# SHUAIJUN LIU

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## EDUCATION

| Boston University | 01/2024 - 07/2025 |
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**M.Sc. in Applied Data Analytics**   *Accepted offer for Fall 2023 (23fall) and deferred until 2024 (24spring)*

| Hong Kong Baptist University | 09/2019 - 06/2023 |
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**B.Sc. (Honours) in Statistics and Data Science (Major) & Computer Science and Technology (Minor)**

Main Courses: *Data Analysis by R, Database Management System (SQL), Data Structures and Algorithms, Object-Oriented Programming (JAVA), Principles of Compilers, Data Mining, Advanced Statistics, Time Series Analysis, C++*

## ACADEMIC RESEARCH        *Supervisors and Acknowledgements: Prof. Jingjin Wu, Yuhui Deng, Aihua Zhang* (Marked with *)

**Participate in Peer Review:** IEEE Transactions on Green Communications and Networking (TGCN) 2023. Transactions on Emerging Telecommunications Technologies (ETT) 2023. Int Conf on High Performance Computing & Communications (HPCC) 2023.

### Design and Optimization of a Network Model for UAV-Assisted Fog Computing        11/2021 - 12/2022

- **Key Words:** Cloud and Fog Computing, UAV Trajectory Planning Algorithms, High-Performance Distributed Computing
- **Overview:** This project involves deploying Unmanned Aerial Vehicle (UAV) equipment with powerful communication and computing servers at the edge of the Internet of Things (IoT), providing efficient and secure auxiliary computing services for users' mobile devices. We model and simulate the trajectory planning, resource allocation, and distributed task computing process of UAV obstacle avoidance flight, seeking the optimal solution based on two algorithms: Ant Colony Optimization (ACO) and Particle Swarm Optimization (PSO). Ultimately, we solve the problem through continuous convex approximation. Simulation results demonstrate a more than 40% improvement in fog computing network efficiency (weighted sum of energy consumption and delay) compared to existing baseline algorithms.
- **Publication:** S. Liu, J. Yin, Z. Zeng, and J. Wu*, "Optimal trajectory planning and task assignment for UAV-assisted fog computing," *2022 IEEE 24th Int Conf on High Performance Computing & Communications (HPCC)*, pp.1400–1407, doi:10.1109/HPCC-DSS-SmartCity-DependSys57074.2022.00217.
- **Supports:** Partly supported by the Guangdong Provincial Science and Technology Innovation Fund, Information technology category 2023 (Grant No.: *pdjh2023b0593*), the Guangdong Provincial Key Laboratory of Interdisciplinary Research and Application for Data Science (Grant No.: *2022B1212010006*).

### UAV Attitude Control and Trajectory Planning System Development        12/2022 - 10/2023

- **Key Words:** UAV Attitude Control System, Hardware and Software System Design, Heuristic Algorithm Optimization
- **Overview:** In this project, we proposed an anti-lockout ant colony system (ACS-DS) algorithm with two mechanisms for setting decoupling & safety values to solve the problem of local optimization in three-dimensional trajectory planning of the Unmanned Aerial Vehicle (UAV), taking into account the energy efficiency of a single UAV assisted fog computing network. We have integrated a fuzzy PID attitude control system for a quadrotor UAV, which is the first application of a UAV control system in an open paper in the field of Assisted Fog Computing as of October 23, and has been shown to significantly reduce ($\geq$34%) the consumption of an existing model.
- **Publication:** S. Liu, J. Du, Y. Zheng, Y. Deng* and J. Wu*, "A Holistic Optimization Framework for Energy Efficient UAV-assisted Fog Computing: Attitude Control, Trajectory Planning and Task Assignment," *2023 Transactions on Cloud Computing (TCC)*. Peer review.
- **Supports:** Partly supported by the Guangdong Higher Education Upgrading Plan 2021-2025 (Grant No.: *UIC R0400001-22*), the Zhuhai Basic and Applied Basic Research Foundation Grant (Grant No.: *ZH22017003200018PWC*).

### Text-based Stock Price and Investor Sentiment Analysis        07/2022 - Present

- **Key Words:** Natural Language Processing (NLP), Data Mining (Scrapy Framework), LSTM Neural Networks, Sentiment Text Analysis
- **Overview:** This project aims to study the role of sentiment analysis in stock prediction. We used the Scrapy framework and BeautifulSoup web parser to crawl 400,000 stock comments text and their corresponding historical trading data from the East-money stock bar, and stored them in a database. We extracted the text feature vectors using jieba word splitting and TF-IDF methods, used a SVM sentiment classifier to classify the crawled text data into sentiment polarities and constructed an investor sentiment index. Finally, we trained price prediction models using LSTM neural network and ARIMA time series, the prediction result is a significant improvement over the baseline evaluation criteria.
- **Publication:** S. Liu, X. Hu, J. Wu*, and A. Zhang*, "An Empirical Analysis on Stock Price and Investor Sentiment Based on Text Analysis," Manuscript.

**Convolutional Neural Network & Computerized Image Recognition Based Surroundings Prediction and Trajectory Planning in UAV-Assisted Fog Computing**                                   10/2023 - Present

- **Key Words:** Deep Learning, Computerized Image Recognition (CIR), Fog Computing, UAV Trajectory Planning
- **Overview:** The focus of this project is to utilize deep learning to help Unmanned Aerial Vehicles (UAVs) predict changing trends in the environment during assisted fog computation in order to enhance UAV execution efficiency in various environmental contexts. First, OpenCV computer vision library is used for topographic image reading, edge detection, and segmentation. The map data combined with solar radiation is used to build hydrodynamic and meteorological models, which include temperature, humidity, atmospheric pressure, wind speed, and wind direction. Next, a convolutional neural network (CNN) is trained to enable the UAV to predict the environment based on sensor and terrain image recognition. Additionally, model sharing and collaborative learning among multiple UAVs are achieved through fog computing network, allowing the UAVs to movement while avoiding abnormal terrain and meteorological regions. Compared to movement without considering predicted surroundings, the chance of crashing due to abnormal areas and weather is reduced by about 64%.
- **Publication & Supports:** S. Liu, X. Hu, J. Yin, Y. Deng*, and J. Wu*, "CNN & CIR-Based Surroundings Prediction and Trajectory Planning in UAV-Assisted Fog Computing," Manuscript.

**Others**                                   09/2019 – Present

- **A Data-Driven Approach for Optimal COVID-19 Medical Resource Allocation by SVIR Model and Gurobi Solver:** This study proposes an integrated model for vaccine distribution and critical medical resource allocation in response to the COVID-19 pandemic. Using China as a case study, we categorized the population by region and age stage, Modeled SVIR and estimated the shortage of resources based on future demand. By utilizing the Gurobi solver to optimize the allocation to minimize infections, hospitalizations, and deaths. (J. Du, S. Liu, Y. Zhen)
- HTML and Database Based Takeaway Website Construction, Deep Learning-based Credit Card User Evaluation and Default Prediction, …

## INTERNSHIPS

**Cross-Border Sustainable Children's Wear Brand ayaMaa**                                   06/2021 - Present

*Co-founder & Research Analyst*

- Jointly founded the brand ayaMaa and launched the first 20 SKUs of the "First Light" and "The Meadow" collections for sale on the standalone website (https://www.ayamaa.com) in June 2022 to sell to 7 countries, including the U. K., the U. S., France, and Germany.
- Plugins available to cross-border e-commerce in Amazon and Shopify and improved the website structure and functions with HTML
- Investigated and assessed more than 47 brands' overseas markets, current situation and anticipation of industries by using Python and R.

**Chengdu Xinchao Media Ltd.**                                   07/2021 - 09/2021

*Technician of the Face Recognition Development Project, Digital Platform Department*

- The Face Recognition Development Project Team is mainly responsible for developing and managing the face recognition system.
- My specific responsibilities are the annotation of facial feature data and the screening of similar faces, as well as participating in the extraction of facial features, image coding and low-resolution image optimization of the recognition model in the face recognition system to improve the accuracy of face detection.

**Others**

- **Beijing Normal University-Hong Kong Baptist University UIC** (*Data Administrator of the Four-Point Office*)   09/2021 - 12/2021
- **Shenzhen Wanhong Asset Management Co., Ltd.** (*Data Analyst*)   06/2020 - 08/2020

## AWARDS & SKILLS

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| Outstanding Graduation Thesis | 06/2023 |
| National Second Prize & Guangdong First Prize of the China Undergraduate Mathematical Contest in Modeling | 09/2022 |
| Meritorious Winner of the 2022 Mathematical Contest in Modeling | 05/2022 |
| Second Prize (Guangdong Division) of the 2021 Contemporary Undergraduate Mathematical Contest in Modeling | 10/2021 |
| Best Writing & Planning Award (UIC) | 05/2021 |
| Top Ten Outstanding Volunteers of the Year (UIC) | 12/2020 |

- ➤ **Office:** Excel, PPT and other office software, Linux (Ubuntu) operating system, configuration and use of virtual machines (VMware).
- ➤ **Programming & Development:** Python, Matlab, R, JAVA, C++, Deep learning and Heuristic algorithm optimization, Data mining, Object-Oriented Programming, Basic concepts and operations of WEB front-end (HTML) and some back-end (SQL).
- ➤ **Language:** IELTS 6.5
- ➤ **Others:** Computer assembling, CPU overclocking and BIOS (Basic Input/Output System) debugging.