Shengnan Liu

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Education: Graduate and Undergraduate

University of California, Santa Barbara (UCSB) Santa Barbara, California
Major: ***Master of Science in Computer Science*** **| Cumulative GPA:** 3.75/4.00 *Sep. 2024 - June, 2026 (Expected)*
Relevant Courses: Artificial Intelligence, Reinforcement Learning, Quantum Computing, Security in Machine Learning and Post-Quantum Cryptography, Combinatorial Algorithms, Software Foundations, Computational Geometry, Graph Theory, Graph Neural Networks, Computer Graphics
Personal Webpage: https://dolloading906.github.io/My-Personal-Webpage/

University of California, Santa Barbara (UCSB) Santa Barbara, California
Major: ***Bachelor of Science in Mathematics*** **| Cumulative GPA:** 3.76/4.00 *Sep. 2020 - June, 2024*
Minors: Statistics and Data Science; Spatial Science
Honor: UCSB College of Letters & Science Dean's Honors during Spring 2024, Winter 2024, Fall 2023, Fall 2022, Spring 2021, Winter 2021
Relevant Courses: Linear Algebra, Abstract Algebra, Real and Complex Analysis, Linear and Non-linear Optimization, Graph Theory, Topology, Differential Geometry, Euclidean and Non-Euclidean Geometry, Number Theory, Data Structure, Data Management, Web Design, Linear Regression, Statistical Machine Learning, Stochastic Process, Remote Sensing

Skills

- **Programming Languages:** Python, JavaScript, Java, C++, C, SQL, R, MATLAB
- **Frameworks:** React, Node.js, Flask, FastAPI, Express
- **Tools & Platforms:** GitHub, VS Code, Git, Figma, PyCharm Community, Anaconda, API Gateway, R-Studio, MySQL, Jupyter Notebook, QGIS, Overleaf, MATLAB, Microsoft Excel, Microsoft Word, Microsoft PowerPoint

Project Experience

"ezLoop"- Mobile App Development (Ongoing Group Project) *September, 2024 – Current*

- Designed UI/UX in **Figma** for Settings, Product Detail, Saved Collection, Login, and Checkout; built component variants, defined the icon library, and exported assets for hand-off
- Implemented front-end pages in **React Native** (**Expo**) using **VS Code**, writing **JavaScript** and **JSON** configs for navigation/routes and screen states; added a small JSI-based **C++** native module to offload compute-heavy utilities used by Product Detail/Saved screens
- Polished layouts by standardizing spacing/typography, aligning colors and iconography to **Figma**, and fixing iOS breakpoint/layout bugs
- Integrated Firebase Auth (email/password) for sign-up/sign-in and session persistence
- Built **Firestore** data layer with real-time listeners and queries; modeled collections for users, products, carts, and saved items to enable live updates across screens
- Implemented product-management APIs and flows (create/read/update/delete, listing, search/sort) and synchronized UI with **Firestore** with payload validation and robust loading/error states
- Localized the UI with i18next (English/Chinese), externalizing strings to **JSON** and auto-selecting language based on device settings
- Collaborated with an 8-member cross-university team via **Git/GitHub** (branching, pull requests, code reviews) and lightweight Agile sprints to plan features and track progress
- Goal: enable international students in North America to buy and sell second-hand furniture and daily necessities

Quantifying Representation Learning with Large Language Models for Recommendation (Group Project)
Santa Barbara, California, USA
Instructor: Tao Yang, Professor at UCSB September, 2025 – December, 2025

- Reproduced and extended RLMRec, a WWW'24 framework that injects LLM semantics into collaborative filtering, on three datasets (Amazon-book, Yelp, Steam) and multiple graph-based backbones, including GCCF, LightGCN, SGL, SimGCL, AutoCF and related variants.
- Implemented an end-to-end training and evaluation pipeline in **Python** within a **Miniconda** environment, launched and managed via the **Windows command line**, including configuration management, logging, checkpointing, and Recall@K / NDCG@K ranking evaluation, while keeping the inference-time footprint identical to the backbone models.
- Built a semantic analysis toolkit to quantify alignment between ID embeddings and LLM-based text embeddings using neighbor-overlap Jaccard similarity, alignment-trend curves, step histograms, and UMAP visualizations.
- Demonstrated that contrastive alignment improves Jaccard overlap with text-derived semantic references by about 40% on average across settings, without increasing online latency.
- Took ownership of full-scale training experiments and final communication: configured and launched all RLMRec runs across the full grid of datasets, backbones, and alignment settings, adapting scripts and configuration files, tracking progress and resolving data/configuration issues, aggregating metrics into final result tables and plots, drafting the initial presentation and anticipated Q&A material, and coordinating cross-review of code, logs, figures, and writing with teammates.

Research Experience

Extending Online Policy Optimization Algorithm to Manifolds (Individual Research) Santa Barbara, California, USA
Instructor: James Preiss, Assistant Professor at UCSB *March, 2025 – June, 2026 (Expected)*

- (In progress) Developing a differential-geometric theoretical framework for M-GAPS, adapting and extending assumptions and results from two prior lines of work on online policy optimization and contractive perturbations, and introducing new results where necessary
- Derived a standalone Memoryless Gradient-based Adaptive Policy Selection (M-GAPS) (known-model, no residuals/perturbations) by isolating the policy-update mechanics from two prior frameworks, *"Online Policy Optimization in Unknown Nonlinear Systems" and "Online Adaptive Policy Selection in Time-Varying Systems No-Regret via Contractive Perturbations,"* achieving O(1) memory with local-regret comparable to GAPS in **Overleaf**
- Structured a comprehensive differential geometry document for educational purposes and for extending M-GAPS to manifolds in **Overleaf**
- Connected with authors from two prior frameworks to discuss potential typos and issues in those papers

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 data collection on factory machines, built corresponding data frames and analyzed the data in **R-Studio**
- Calculated the premium product yield rate and "monetary yield rate" in **Excel** to report whether each factory is in profit or loss based on given computing algorithm and datasets
- Developed a more accurate algorithm for "monetary yield rate" to more precisely assess factory performances
- Applied **Excel** formulas to calculate "continuous excellence date" of all manufacturing processes and used **Python** 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
- Repaired broken **Excel** forms so that future data can be more precisely and efficiently recorded and analyzed
- Participated in the optimization of Work In Process (WIP) management by offering theoretical algorithms and analysis
- Analyzed and optimized the raw material claiming rules using **Python**
- Fixed miswording, format and printing errors, and English authenticity issue of signage inside various factories