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 research thesis explores the distribution and parallelism of adaptive machine learning computation. I was motivated to build an optimized heterogeneous system after noticing the correlation between the activation of different compute units. This correlation can be leveraged to distribute workload in both compilation and run-time. I believe with the current development of GPUs, taking advantage of heterogeneous architecture, on top of existing optimization techniques such as FlexFlow, can achieve a substantial speedup.

Work Experience

MAY 2022 – AUG 2022 (SG)

Open Government Products
Software Engineering Intern open source customize-and-broadcast 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.
- Introduced search and sort functions on dashboard to enhance user experience.

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 dynamically blend foreground and background learning, boosting accuracy by 10%.

AUG 2020 – SEP 2020 (SG)

Insignia Ventures Partners
Software Engineering Intern Web development

- Created a VC simulator to visualizes 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 to ensure security of Trace Together, a Covid-19 contact tracing app, protecting privacy of millions of users.
- 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 to protect the nation's transport infrastructure, by supporting the Modbus protocol and filtering of proprietary instruction codes.
- Expanded it into a robust Intrusion Detection System using semi-supervised machine learning to reduce reliance on rule-based detection and manual work.

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
15259 Probability and Computing
15440 Distributed Systems
15346 Computer Architecture
17363 Programming Language Pragmatics
16385 Computer Vision
18330 Computer Security

Skills

LANGUAGES C, Java, Python
Standard ML
Javascript, Typescript

TOOLS OpenCV
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