Research Project: Transformer-based approach for bug identification, summarization and classification

Software bug reports are crucial in software maintenance and evolution, with concise summaries considerably enhancing the efficacy of bug triggers and ultimately contributing to developing high-quality software products [1, 3]. Due to the emergence of social media, there is an exponential increase in the demand for developing various software applications targeting different application domains. Moreover, all the popular software applications, such as Bugzilla, Facebook, etc., constantly release new versions of the applications, making the software management and evolution process challenging. Recently, there has been an increase in the bugs reported by the end-user across various social media platforms for a particular application. For example, based on a study published in 2013, Bugzilla receives 135 bug reports daily, which might be increased now based on the recent usage and increase in the end-users population.

Moreover, bug identification and resolution remedies are essential in time to retain the large pool of end-users [2]. In contrast, the user gets frustrated and leaves or uninstalls the software application [4]. Moreover, in the literature, automated approaches have been proposed using machine and deep learning to identify and classify bug reports. However, these approaches must be more generalized to the machine and deep learning algorithms' performance in multiple datasets. Also, these approaches often produce poor summaries due to two primary limitations: the challenges in incorporating the domain-specific knowledge inherent in bug reports and the limitations of purely supervised learning in comprehending the comprehensive context of bug reports. We are interested in proposing an improved bug identification and classification approach. We are interested in extending this research in multiple directions.

1. Improve the performance of bug identification and classification by introducing customized transfer learning algorithms.
2. Identify the performance of the proposed transfer learning algorithm on multiple data sets aiming at the generalization of the proposed approach.
3. Many bug reports are submitted against popular software applications, which makes it challenging for software developers and vendors to provide in-time remedies. Also, the the bug reports submitted are lengthy, comprising many unimportant information. Therefore, we aim to propose a transfer learning approach to summarize the bug reports efficiently and simplify the job for developers and software vendors by restoring the software quality and user satisfaction.
4. Another challenge is that many bug reports are submitted to the issue tracking system by the software developers and users; some of them are critical and need instant resolution and attention from the software vendors. Therefore, we propose an automated approach that identifies the bug's severity in the bug-tracking system using a transfer learning approach.
5. The most concerning issue with machine, deep, and transfer learning algorithms for bug identification and classification tasks is their black-box nature, which restricts software vendors from understanding the complex decision-making process. Therefore, we are interested in introducing a novel explainability-based deep learning approach for identifying, classifying, and summarizing bug identification that would help software vendors and developers improve the decision-making process.

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