

Machine Learning in API Performance Testing

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Abstract: *Performance testing of APIs is a fundamental building block of modern software development, playing a key role in ensuring scalability, reliability, and user satisfaction in the feasibility of complex and interconnected systems. Traditional approaches are far too static, based on rules and historical data, and therefore do not hold up for dynamic, evolving workloads. Machine Learning (ML), in particular, forms a radically new paradigm in this field, allowing data-driven insights to be generated more dynamically than would be possible with traditional methods. Utilizing ML algorithms for anomaly detection, predictive modeling, and dynamic workload simulation, this paper investigates how ML may change API performance testing.*

The conversation discusses the potential of ML to help with proactive bottleneck identification, performance forecasting, optimization, and a feedback loop for continuous improvement. We showcase the benefits of using ML in performance testing via an application of framework, detailed through case studies and addressing challenges like data quality, integration complexity, and resource constraints. Advocating for a human-centered approach, this paper argues that while ML techniques are a technical innovation, their successful implementation will require human interpretation of results, ethical use of technology and the development of skills within the testing teams. In conclusion, this study aims to pave the way for a future where ML-based performance testing not only improves the efficiency and accuracy of API assessment but also contributes to developing resilient, scalable, and user-centric systems, ensuring that digital experiences can meet the requirements of future applications [5,8].

Keywords: Machine Learning, API Performance Testing, Anomaly Detection, Predictive Modelling, Reinforcement Learning, Automation, Human-Centered Approach