Dawson Ren

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Education

Northwestern University, McCormick School of Engineering, Evanston, IL — Expected June 2024
Bachelor of Science in Industrial Engineering and Management Science, GPA: 3.91
Minor in Computer Science, Kellogg Certificate in Managerial Analytics

Relevant Coursework: Optimization I (Graduate-level class), Real Analysis, Optimization Methods in Data Science, Online Markets, Operations Engineering and Management

Research Experience

Sequential Decision Making for Equity and Fairness in Nonprofit Operations
Research Assistant, August 2023 - Present
Developing policies for equitable and sustainable vehicle routing for the Greater Chicago Food Depository with Professor Seyed Iravani. Constructing simulation model to validate policy performance under both static and dynamic allocation cases. Continuing research during the 2023-2024 school year for an undergraduate thesis.

Online Matching for Medical Professionals
Research Assistant, January 2023 - June 2023
Designed numerical experiments to evaluate heuristic methods on a variant of the revenue management problem in the healthcare matching context. Formulated equations for the total expected revenue of the static policy and the dynamic equations governing the online case. Participated in biweekly research meeting with Professors Seyed Iravani and Sanjay Mehrotra (Northwestern University Department of Industrial Engineering and Management Sciences) to demonstrate results. Developed a heuristic method that achieved 98% optimality for tested problem sizes.

Experiments in Online Markets
Project Member, January 2023 - March 2023
Characterized optimal bidding in first and second price auctions based on bid data collected from 30 students. Explored differences in Follow the Leader and Follow the Regularized/Perturbed Leader in regret minimization against adversarial payoff structures. Designed truthful mechanisms for exponential weights learners in generalized second-price auctions with reserve, culminating in learning the values of bidders.

Saint Louis University, Department of Biomedical Engineering
Research Fellow, May 2019 - July 2019
Performed UV-Vis Spectroscopy to study macromolecular crowding effects on collagen coagulation with applications to tissue repair. Worked with Professor Natasha Case to determine effect size at different concentrations to optimize free energy available to cells in the healing process. Conducted data analysis using Microsoft Excel and was awarded an Excellent Research Paper in the Students and Teachers As Research Scientists (STARS) program.

Leadership/Service

IEMS 302: Probability
Grader, September 2023 - Present
Grade homework and exams for the introductory probability class, consisting of 50 students.

Connections for the Homeless
Volunteer, January 2023 - August 2023

Analyzed survey data for over 300 local residents in under-represented communities for the Evanston Zoning Project. Presented findings to a city council that determines zoning policies, including the mayor.

Northwestern Department of Computer Science
Peer Mentor, March 2023 - June 2023
Held office hours for CS 321 (Programming Languages) in a class of 100 students. Received a 5.7/6 rating from students.

Design and Innovate for Social Change
Project Lead, January 2022 - June 2022
Lead the creation of a data visualization application to analyze customer spending in a team of five people. Decreased customer acquisition costs by 15% for Urban Tables, a catering company whose mission is to provide fresh, healthy meals to underprivileged communities.

Academic Student Learning and Advancement
Study Group Leader, September 2021 - June 2022
Held weekly study groups in general engineering (linear algebra, introductory physics, differential equations, modeling systems).

Projects

Operations Engineering and Management: Inventory Management Calculator (link). Supported by the Asher Family Fellowship, presented to the IEMS Advisory Board at Northwestern.

Ren, Dawson and Bhaskar, Ronik. "PizzaLang: A Language for Hungry Developers." Carnegie Mellon University, Pittsburgh, Pennsylvania, March 31st, 2023. Conference Publication.

Professional Experience

Caterpillar
Data Analytics, Frontend, and Backend Intern, June 2022 - August 2023
Analyze and clean datasets with tens of millions of rows from Snowflake using AWS Lambda Cloud functions. Pioneer use of machine learning model to automatically interpret severity level of oil samples for heavy machinery (bulldozers, excavators, etc.). Utilize robust statistical measures and validation techniques to determine the best model. Increased classification accuracy compared to the current rules-based model by 15%, saving thousands of hours of work for chemical analysts at labs around the world. Presented to executive leadership (Chief Digital Officer) for outstanding solution during the intern hackathon. Contributed to the VisionLink Mobile application and the distributed data streaming platform using Apache Kafka during the summer and fall of 2022.

Technical Skills

Mathematical Frameworks: COIN-OR, Google OR-Tools, PyTorch, Scikit-learn
Programming Languages: Python (advanced), Javascript (advanced), R (intermediate)
Development Frameworks: Amazon Web Services, Jupyter notebook, Numpy Stack, React/Angular

Example Personal Projects: Traveling Salesman Problem, GraphFlow, Markov Chain Text Generator

Languages

Chinese (fluent)
Spanish (conversational)