

ABSTRACT

Automated Program Repair holds high potential to reduce the human intervention required for fixing software bugs, particularly now with Large Language Models. However, integrating these models effectively into practical, distributed software development workflows remains challenging, often lacking structured, human-centered approaches. This paper introduces and evaluates an LLM-based Human-in-the-Loop Automated Program Repair workflow for integration within modern development environments like GitHub Actions. The workflow incorporates a Human-in-the-Loop approach and specific prompt engineering patterns to encourage collaboration between the developers and the LLM to help improve fix quality and acceptance. The workflow was evaluated through a controlled experiment where the task efficiency and developer acceptance were compared against a baseline workflow. Results show the proposed workflow achieved better average task efficiency and developer acceptance, though practical challenges such as LLM response latency were observed. This study validates the potential of a structured, human-centered approach for LLM-based APR while highlighting areas needing further refinement for practical deployment.

Keywords: *Automated Program Repair, Large Language Models, Human-in-the-Loop*