Yuhan Tan

(607)–233–3661 - [yt628@cornell.edu](mailto:yt628@cornell.edu) - linkedin.com/in/yuhan-aaron-tan

# EDUCATION

**Cornell University Ithaca, USA**

*Candidate for Master of Information Science; GPA: 3.8/4.0 08/2023 - Present*

**University of Liverpool Liverpool, UK**

## (First Class Hons)BEng in Computer Science and Electronic Engineering; GPA: 3.8/4.0 09/2021 - 07/2023

**Xi’an Jiaotong-Liverpool University Suzhou, China**

*Major in Computer Science and Technology 09/2019 - 07/2021*

# SKILLS

**Languages:** Java, Python, C++, C#, C, SQL, Shell, HTML, R

**Framework&Tools:** Spring, Spring Boot, MySQL, Redis, MyBatis Plus, Kafka, Docker, Linux, CentOS, Knife4j, Hadoop, Hive, HDFS, VIM, Qt, GIT, PyTorch, TensorFlow, Numpy, AWS, Jira, Agile

# EXPERIENCE

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**Software Development Intern Spring Boot, MyBatis Plus, MySQL, Redis 05/2024 - 08/2024**

*NextTier Sacramento, CA*

* Implemented **distributed sessions** to synchronize login states across distributed servers by using **Redis**. Enabled single field modification by using **Hash** instead of **JSON** to store user information, reducing memory **by 20%**.
* Worked closely with frontend teams to reduce API response time **by 95%** by caching user information in **Redis** and ensuring data integrity with **custom Redis serializers**.
* Led efforts to introduce scheduled **cache warming** with **Spring Scheduler**, improving initial access speed **by 97.7%**.
* Implemented database write operations by using **custom thread pools** with **CompletableFuture** concurrency, reducing the import time for **1 million** rows **from 300 seconds to 54 seconds**.
* Introduced friend similarity matching function using the **edit distance algorithm**. Led a team of 3 engineers to optimize matching speed **from 34 seconds to 7 seconds** through memory optimizations, selective data retrieval, and caching strategies, inspired by **large-scale** recommendation systems.
* Collaborated with cross-functional teams to enhance concurrency control by **Redisson distributed locks** to prevent duplicate team joining and exceeding team capacity, ensuring **mutual exclusion** and **API idempotency**.

**Software Development Intern Kafka, Spring Boot 08/2023 - 12/2023**

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*Eth Technology Newark, CA*

* Coordinated with senior engineers to develop a **streaming microservice** capable of processing over **1000 events** concurrently, using **Kafka** and **Spring Boot** to ensure efficient and **scalable** event handling.
* Consulted with the product team to design and built **REST APIs** for event consumption and publication to Kafka topics, implementing Kafka Consumer and Producer patterns.
* Implemented **unit tests** and **integration tests** using **JUnit** and **Embedded Kafka**, achieving **90% code coverage**; Conducted **end-to-end testing** for different scenarios of data-streaming APIs using **Postman**; Implemented **concur- rency testing** & **automatic load testing** process using **Jmeter**.
* Integrated **Spring JPA** and utilized **H2 database** to store events metadata.

**Machine Learning Researcher NLP, BERT, PyTorch 02/2024 - 05/2024**

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*American Express Ithaca, NY*

* Collaborated with cross-functional teams to develop a method to detect **BERT**’s prediction errors over financial dataset by applying **Louvain** and **HDBSCAN clustering**.
* Developed a method to identify BERT’s misclassification patterns by categorizing mislabels into topics, and analyzed BERT’s **internal activations** using **Captum** to visualize attention score and uncover error-prone areas.
* Led a team to adjust the model’s architecture, introducing a **Specialized Attention Layer** and applying **Weighted Loss** for error-prone classes, resulting in a **13% improvement** in model accuracy.

# PROJECTS

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**Asynchronous Processing Framework: AaronFlow Spring Boot, MySQL, Redis 03/2024 - Present** *AaronFlow is an asynchronous task processing framework developed in Java that supports* ***automatic scheduling****,* ***automatic retries****, and* ***fiexible task configuration****.*

* Implemented a two-layer architecture with Flowsvr (Server) providing **HTTP services via APIs** for **task querying, scheduling, and management**, and Aaron (Worker) pulling and consuming tasks, achieving a separation between **distributed task scheduling** logic and **business** logic.
* Designed database tables by separating task information, configuration, and scheduling, achieving a **loosely coupled** structure that reduces dependencies between tables. Used **indexing** for quick **task retrieval**, allowing flexible **task registration** and **management**.
* Implemented **timeout task monitoring** and **recovery**, using a **polling** mechanism to regularly check task status. Monitored table size to trigger **table partitioning** when thresholds are reached.
* Optimized multi-worker coordination by initially using **MySQL row-level locking** to prevent multiple Workers from pulling the same batch of tasks, and later improved performance by introducing **Redis distributed locks** on the Aaron (Worker) side.
* Implemented performance optimization by conducting **stress testing** with **wrk and Lua scripts** to analyze bottle- necks. Utilized a **MySQL connection pool** and increased the maximum number of connections, improving through- put **from 100 QPS to 500 QPS**.

**Machine Learning to Analyze 3D Microscopy Images** *|* **Deep Learning, UNet 09/2022 - 05/2023**

* Collaborated with cross-functional team to develop and fine-tune an **ensemble of five UNet-based deep learning models** to segment IMPDH2 structures in 3D microscopy images, achieving an average **Dice score of 0.81**.
* Designed and implemented robust pre-processing pipelines to handle domain shifts using **automatic scaling** and

**normalization**, improving average Dice scores **by 258%, from 0.279 to 0.72**, across various microscopy setups.

* Developed a **Qt-based** desktop application with multi-threaded processing and replaceable weights files, resulting in a **6000% increase in efficiency** compared to manual segmentation methods.
* This project was awarded the **Edgar Walford Marchant Prize**, and the research paper based on this project will be published in the **BMC Bioinformatics journal**.