# Suei-Wen Chen

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## RESEARCH INTERESTS

I am broadly interested in the mathematical and probabilistic aspects of machine learning and data science, and more specifically the application of Markov chains and probability theory in reinforcement learning. On the application side, I am also interested in continual learning, natural language processing and computer vision.

## EDUCATION

**New York University Abu Dhabi** *Bachelor of Science*                                          Aug 2019 - May 2023

Major: Mathematics, Minor: Computer Science, Cumulative GPA: 4.0/4.0 (summa cum laude)

## ACEDMIC EXPERIENCE

**Research Assistant** | *Division of Science, New York University Abu Dhabi*          Sep 2023 - Present

Works on the mathematical aspect of machine learning under Dr. Pierre Youssef, with projects including:

- Establishing convergence properties for Monte Carlo algorithms in Markov decision processes
- Investigating the model collapse phenomenon in language models due to recursive training
- Application of tensorization and functional inequalities in multi-modal classification using entropy regularization
- Causality-based incremental learning for image classification

## RESEARCH PROJECTS

**A Fuzzy Decomposition Method to Establish Functional Inequalities** | *Undergraduate Thesis*          Mar 2022 - May 2023

Proposed a generalization of a previous result that establishes functional inequalities via Markov chain decomposition (submitted to the Minnesota Journal of Undergraduate Mathematics). The paper is linked here, and the entire Capstone Project can be found here.

## PROJECTS

**Column generation for mixed integer programming** |                                          Jul 2023 – Aug 2023

Combined graph-reduction algorithm and column generation for solving a modified vehicle routing problem

**Reinforcement learning on vehicle routing problems** |                                          Dec 2022 - Feb 2023

Combined multi-arm bandit algorithm and local search methods for stochastic vehicle routing problem

**Effects of colonialism on sentiments towards Queen Elizabeth II** |                                          Oct 2022 – Dec 2022

Emotion analysis on Tweets to compare the difference in sentiments towards the queen's death between former British colonies and other countries (project repo)

**Feature engineering for unbalanced class classification of delivery data** |                                          Sep 2022 - Oct 2022

Process features for classification with unbalanced class using gradient boosting classifier and data augmentation

**Smart addressing system** |                                          Apr 2022 – Aug 2022

Named-entity recognition for UAE addresses using language models and graph-based methods; outperformed several commercially available geocoding services

**Towards self-driving car** |                                          Oct 2021 – Dec 2021

Application of the YOLOv3 algorithm on real-time object detection in videos for self-driving car use case

**Debunking the myth regarding Ghost Month and drowning** |                                              Oct 2021 – Dec 2021

Data analysis on drowning in relation to the Ghost Month, a traditional belief in East Asia (project repo)

## WORK EXPERIENCE

**Data Science Intern** | *Swftbox Delivery Service LLC, UAE*                    Mar 2022 - Feb 2023, Jul 2023 - Aug 2023

Produced data-driven and mathematical solutions to optimize last-mile logistics, including a geocoding pipeline, prediction

algorithms, and mathematical optimization for vehicle routing problems

**Intern** | *Arab Chamber of Commerce Taiwan, Taiwan*                                            Jun 2020 - Aug 2020

Produced commercial clips for Taiwanese businesses targeting Arab countries

**Teacher and administrative assistant** | *Julia's English Classroom, Taiwan*                    Feb 2019 - Sep 2023

Gave English classes, engaged in classroom administration and promotion, compiled teaching materials for various levels

## VOLUNTEER AND LEADERSHIP EXPERIENCE

**Vice Director** | *Global Devotion Association, Taiwan*                                          Jun 2017 – Present

Organized cultural exchange programs between Taiwan and the US, summer camps, volunteering and community outreach

in aboriginal tribes and hospitals; promoted student initiatives and leadership

## LANGAUGES AND SKILLS

**Programming Langauges/Skills** |

- Langauges: Python, Julia, C++, Java

- Data science and machine learning: pandas, numpy, scipy, scikit-learn, PyTorch

- Data visualization: matplotlib, seaborn

- Database building and management (SQL, noSQL)

- Geospatial data analysis and visualization (OpenStreetMap)

- API building

**Langauges** |

Mandarin (native), English (proficient), Arabic (intermediate)