Shengnan Liu

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Education: Graduate

University of California, Santa Barbara (UCSB) Santa Barbara, California
Master of Science in Computer Science Expected Graduation Time: June, 2026
Cumulative GPA：N/A

Education: Undergraduate

University of California, Santa Barbara (UCSB) Santa Barbara, California
Bachelor of Science in Mathematics Graduation Time: June, 2024
Minors：Statistics and Data Science; Spatial Science
Cumulative GPA：3.76/4.00
Honor: UCSB College of Letters & Science Dean's Honors during Spring 2024, Winter 2024, Fall 2023, Fall 2022, Spring 2021, Winter 2021 Quarters

Skills

- Programming Languages：Python, JavaScript, C++, R, C, MATLAB
- Software Skills：PyCharm Community, VS Code, R-Studio, Jupyter Notebook, QGIS, Overleaf, MATLAB, Microsoft Excel, Microsoft Word, Microsoft PowerPoint
- Language Skills：English, Chinese

Work Experience

EVE Energy Co., Ltd. Huizhou, Guangdong, China
Analyst in Lean Lab, Engineer in Quality Research Office July, 10th, 2023 – Sep., 12th, 2023

- Learnt cell fundamentals and the entire production process by both impartment and in person visits
- Learnt to collect data on factory machines, built corresponding data frames in R-Studio, and analyzed the data
- Calculated the premium product yield rate and "monetary yield rate" to report whether each factory is in profit or loss based on given computing system, algorithms and datasets
- Developed a more accurate algorithm for "monetary yield rate" to more precisely assess the gains of factories
- Applied Excel formulas to calculate "continuous excellence date" of all manufacturing processes and used R-Studio to obtain the distribution of product deficiency amounts to report which processes need specialized improvements
- Applied Excel formulas to determine the existence of error in data transformation across different documents
- Participated in the optimization of Work In Process (WIP) management by offering algorithms and analysis
- Repaired broken Excel forms for factory employees so that future data can be more precisely and efficiently recorded and analyzed
- Analyzed and optimized the raw material claiming rules in use
- Fixed miswording, format and printing errors, and English authenticity issue of signage inside various factories
- Communicated with employees from factories and financial department to avoid data falsification and discrepancies
- Assisted working group members by recording information while they are busy with communicating with factory employees or by offering reminders and suggestions
- Offered suggestions regarding the 5S approach used in factories and lean lab
- Offered suggestions on Excel form standardization, intact database construction, and corresponding data analysis

Research Experience

Research on the Minimum Label Spanning Tree Problem Santa Barbara, California, USA
Subhash Suri, Distinguished Professor at University of California, Santa Barbara October, 2024 – December, 2024

- Investigated the Minimum Label Spanning Tree (MLST) problem to minimize edge label diversity in spanning trees
- Deeply Analyzed 2 heuristics solutions, including a logarithmic performance-guaranteed algorithm, for approximating NP-hard MLST solutions
- Proved NP-hardness of MLST problems via reduction and established performance bounds for efficient solutions
- Leveraged Union-Find structures, integer linear programming, etc. for optimized spanning tree construction

Research on Infinite Sets and the Axiom of Choice (Group Research) Santa Barbara, California, USA
Geunho Lim, Former Visiting Assistant Professor at University of California, Santa Barbara April, 2023 – June, 2023

- Wrote an individual mathematical paper introducing infinite sets and the axiom of choice, proving theorems and lemmas, constructing applications based on them, and generating reflections
- Filmed a video with group members: went over proofs, explained the importance of the axiom of choice and offered examples, applications, and reflections under the context of both the mathematical world and the real life
- Organized group discussions and meetings

Project Experience

Mobile App Development (Ongoing Group Project) September, 2024 –

- Name of the App: "**ezLoop**"
- Write code to generate mobile app pages, including Settings page, Product Detail page, etc.
- The team consists of eight member across different universities in the United States
- Aim to develop a mobile application that enables international students in North America to easily buy and sell second -hand furniture and daily necessities

Statistical Machine Learning (Individual Project) Santa Barbara, California, USA

Katie Coburn, Lecturer at University of California, Santa Barbara October, 2023 – December, 2023

- Chose Kaggle's Spaceship Titanic Dataset, a twist on the classic Titanic competition, and decided the topic of prediction: which passengers on the ship went missing after the ship's collision
- Conducted exploratory data analysis (EDA), data cleaning, and feature engineering
- Applied machine learning knowledge, including but not limited to classification and regression training, to develop models, such as random forest and gradient boosting machine, to predict which passengers were missing

Biometric Indicators of Heart Failure (Group Project)_ Santa Barbara, California, USA

Saad Mouti, Visiting Assistant Professor at University of California, Santa Barbara April, 2023 – June, 2023

- Analyzed the dataset, visualized the distributions of variables in the dataset, and selected variables of interest for further statistical analysis in R-Studio
- Built simple linear regression model and conducted hypotheses testing as well as t-test in R-Studio
- Built multiple linear regression model, conducted F-test, and derived confidence and prediction intervals in R-Studio
- Performed Lasso and Ridge regression to test for collinearity between predictors in R-Studio
- Performed weighted least squares method to explore whether a model with a higher explainability could be built

Geometry Investigation (Group Project) Santa Barbara, California, USA

Nathan Schley, Lecturer at University of California, Santa Barbara November, 2023 – December, 2023

- Investigated whether Side-Angle-Side Congruence (SAS) and Angle-Side-Angle Congruence (ASA) for triangles in Euclidean Geometry remain true for triangles in Non-Euclidean Geometry, including spherical and elliptic geometry
- Presented the findings and results, including but not limited to the proof that shows SAS holds in spherical geometry but fails in cylinder and circular cone geometry, and the analysis that shows the fundamental cause of such a difference

Web Mapping (Individual Project) Santa Barbara, California, USA

Vena Chu, Vice Chair of Undergraduate Programs at University of California, Santa Barbara
November, 2022 – December, 2022

- Applied R-Studio, Github, and Microsoft Excel to create a dataset and a website page of a custom online world map introducing six specific amazing places with images and texts, including the beautiful UCSB campus

Map Blog Post (Individual Project) Santa Barbara, California, USA

Vena Chu, Vice Chair of Undergraduate Programs at University of California, Santa Barbara
November, 2022 – December, 2022

- Applied QGIS and standard map format to process and evaluate "World Map of Sports Popularity Based by Region"
- Wrote a report to summarize the merits and deficiency of "World Map of Sports Popularity Based by Region" and extend to general map making

Volunteer Experience

Math Motivators- A Program of The Actuarial Foundation Illinois, USA

Volunteer Tutor January, 2022 – June, 2024

- Attended remote sessions to tutor students varying from high schools to primary schools regarding algebra, geometry, calculus, statistics, and other relevant topics by explaining concepts, answering questions on homework, and offering exam preparation advice
- Attended remote sessions to tutor students from high schools to assist their SAT test preparation

UCSB Math Tutors Santa Barbara, California, USA

Volunteer Tutor January, 2022 – June, 2024

- Assisted Gauchos (individuals from UCSB) who need tutoring in UCSB math courses which I have taken and succeeded by explaining concepts, answering questions on homework, and offering exam preparation advice