Rae Wong Ying Yee

Systems and Machine Learning

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Senior Thesis

"Optimizing Adaptive Machine Learning computation on Heterogeneous Devices"

My final year thesis with the Catalyst research group explores the distribution and parallelism of adaptive machine learning computation with the aim of building an optimized heterogeneous system. In adaptive ML, different computation units are triggered based on its input. This correlation between the activation of computation units can be leveraged to distribute workload in both compilation and runtime, allowing us to take advantage of recent heterogeneous architecture developments to achieve a substantial speedup.

Work Experience

MAY 2022 – AUG 2022   (SG)

Open Government Products
Software Engineering Intern full stack developer on open source product

- Automated E2E smoke tests using Cypress, Gmail API and Twilio API and integrated them into the CI/CD pipeline, reducing deployment time by 20%.
- Built a custom html converter to enable copy-and-pasting of styles from MS Word to our rich text editor based off the Draft.js framework by Meta.
- Implemented search, filter and sort functions on the dashboard by introducing new frontend designs, backend APIs, sequelize queries and routing tests.
- Deployed app to AWS Amplify, EB and ECS using dockers and github actions.

JAN 2022 – CURRENT   (US)

Carnegie Mellon University
Teaching Assistant 15-210 : Parallel and Sequential Data Structures and Algorithms

- Teach parallel algorithms using functional programming in a core CS class.
- Hold recitations and office hours to clarify any doubts and provide feedback readily.

APR 2021 – DEC 2021   (US)

Carnegie Mellon University
ML Research Assistant Computer Music Lab

- Developed a model for music prediction and to further extract repetition patterns.
- Implemented Variable Order Markov Models to improve prediction results by 30%.
- Conducted confidence weighting to blend foreground and background learning, which incorporates song and genre specific information, boosting accuracy by 10%.

AUG 2020 – SEP 2020   (SG)

Insignia Ventures Partners
Software Engineering Intern Web development

- Created a VC simulator to visualize ownership division per series of funding.
- Deployed an interactive version of the simulator as an online compute tool for all and benefited over 50 international startups by flagging out risks of fund raising.

JAN 2020 – MAR 2020   (SG)

Government Technology Agency
Computer Security Intern IoT – Bluetooth Low Energy (BLE)

- Researched on BLE for TraceTogether, a Covid contact tracing app used by millions.
- Led testing of bluetooth devices and drafted nationwide security standards.
- Demonstrated XSS attack on an IoT system to heighten awareness of vulnerabilities.

JAN 2017 – JAN 2019   (SG)

Agency for Science, Technology and Research
Research Assistant System Security and Machine Learning

- Designed and implemented a software to configure Linux iptables firewall with ease.
- Customized the product for the nation's critical transport infrastructure by supporting the Modbus protocol and filtering of proprietary instruction codes.
- Expanded it into a robust Intrusion Detection System using semi-supervised ML to reduce reliance on rule-based detection and manual configuration.

Education

2023 – 24	**M.Sc. in Computer Science** **Carnegie Mellon University** Catalyst Research Group
2020 – 23	**B.Sc. in Computer Science** **Carnegie Mellon University** DEAN'S LIST HIGH HONORS GPA 4.0/4.0
2018 – 19	**Cambridge A-Levels** TOP IN COMPUTING 7 Distinctions

Courses

15897	Parallelism and Concurrency
15451	Design and Analysis of Algorithms
15210	Parallel Algorithms
15259	Probability and Computing
15251	Great Theoretical Ideas in CS
15440	Distributed Systems
15346	Computer Architecture
17363	Programming Language Pragmatics
16385	Computer Vision
18330	Computer Security

Skills

LANGUAGES	C/C++, Java, Python Standard ML, OCaml Javascript, Typescript
TOOLS	OpenCV AWS Node.js ReactJS, HTML/CSS

Extracurriculars

2022	**Outreach Coordinator** CMU Project Smile
2022	**Teaching Volunteer** Epworth Community Services
2019	**Co-Chairperson** International Science Youth Forum

Awards

Summer Undergraduate Research Fellowship, Carnegie Mellon University

Bronze, Science and Engineering Research Fair

Joint First in Nationals, International Mathematical Modelling Challenge

Championship and Best Defender, Cyber Defenders Camp CTF