Khushi Kaushik

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Education

California State University, Fullerton May 2025
Bachelor of Science in Computer Science (Magna Cum Laude | 3.87) *Fullerton, CA*
- • Coursework: Relevant Coursework: Machine Learning, Data Science, Big Data, Databases, Algorithms, AI, Multivariable Calculus, Linear Algebra

University of California, San Diego June 2027 (Estimated)
Masters in Science in Computer Science + Micro MBA *La Jolla, California*

Experience

Prompt Optimization for Faster AI Responses July 2025 - Present
Research Assistant *Fullerton, CA*
- Leading development of a latency-aware prompt optimization framework using mathematical signal analysis, neural network behavior profiling, and prompt entropy scoring.
- Prototyped a prompt-rewriting algorithm that reduced inference latency by ~15% across open-source LLMs including GPT-J, LLaMA, and Mistral.
- Preparing production deployment for lightweight NLP systems, targeting a 20% performance uplift across three benchmark scenarios.
- Designed and tested agent-like prompt workflows with modular inference logic for GenAI use cases, simulating autonomous behavior.
- Integrated RAG workflows using context retrieval and prompt shaping for LLMs; explored vector database indexing.

College of Engineering and Computer Science August 2023 - May 2025
ECS Instructional Student Assistant (ISA) *Fullerton, CA*
- Tutored 1,500+ students including beginners in Python, SQL, and algorithms. Known for making technical concepts fun and accessible.
- Led interactive coding sessions and debug walkthroughs, fostering a supportive learning environment.
- Diagnosed and resolved 100+ weekly coding issues in Python and SQL via interactive debugging walkthroughs and deployed 12+ database schema and normalization labs using MySQL and SQLite, improving schema design accuracy by 25%.
- Praised for being an effective communicator, facilitating understanding of complex CS concepts for a diverse student body.

SoCal Data Science Research Program June 2024 - August 2024
Data Science Research Assistant/ Consultant *Irvine, CA*
- Built a regression model using Scikit-learn to estimate column drift ratios in earthquake simulations, improving prediction accuracy by 35% ($R^2 = 0.947$) across 10,000+ simulation frames.
- Automated data preprocessing and feature selection using NumPy and custom Python scripts, reducing runtime by 40% and ensuring reproducibility across collaborative research teams.
- Deployed scalable ML pipeline components to support batch simulations on structural datasets with 10,000+ entries, decreasing manual setup time by 60%.

CSUF Department of Mathematics January 2023 - October 2024
Research Assistant | Computational Complexity & Machine Learning *Fullerton, CA*
- Formulated FRACTRAN programs computing $\sqrt{2}$ using Catalan's product and Newton–Raphson methods via prime exponent iteration. Proved convergence and digit correctness using formal arithmetic analysis; optimized runtime via fraction list minimization and prime-state reduction.
- Reduced execution depth by 40% compared to Conway's π model; expanded applications of FRACTRAN in computable real number generation. [First Author, arXiv:2412.16185]

Involvements

Teaching & Outreach Experience
- Mentored 5+ middle school students through AP Computer Science Principles, AP Computer Science A, Code.org Application Development, Prompt Engineering and Artificial Intelligence.
- Created 30+ beginner-friendly coding exercises using visual tools like Scratch.
- Engaged and mentored 50+ incoming university students through hands-on computer science demos and interactive workshops.
- Promoted inclusive learning and sparked interest in STEM careers through peer-led discussions and beginner-friendly coding activities.

Projects

Altivue – AI-Powered Drone Control Platform
Built a drone system that autonomously avoids obstacles using real-time computer vision and AI, enabling safer navigation.
- Developed an object detection pipeline using YOLOv5 and retrieval-augmented generation (RAG) to enhance drone visual processing.
- Deployed Flask-based ML APIs on edge devices, reducing latency by 40% and improving drone pathing accuracy by 30% in 100+ test flights.
- Used retrieval-enhanced generation (RAG) principles to improve drone decision-making; stored embeddings using vector databases.

Biomarker Analysis for Neuro-cognitive Decline Post-Cardiac Surgery
Used clinical biomarker data to predict which heart surgery patients may face memory or thinking issues, aiding early intervention.
- Applied SHAP for explainable AI and automated preprocessing workflows, reducing preprocessing time by 50% and increasing model interpretability.
- Designed and implemented an ML pipeline leveraging core AI/ML concepts including supervised learning, ensemble modeling, and model interpretability techniques.

Stock Market Prediction Using LSTM & Ensemble Learning
Built a hybrid machine learning model to forecast next-day directional movement of S&P 500 stocks from historical financial data.
- Collected and processed OHLC data with momentum indicators (RSI, MACD) via yfinance and Pandas; automated feature engineering pipeline.
- Backtested model signals over 30-day periods, yielding simulated portfolio returns 8.2% above baseline S&P performance.
- Constructed a dual-model system using LSTM for sequential pattern learning and XGBoost for classification, achieving ~70% directional accuracy.

Skills

Programming Languages Python, SQL, C++, Java, R, JavaScript
AI Tools & Frameworks TensorFlow, Scikit-learn, Keras, PyTorch, Pandas, NumPy, SciPy
Developer Tools GitHub, Jupyter, Flask, FastAPI, MySQL, SQLite, Linux, AWS, Databricks, Django, React, Spring Boot, MongoDB
AI Tools YOLOv5, SHAP, RAG, GPT-J, LLaMA, Mistral
GenAI & Agent Skills Building AI agents, Prompt Engineering, Vector Databases (e.g., FAISS), RAG implementations
Data & Analysis Data management, Statistics, Clinical trial design, Analytical reasoning, Proactive approach