Weihao Sun

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EDUCATIONAL BACKGROUND

Cornell University   *Ithaca, United State*
Master of Science in Systems Engineering   *Ausgust 2024 – May 2026*
Thesis: AI Recommendation for Lane Changing Applying Cyber-Physical Human Systems (CPHS).
Advisor: Dr. Andreas A. Malikopoulos

Cornell University   *Ithaca, United State*
Master of Engineering in Systems Engineering   *Ausgust 2024 – May 2025*
Relavent Courses: Model Based Systems Engineering (A), Optimal Control and Decision Theory, Project Management and Leadership for Complex Systems (A+), Engineering Stochastic Process.

University of British Columbia   *Vancouver, Canada*
Bachelor of Science in Statistics | Minor in Data Science   *August 2019 – May 2024*
Relavent Courses: Probability (A+), Statistical Inference for Data Science (A), Machine Learning and Data Mining (A), Statistical Learning (A), Statistical Modelling for Data Science (A)

WORKING EXPERIENCE

CSCEC International Construction Co., LTD. | *Data Analyst Intern*   *June 2024 – August 2024*
- Analyzed purchase data for over 50 construction projects, identifying trends and patterns to optimize procurement processes, resulting in a 5% reduction in costs.
- Reviewed and verified monthly purchase detail calculations totalling over ¥200 million to ensure accuracy and compliance.
- Developed and maintained data dashboards, increasing reporting efficiency by over 30% and supporting decision-making.
- Collaborated with cross-functional teams to simplify the data collection and reporting pipeline, reducing processing time by over 25%.

Triple Eagle Logistics Vancouver | *Data Engineer Intern*   *May 2022 – August 2022*
- Developed, tested, and maintained an internally used automatic bill calculation system.
- Updated and maintained the company database; Analyzed the database structure; designed and modified the structure to cater to different use cases.
- Designed the Microsoft Power Automate pipeline to Use Excel Online to write Office Script to automatically fill in charging rates, amounts, and dates into the daily form.
- Matched and extracted essential information such as tracking numbers and prices from large, noisy data provided by clients for usage by other departments, which improved the working efficiency by over 60%.

RESEARCH EXPERIENCE

Cyber-Physical Human System (CPHS): An AI Lane Changing Recommendation Application   *October 2024 – Present*
Personal Thesis, Cornell University
Supervisor: Dr. Andreas A. Malikopoulos
- Aimed to enhance AI-driven recommendations for vehicle lane adherence and switching in autonomous driving systems by incorporating human behavior dynamics, improving decision-making reliability in real-world scenarios.
- Conducted a comprehensive literature review on CPHS frameworks, including mathematical and statistical derivations and proofs of lemmas, methodologies to adapt the framework for diverse application areas.
- Refined and extended the CPHS framework by introducing new mathematical formulations and functional components tailored to address the complexities of lane recommendation problems in mixed human-AI environments.
- Currently preparing for model validation and simulation using state-of-the-art autonomous driving platforms (e.g., CARLA), and optimizing AI recommendations through reinforcement learning techniques such as Q-learning.

Enhancing Post-Pregnancy Loss Mental Health Support Decision Tool
Research Project, Cornell University   *September 2024 – Present*
Supervisor: Dr. Clifford Alan Whitcomb, Dr. Yiye Zhang
- Aimed to develop a clinical decision support tool for personalized mental health interventions in patients experiencing pregnancy loss, for the doctors to make decisions on predicted risk levels.
- Conducted literature review on methodologies to find factors influencing risk levels in post-pregnancy complications and predictive models for risk assessment.
- Currently working on generateing data visualization, summary, and analysis results using PRAMS healthcare data.

Physics-Informed Neural Networks (PINNs) for Battery Modeling
Research Assistant, University of British Columbia   *November 2021 – April 2022*
Supervisor: Maricela Best McKay (Ph.D. at University of British Columbia)

- Contributed to the PINN for Battery Modeling Project, aiming to solve partial differential equations of battery modelling to improve current performance.
- Developed and analyzed the PINN model using Julia, fitted the model to existing data to solve positive and negative electrode concentrations with respect to scaled time and particle radius.
- Conducted literature survey on PINN, SPM, and Lithium batteries. Performed battery data cleaning, analyzing, and visualization. Using PyBamm to generate simulated data.

PROJECTS

Forecasting the Demands for Urgent Care Service　　　　　　　　　　　　　　*July 2023 – February 2024*
Team Project, Borealis AI & University of British Columbia
- Applied and evaluated advanced machine learning models, including Neural Networks, Time Series models, etc., to predict local emergency department demands.
- Utilized the Hospital Triage Dataset on Kaggle as a starting point, and merged local climate and holiday data as additional feature creations.

Classification on Smog Ratings of Cars in the Year 2022　　　　　　　　　　*January 2023 – April 2023*
Team Project, University of British Columbia, STAT 447
- Performed early-stage raw data collection via public channels, including National Statistics Bureau, etc.
- Applied Naïve Bayesian analysis, KNN, and SVN strategies for model construction and autonomous testing.
- Applied classical statistical methods, including confidence and prediction intervals and their calibration to evaluate models.
- Adopted transformers including SVD and PCA for model improvements.

Building Packages and Data Analysis Pipelines for Zoo Analysis　　　　　　*January 2022 – April 2022*
Team Project, University of British Columbia, DSCI 310
- Implemented and evaluated various machine learning models (k-nearest neighbor, decision tree, support vector machine, and logistic regression) to classify animal specifies based on physical features.
- Developed a reproducible pipeline for the classification problem, and integrated the pipeline using Docker.
- Developed, maintained, and published Python packages encapsulating commonly used functions in the pipeline to enhance reproducibility.

Amusement Park Management System (APMS)　　　　　　　　　　*September 2021 – December 2021*
Team Project, University of British Columbia, CPSC 304
- Developed an amusement park management system from scratch using Django framework, enabling streamlined operations and scalability to model various park activities.
- Implemented an SQLite database modelling functions on services, employment management, and amusement facilities, ensuring robust data organization and efficient query processing.
- Designed the user interface of the application with the Bootstrap 4 template.

Harry Potter Themed Text-based Role-playing Game　　　　　　　　　　　*May 2020 – August 2020*
Personal Project, University of British Columbia, CPSC210
- Developed in the progress of both console-based and GUI-based versions and maintained simple transitions.
- A turn-based RPG where players engage in battles using a selection of spells, each with unique attack values, against progressively challenging enemies, enhancing the immersive Harry Potter-themed experience.
- Implemented a dynamic archive management system allowing players to choose from various wizards, each with distinct HP and ATK stats, adding strategic depth to battles and ensuring a varied gaming experience across different sessions.
- Included a well-designed interface, stories, characters and portraits.

AWARDS

Faculty of Science Dean's Honor List　　　　　　　　　　　　　　　　*May 2020, May 2021*
Outstanding International Student Award　　　　　　　　　　　　　　　*August 2019*

LANGUAGE & TECHNICAL SKILLS

Programming Languages:
- **Proficient**: Python, R, SQL.
- **Familiar**: Java, Javescript, C++, C#, Julia, Racket, Dart.

Frameworks: Django, PyTorch, Flask, Node.js.
Developer Tools: Git/Github, Jupyter Notebook, Docker.
Natural Languages: Mandarin (Native), English (Proficient), French (Beginner).