ABSTRACT

Crowdsourced testing is an emerging trend in software testing, especially for mobile testing due to Android fragment issues. Gaining the productive outputs of high quality always comes with the assumption that the workers are experienced. However, the crowd of testers are not usually professionals. Thus, it becomes an interesting topic to guide the crowd to obtain domain knowledge and fulfill tasks. Motivated by an article in Science[1], we propose an approach in this paper to enhance the power of the crowd. (1) Along with professionals taking the task, exception information is recorded into database to provide hints for the crowd. (2) With the feedback from new exceptions caught in processing of crowd, the database is enriched. Such an iterative process will guide the crowd to finish their tasks effectively.

CCS Concepts

- Software engineering → Software verification and validation; Software testing and debugging; Human-centered computing → Human computer interaction;

Keywords

Crowdsourced testing; crowdsourcing platform; mobile testing

1. INTRODUCTION

Crowdsourced testing is an emerging trend in software testing. By outsourcing testing tasks online to a large group of people in the form of an open call[2], requesters can complete the task at a low cost. By taking the testing task on crowdsourced platforms, workers are provided with more job opportunities and extra income. Despite its popularity, one important problem in crowdsourced testing is the quality[3]. Both unskilled workers and unclear instructions provided by requesters contribute to the subpar responses. Thus, there is an urgent demand on guiding the crowds to get familiar with the flow quickly for easier and better work[4].

Kikbug is a crowdsourced testing platform for mobile applications. In this platform, an Android driver has been implemented to record detailed actions of workers as well as logs and screenshots during the testing process. However, this tool just tracks and records what workers have done, and does not provide any information to guide the crowds yet. In this paper, we propose an iterative approach by providing the crowds guides for what they could do next during testing to enhance the crowdsourced testing quality. On the one hand, guides are provided when an action taken by a worker matches the one that belongs to one of the patterns stored in database. On the other hand, if a new exception occurs during testing, such a pattern will be stored into database, named ‘exception found’. Moreover, if the times a pattern recurs reaches the threshold, such pattern will be tagged with ‘exception identified’.

With the assistance of our approach, the crowds can go with an easy and productive testing while the requesters can obtain results in high quality with patterns for ‘exception found’ and ‘exception identified’, respectively.

2. APPROACH

Before describing our approach, we summarize the background about the Android driver used in Kikbug. The Kikbug driver has been implemented to record the actions of workers automatically. Besides, it can store the outputs of Android logcat when testing is finished. Furthermore, it can facilitate workers’ taking screenshots. In Figure 1, we propose an approach to aid testing with the help of Kikbug driver.

Figure 1: Framework of the Approach

The database module contains two main models. One records the information of the already found exceptions while

http://kikbug.net
the other records the already identified exceptions in the testing processing. The former represents exceptions which still need to be tested, and the latter represents the already confirmed exception which will not be tested in the latter testing processing. Based on the situation that crowdsourced testers are managed loosely and do not work simultaneously of large scale[3], the database does not need to be synchronous. Local guides will be given to testers once tasks are taken, and the central database is updated after testing reports are submitted. In the real testing environment, Kikbug, crowdsourced testing works in batches.

Initialization

Before tasks are open to the crowds on the Kikbug platform, requesters are required to complete each task with the aid of Kikbug. Their operations for each testing task are considered as a standard guides recommended to the crowds, such that the workers can acknowledge future what they should do in the next step for each task. Furthermore, workers can explore more unknown exceptions with the equipment of basic acknowledge. The database for patterns are initiated by requesters.

Execution

After the task is published on the Kikbug, workers can take the tasks and do testing with the help of Kikbug accordingly to the requirements from requesters. During the testing process, comparisons are made between the current action of workers and the stored actions in the database, which have triggered exceptions in other workers’ testing tasks. Once matched, hints will show up on the screen, as shown in Figure 2, to guide the workers to identify the exception. When exception has been triggered by a number of workers so that the times the exception recurs over a threshold, this exception is remarked to be ‘exception identified’. In the following testing process, hints about this exception will not be given to avoid duplicate data. For requester-s, these ‘identified’ exceptions are required be tackled with synchronously before the deadlines of crowdsourced tasks.

After the removal, new exceptions may be triggered as related hints of identified exceptions will not be given to testers for identification in testing process. In this way, the coverage of exception is improved in this process. In crowdsourced platforms, this approach manages to guide testers to complete the testing request to local sufficiency. Such an iterative way enriches the database during crowdsourced testing process. At the same time, it avoids wasting time on the same exceptions, which means saving money for requesters. What’s more, as the ‘identified’ exception has been recurred for many times, requesters do not need to verify whether they are bugs or not, which is a resource-consuming task in software testing.

Processing

After the deadline of task on Kikbug, results for the task will be presented to the requesters. After proper processing of the database, the database of exception identified is directly reflected to the requesters for debugging, while the database of exception found is analyzed for their occasional appearance.

In such a framework as shown in Figure 1, the crowds can enjoy an easy and professional testing process, while requesters can benefit from earlier identified bugs and bug-fixing tasks with lower cost and less time.

3. CONCLUSION

An iterative process is proposed to help guide the crowdsourced testing for Android apps. Hints are available to lead workers who are less professional to finish the work sooner and better. With the enrichment of exceptions in database during the crowdsourced process, requesters are provided with effective feedbacks. As far as we know, this is the first work on guiding crowds for mobile testing. We will integrate this work into Kikbug after implement in future. Besides, we will introduce more mining and recommendation algorithms to do a better guide.

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4. REFERENCES