

Study on Integration of ChatGPT in Java Software Development Workflows

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Abstract: *The rapid proliferation of large language models (LLMs), exemplified by ChatGPT, has ushered in a transformative era for various domains, including software development. This research delves into the integration of ChatGPT within Java software development workflows, meticulously examining its efficacy across a spectrum of critical tasks. Specifically, this study investigates ChatGPT's capabilities in code generation, debugging processes, the creation of unit tests, and the generation of software documentation within the context of real-world Java projects, particularly focusing on Spring Boot REST API development. Through a series of controlled experiments and insightful developer case studies, we aim to quantitatively and qualitatively evaluate the potential productivity enhancements afforded by AI-assisted programming. Furthermore, the research scrutinizes the accuracy and reliability of code suggestions provided by ChatGPT, while also identifying and analyzing the inherent limitations, such as the occurrence of hallucinated outputs and the crucial dependency on developer expertise for thorough validation and contextual understanding. The findings of this investigation illuminate the considerable potential of LLMs to accelerate routine coding tasks and significantly boost developer productivity. However, the study also underscores the necessity of human oversight and critical evaluation to ensure the correctness, security, and maintainability of AI-generated code, emphasizing that while ChatGPT serves as a powerful assistive tool, it is not a substitute for sound software engineering principles and practices.*

Keywords: ChatGPT, Java, AI-assisted programming, code generation, software development workflow, LLMs, automation

