

AI-Powered Test Automation Frameworks for Enhancing Quality Assurance in Software Engineering

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Abstract: *The increasing complexity of modern software systems has made traditional testing approaches insufficient to ensure high-quality and reliable applications. Test automation frameworks have emerged as a critical solution, but they often face challenges such as limited adaptability, high maintenance costs, and inefficiencies in handling large-scale test cases. With recent advances in artificial intelligence (AI) and machine learning (ML), intelligent test automation frameworks are revolutionizing software quality assurance (QA) by automating test case generation, prioritization, defect prediction, and adaptive test execution. AI-powered frameworks not only reduce testing time and human intervention but also enhance defect detection accuracy, optimize regression testing, and provide predictive insights into potential software failures. This research explores the architecture, methodologies, and applications of AI-driven test automation in software engineering. It emphasizes how integrating AI into QA processes improves scalability, reduces costs, and accelerates time-to-market while ensuring robust software quality. The study also discusses real-world use cases, challenges in adoption, and the future scope of AI-enabled quality assurance systems, positioning them as a transformative approach to meet the demands of agile and DevOps-driven software development environments.*

Keywords: Artificial Intelligence, Test Automation, Quality Assurance, Software Engineering, Machine Learning

