AI-Assisted Debugging: The Future of Automated Code Fixing

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Abstract: *This research explores how AI-assisted debugging can shape the future of automated code fixing. Today, developers face increasing pressure to find and fix bugs quickly, and traditional tools often fail to handle complex errors effectively. Recent studies show that AI systems like ChatGPT, Copilot, and LLM-based repair models can detect bugs, suggest fixes, and support developers in real time, but they still make mistakes and lack full understanding of business logic. The literature reveals a clear gap: no unified evaluation of AI debugging tools, limited testing on large real-world codebases, and low trust in automated fixes. Our methodology involves analysing existing AI debugging research, comparing tool capabilities, and identifying strengths and limitations. Findings show that AI performs well on simple bugs and speeds up debugging, but human review is still required. This study concludes that AI will strongly support future debugging, but cannot yet replace developers.*

Keywords: *AI-assisted debugging, automated program repair, real-time code fixing, large language models, conversational debugging*