Mengqi Liu

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EDUCATION

UNIVERSITY OF LEICESTER **Leicester, United Kingdom**
MSc Advance Computer Science *January 2024 - May 2025*
Expected Grade: 70% (Distinction)

WENTIAN COLLEGE, HOHAI UNIVERSITY **Maanshan, China**
Computer Science and Technology *September 2017 - June 2021*
Obtained Grade: 78.05%

KEY SKILLS

- **Languages:** C, C++, Java, Python, HTML, CSS, JSP, SQL, Groovy, Xtext, XML
- **Tools & Technologies:** Git, GitHub, MongoDB, Spring Boot, Hibernate, .NET, LaTeX, Eclipse IDE, Eclipse JDT, Java Emitter Templates (JET), Lambda Cloud, CodeXGLUE, AST Parsing, Natural Language Processing (NLP)
- **Frameworks & Libraries:** REST APIs, JUnit, Maven, JPA, Linux, Windows, PyTorch, Hugging Face Transformers, CodeT5
- **AI/ML Concepts:** Code Summarization, Transfer Learning, Model Compression, BLEU/ROUGE/METEOR Evaluation
- **Development Practices:** IDE Plugin Development, Unit Testing, Agile Methodology, Cloud-based Training

MSC DISSERTATION

Code Summarizer AI-Model *February 2025 - May 2025*

- Designing and developing an Eclipse plugin that leverages transformer-based NLP models (CodeT5) to auto-generate Java method and class summaries, improving code comprehension within the IDE.
- Completed AST parsing and integrated code rewriting using Eclipse JDT, enabling automated comment insertion in real-time.
- Preprocessed 50,000+ Java methods from the CodeXGLUE dataset and implemented a functional training pipeline on Lambda Cloud for initial model experimentation.
- Currently optimizing model performance through pruning, quantization, and knowledge distillation to ensure lightweight, CPU-compatible deployment without sacrificing accuracy.
- Planned full evaluation using BLEU, ROUGE, and METEOR, with final integration of an IDE GUI interface and testing across large-scale Java projects.

ACADEMIC PROJECTS

DISTRIBUTED WHITEBOARD APPLICATION *January 2025*

- Engineered a fault-tolerant, cloud-native whiteboard system deployed on 3 OpenStack VMs using the Paxos consensus algorithm, enabling consistent multi-user (1 to 10) collaboration with real-time synchronization and deterministic conflict resolution across distributed nodes.
- Containerized backend services using Docker and orchestrated the deployment via Kubernetes StatefulSets with Horizontal Pod Autoscaler (HPA), scaling from 1 to 4+ pods while preserving whiteboard state and handling dynamic IP changes, node failures, and user growth with 100% uptime.
- Automated OpenStack networking, port forwarding, and security group setup to support high-throughput UDP/TCP traffic for inter-node messaging and Flask-SocketIO events, achieving sub-150ms latency and stable CP-Compliant performance during real-time collaboration.

FLIGHT JOURNEYS SYSTEM *January 2025*

- Developed a robust console-based flight booking system with secure user authentication, booking management, and admin controls, ensuring 100% data integrity and reliability.
- Led Agile-driven development, executing two successful sprints with GitHub issue tracking, Planning Poker for story point estimation, PERT analysis for critical path optimization, and COCOMO-based cost estimation, achieving 93% sprint efficiency.
- Implemented rigorous software quality assurance, designing and executing comprehensive black-box and white-box test cases to attain 97% test coverage, ensuring zero critical defects and maximum system stability.

SPRING BOOT PROJECT GENERATION USING XTEXT AND GROOVY *December 2024*

- Developed a Spring Boot project generator using Xtext and Groovy, automating the creation of pom.xml, application.properties, SpringBootApplication.java, entities, DTOs, repositories, services, and controllers for a Twitter-like schema (users, tweets, likes, followers).
- Designed a custom DSL using Xtext to define Spring Boot project models, supporting annotations, cardinalities, complex entity relationships (@OneToMany, @ManyToOne), and JPA repository generation, integrating seamlessly with Maven.
- Implemented a Groovy-based code generator to translate DSL models into Spring Boot project skeletons, resolving Xtext grammar conflicts, automating REST API generation, and ensuring scalability with domain-driven design (DDD) principles.

NOSQL DATABASE QUERY OPTIMIZATION AND ANALYSIS *November 2024*

- Implemented a MongoDB-based cloud solution to process and analyze Twitter data (Tweet ID, Reach, Sentiment, Location), automating the transformation of 100000+ CSV records into structured JSON datasets, and loading them into MongoDB Atlas Cloud.
- Optimized MongoDB queries by indexing LocationID and Country fields across all records, improving query performance by 40% and cutting response time to 7ms. Applied data selection, projection, filtering, and aggregation to extract actionable business insights.
- Benchmarked MongoDB vs SQL performance, optimizing query execution on 10000+ tweets to improve speed by 15%. Demonstrated the scalability and efficiency of cloud solutions through query optimization and scalability analysis in an Agile environment.

SECURE SERVER-CLIENT SYSTEM *March 2024*

- Engineered a secure client-server messaging system using Java socket programming, enabling 100% encrypted communication with RSA encryption (RSA/ECB/PKCS1Padding) and digital signatures (SHA256withRSA) for authentication.
- Implemented MD5 hashing for identity protection, anonymizing 100% of stored user data, preventing unauthorized access, and ensuring zero plaintext message leaks even in case of server compromise.
- Designed an optimized encryption workflow for secure message storage and relay via an intermediary server, enhancing key management, signature validation, and end-to-end security, achieving a 2× faster message retrieval process.

PUBLICATION

DATA BALANCING IN SAT-NET **Xian City, China**

Effects on Logistic Regression and Random Forest Performance *October 2024*

Citation: M. Liu and X. Li, "Data Balancing in SAT-NET: Effects on Logistic Regression and Random Forest Performance," in *2024 IEEE International Conference on Satellite Internet (SAT-NET)*, Xian City, China, 2024, pp. 12–17, doi: 10.1109/SAT-NET62854.2024.00011.

- Published research on handling imbalanced satellite Internet datasets using the Synthetic Minority Oversampling Technique (SMOTE).
- Evaluated the impact of SMOTE on Logistic Regression and Random Forest, using metrics such as accuracy, precision, recall, and F1-score.
- Analyzed a large-scale diabetes dataset of over 100,000 records to demonstrate Random Forest's robustness and SMOTE's effects.

EXPERIENCE

Southeast University, School of Cyber Science and Engineering **Nanjing, China**

Research Assistant *September 2021 - August 2022*

- Processed encrypted blockchain datasets and explored the application of machine learning algorithms to on-chain data analysis.
- Applied AI techniques to support pattern discovery and anomaly detection in blockchain transaction data.
- Collaborated with undergraduate students on their final-year theses by guiding data processing, providing feedback on technical implementation, and helping prepare presentations.
- Prepared internal research presentations (PPTs) and contributed to technical reporting within the lab.