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City University of Hong Kong

Transforming Software Engineering Practice: Empowering Students through Generative AI Integration

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Principal Investigator: Prof. Jacky KEUNG

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Abstract:

Empowering our students as the Next Generation of Software Engineers (SE) with new Generative AI knowledge in Cutting-Edge Software Engineering Education is the primary objective of this TDG project. This project aims to enhance the CS3343 Software Engineering Practice course at the City University of Hong Kong by integrating generative AI into the course, modernizing its practical learning elements, and evaluating how AI can be utilized by students to improve their learning outcomes. The integration of generative AI for SE can greatly benefit students by assisting them to create quality software code and learn from their own mistakes by providing intelligent suggestions for debugging and optimization, facilitating automated testing, and assisting in documentation. By incorporating generative AI tools into the course, students will develop proficiency in efficient coding techniques, problem-solving and debugging skills, understanding of testing and quality assurance, and documentation proficiency with enhanced software quality with assisted AI tools needed in the current and future software development industry. This project outlines the potential impact of integrating generative AI tools in computer science education, highlighting the expected learning outcomes and the benefits of preparing students for real-world software engineering practices.

Motivation and Background

The rapid advancement of large language modeling technologies and generative AI has disrupted various industries, including software engineering. These advancements have significantly reshaped the software development landscape, revolutionizing areas such as software design, coding, testing, debugging, and maintenance. Consequently, there is a pressing need to integrate generative AI into education and training programs to equip graduates with modern techniques that enhance software quality, reduce errors, and streamline development processes. This project emphasizes the practical integration of generative AI into software engineering education, aiming to empower students with the skills and knowledge required to produce high-quality software code, implement comprehensive evaluation and testing procedures, and leverage process automation to meet the demands of today's fiercely competitive software development environment.

The introduction of CS3342 and CS3343 as core software engineering courses in the Bachelor of Computer Science degree program has been a success for many years and has produced exceptionally qualified software engineers at graduation. However, the traditional teaching and learning practice and



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materials used in these courses have not kept pace with the rapid advancements in generative AI technologies in recent years. As a result, the knowledge acquired by students has become outdated, leading to concerns and feedback from students regarding the need to align the software engineering curriculum with the latest developments in generative AI (TLQ). This project addresses the pressing need to revamp software engineering courses by integrating generative AI, enabling students to learn and adapt to the new paradigm of AI-assisted software development environments, which is in addition to the model-driven software development paradigm that we have been advocating for years. The integration of assisted AI for learning software engineering aims to equip students with the up-to-date knowledge and skills needed to excel in the modern software development industry, where generative AI plays a significant role in expediting and enhancing software development practices.