Junwen Zheng

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Education

Seattle University, Seattle, Washington   *Sep. 2023 -- Present*

Master of Science, Computer Science with a Specialization in Software Engineering
Program GPA: 3.94/4.0

University of California Santa Cruz, Santa Cruz, California   *Sep. 2017 -- Dec. 2021*

Bachelor of Arts, Economics

Key Courses and Project Experiences

Data Structure
- Explored key data structures, analyzing their advantages and trade-offs.
- Developed a template Binary Search Tree (BST) class with functionality for in-order, pre-order, and post-order traversals.
- Designed and implemented an emergency room triage system using a priority queue and min-heap to optimize patient prioritization. The system's user interface was carefully structured to display only essential functionalities, ensuring program integrity.

Artificial Intelligence
- Explored search algorithms, probabilistic reasoning, logical agents, and first-order logic with inference techniques.
- Built a maze-solving agent in Python, processing the maze into a matrix and applying bi-directional BFS to find the optimal path.
- Extended the maze-solving agent using Q-learning, constructing a Q-table through reinforcement learning techniques. The agent was trained to discover the optimal path based on the Q-table.
- Conducted research comparing the performance of bi-directional BFS and Q-learning algorithms across varying maze sizes. Adjusted the exploration-exploitation trade-off in Q-learning to analyze its impact on agent performance and derived meaningful conclusions from the results.

Fundamentals of Software Engineering
- Gained experience in modern software engineering practices, including Agile methodologies and Scrum framework.
- Collaborated in a team to build a boba tea shop website following Scrum practices. Defined key features such as login authentication and user database management based on user stories.
- Led daily standups, sprint planning sessions, and retrospectives, ensuring an efficient and collaborative workflow. Leveraged tools like GitHub and Microsoft Teams for version control, resource sharing, and project management.

Computer System Principles
- Studied foundational concepts of modern computing, including memory management, process scheduling, and concurrency.
- Gained hands-on experience in assembly programming to deepen understanding of system architecture.
- Worked in a team to develop a server-client TypeRacer program, applying key concepts such as process synchronization and multi-threading. Tasks were modularized and assigned based on individual strengths, with pair programming techniques used to ensure code quality and alignment with project goals.

Distributed System
- Designed and implemented a range of distributed system protocols using Python, including client-server systems, leader election algorithms, and distributed hash tables..
- Developed a fault-tolerant client application leveraging TCP/IP sockets, implementing message serialization and error handling mechanisms for communication with distributed servers.
- Implemented the Bully algorithm to achieve consensus in distributed environments, ensuring leader election and handling fault recovery scenarios.
- Built a real-time arbitrage detection system using a subscription-based model, processing Forex data streams over UDP, and identifying arbitrage opportunities with graph-based negative cycle detection (Bellman-Ford algorithm).
- Developed a distributed hash table (DHT) using the Chord algorithm, including node joining, routing via finger tables, and robust key-value storage with SHA-1-based hashing.
- Connected to the Bitcoin peer-to-peer network to retrieve and manipulate blockchain data, demonstrating the immutability and integrity of the blockchain structure.

Business Data Analysis
- Conducted comprehensive sales analysis for a pastry store using R. Performed time series analysis to uncover seasonal trends and sales patterns, identifying weekly peaks during weekends and gradual business growth over time.
- Decomposed sales and order data to distinguish trend, seasonal, and residual components, aiding in understanding underlying sales dynamics. Visualized trends in monthly sales, orders, and discounts through aggregated time-series plots, providing actionable insights for business strategy adjustments.
- Investigated the relationship between sales and discount strategies using a Chi-Square test of independence, guiding data-informed discount policy decisions. Developed ARIMA models to forecast future sales and order volumes, enabling data-driven planning for inventory and promotions.

Software Architecture and Design
- Designed the architecture for an Instagram clone system, a scalable social media platform, applying core software architecture principles from requirements to high-level structure. Evaluated and selected architectural styles such as distributed, client-server, and service-based architecture, based on quality attributes like scalability, fault tolerance, and security.
- Created and iterated on system models using UML, including component diagrams, deployment diagrams, use case diagrams, sequence diagrams, and state models to communicate system structure and behavior. Applied the MVC architectural pattern to organize frontend-backend interaction, ensuring modularity and clear separation of concerns.
- Documented the rationale for architectural decisions, addressed key quality attributes, Explored architectural tradeoffs (e.g., complexity vs. scalability, performance vs. fault isolation) and integrated solutions such as event-driven communication and caching.

Mobile Software Development
- Developed a cross-platform software product using the Flutter framework, with a primary focus on the Android platform. Demonstrated strong proficiency in Flutter's core principles, including building well-structured UIs using widgets and implementing smooth user interactions through the navigation stack. Integrated several key Flutter packages to enhance functionality and performance, including: Hive for local storage; Mockito for unit testing and mocking; Firebase packages for backend services and real-time data management via BaaS.

- Designed and implemented a fully functional navigation application using the Flutter framework. Integrated Google Maps SDK to support place search with location-biased predictions, route calculation, and real-time event listeners. Enhanced the map experience with customizable options such as map type selection (satellite, terrain, etc.). The navigation system allows users to choose different transportation modes and provides seamless routing to pre-saved destinations.

Professional Experience

Product Specialist, Warehouse Management Assistant, *Dada Tech Inc.* in Irvine: *Spring 2022 – Fall 2022*
- Conducted market research and analyzed sales data to identify high-demand products and trends.
- Negotiated pricing and payment terms with wholesalers to optimize inventory costs.
- Managed inventory levels and tracked shelf life of in-stock merchandise to minimize waste and improve efficiency.
- Utilized market insights to increase liquidity of in-stock merchandise and maximize profitability.
- Developed and implemented inventory management strategies to optimize warehouse usage and reduce operational costs.
- Utilized Power BI reporting to inform purchasing decisions and improve weekly sales performance.

Digital Market Analyst and Consultant at *Flame Communications* in Singapore: *Summer 2021*
- Designed dashboard prototypes
  - Conducted user surveys and competitive analysis to identify opportunities for improving dashboard functionality and aesthetics.
  - Designed multiple dashboard prototypes and integrated user feedback into iterative design process.
  - Collaborated with team members to communicate potential improvements and technical limitations of proposed designs.
  - Contributed to the development of final dashboard design that enhanced user experience and streamlined data visualization.
- Analyzed sales challenges of Singapore local merchants
  - Conducted comprehensive analysis of sales challenges faced by local merchants in Singapore.
  - Leveraged local digital platforms to optimize product exposure and drive sales growth.
  - Utilized data-driven insights to continually refine and improve marketing and sales strategies.
  - Gathered and analyzed sales information and data to identify key trends and opportunities.