

- SMU School of Computing and Information Systems Achievement Scholar
- Dean's List (2022 – 2023, 2023 – 2024, 2024-2025)
- Cumulative GPA: 3.93 / 4.00 | Summa Cum Laude | Transcript: https://jet-portfolio-files.com/SMU/transcript.pdf

TECHNICAL SKILLS

Programming Languages & Software
- Python3 (incl. Numpy, Pandas, Scipy, Matplotlib, Scikit-Learn, NLTK, NetworkX)
- Pennylane, Qiskit
- TensorFlow, PyTorch
- Docker
- C++, C, x86-64 assembly
- Amazon Web Services (EC2, SageMaker, S3)
- Angular, Spring Boot, PostgreSQL

Domain Related Skills
- Deep Reinforcement Learning
- Quantum Reinforcement Learning
- Combinatorial Optimization
- Quantum Optimal Control
- Social Network Analysis
- Text-to-Speech Synthesis
- Text-to-Speech Synthesis
- Web Development
- Data Management
- Research Project Management
- Technical Presentations

ACHIEVEMENTS

The 2025 ACM International Collegiate Programming Contest (ICPC)

Representing Singapore Management University | Team Bogosort   Aug 2024 - Present
- The 2024 ICPC Asia Hanoi Regional Contest – High Honour
- The 2025 ICPC Asia Pacific Championship – Honourable Mention

ICPC ID: https://icpc.global/ICPCID/HPS3DEDLCEEG

SOCIETIES & CLUBS

Ellipsis SMU Computing & Information Systems Society | Technology Department

Technology Director | 20th Managing Committee   Dec 2023 – Nov 2024
- Authored algorithmic coding questions for Singapore Management University's annual coding competition Code# 2024
- Conducted workshops for the SCIS student body to better prepare for challenging modules in SMU

Link to Code# 2024 Problem set: https://www.hackerrank.com/contests/ellipsis-code-24/challenges