AN APFD EVALUATION METRICS APPLIED ON REGRESSION TEST CASE OPTIMIZATION BY USING HYBRID FIREFLY ALGORITHM

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Abstract: **Software testing has been established that testing, analysis and debugging prices typically consume over five hundredth of the prices related to the event of huge software systems. Several researchers have found many approaches to schedule associate order for execution. They incorrectly schedule tests and also the value is overrun throughout the prioritization method. To improve the regression testing process, test case prioritization techniques systematizes the execution level of test cases. One of the most critical activities of software development and maintenance, known as regression testing. Regression testing has been proved to be crucial stage of software testing. In our proposed study we introduce a hybrid firefly algorithm based regression test case prioritization. The major contribution of our study is regression test case generation, factors identification, clustering for test case prioritization, optimization of prioritized test case. In this research, the K-means clustering algorithm will be used to separate the relevant test cases from irrelevant test cases. Relevant test cases denote the prioritized test cases. We will consider only this relevant test cases resultant from the clustering algorithm in order to optimize it with Hybrid Fire Fly Algorithm (HFFA). HFFA works by the hybridization of Artificial Bee Colony (ABC) Algorithm and Fire Fly (FF) Algorithm. ABC algorithm is a part of a swarm based meta-heuristic algorithm which is enthused by the sharp foraging behavior of the honey bees. In our HFFA Optimization Algorithm, the FF will be processed within the scout bee component of ABC, which leads to fast convergence and limited search space controlled based optimization of locations. Thus we will obtain Effective prioritized test cases.**

IndexTerms- **Regression Testing, Software Testing, Prioritization, Optimization, Artificial Bee colony, Firefly, K-Means.**

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I. INTRODUCTION

Software testing may be a comprehensive set of activities conducted with the intent of finding errors in package. It is one activity within the package development method geared toward evaluating a package item, like system, system and options (e.g. practicality, performance and security) against a given set of system needs. Customer satisfaction is becoming main focus of the software development companies. To achieve this target software testing plays an important role. Hence software development processes are becoming large and complex and has several activities involved in it. To meet the desired requirement, these activities need to be suitably co-ordinate. Software testing is a process which often considered as an expensive and uncontrollable. It is a process by which we executes the system to identify gaps, errors or missing requirements between actual requirement and specified requirement.

Software maintenance becomes most important phase of the software testing. Whenever modifications are done in this phase, retesting of software application is required. The process of retesting such a software is called regression testing. Regression testing is a type of software testing that seeks to check that the changes made to a system have not introduced new faults in the system. Though regression testing is costly, it is required to perform it on the modified parts of the software. During regression testing, new functionality may be added to the modified software or module to improve its response time. Regression testing involves re-testing of an application or system that has been modified to insure that no previously working components, functions or features fails as result of the repairs. Regression testing is executed parallel with other tests.

The regression testing is having two major parts as Test case selection and test case prioritization. In the regression testing we get already designed test suite for reuse and regression test selection technique may help us to select appropriate test cases from these test suite.

Test case selection works out the problem of choosing the test case which will be helpful to check the modified part of the software. Due to growth of application the test cases also grows and it becomes impossible to implement all the test cases with in a specific amount of time. Test case selection deals with the execution of relevant test cases to find the changes between the previous and the current build of application. Test case prioritization techniques are scheduled over test cases in an order to improve the performance of regression testing. Test case prioritization works on the priorities based on the importance and the customer usage. Test case prioritization technique schedules the test cases for execution depending upon its priority, means the test cases with higher priority executed before lower priority. The objective of test case prioritization is to detect fault at early stages.

Objective of Study-

The primary approach will be to produce efficient test cases. Thus, the main objective of test case prioritization is:
- To increase a test suite's rate of fault detection at the earlier stage of the software process.
- To reveal faults earlier in the testing process.
- To select the appropriate Prioritization technique based on the testing scenarios in order to make the prioritization cost effective.
- To develop an effective test case prioritization method that can be used to schedule many test suites and test cases with the same weight values.

Limitations of the Study-

The common problems in existing regression testing test case prioritization approaches are given below.
- Regression test selection and test suite minimization techniques have some drawbacks. Even though some actual proof shows that, in some cases, there is little or no loss in the ability of a minimized test suite to reveal faults in comparison to the un-minimized one, other actual proof shows that the fault detection capabilities of test suites can be badly compromised by minimized.
- The drawback of all the techniques depend upon execution of the number of marked transition like the test case which covered maximum marked transition are given higher priority.

These are the main drawbacks of various existing works, which motivate us to conduct this research on Regression testing test case prioritization.

II. LITERATURE SURVEY

Several techniques were proposed by various authors for Regression Testing and a few of them are explained below:

- Hyunsook Do *et al* [6] have proposed a series of experiments to assess the effects of time constraints on the costs and benefits of prioritization techniques.
- Md. Imrul Kayes *et al* [7] have proposed a new metric for assessing rate of fault dependency detection and an algorithm to prioritize test cases. Using the new metric the effectiveness of that prioritization was shown comparing it with non-prioritized test case.
- Hong Mei *et al* [8] have proposed an approach to prioritizing test cases in the absence of coverage information that operates on Java programs tested under the JUnit framework.
- Siavash Mirarab *et al* [9] have proposed an approach for selecting and ordering a predetermined number of test cases from an existing test suite.

III. PROPOSED WORK

The test case prioritization problem has newly engaged in scheduling test cases for regression testing in an order that raises their efficiency of performance goal. In regression testing this is unsuccessful to re-execute all the test case. Prioritization methods order the test cases for regression testing using information attained from earlier test case execution. In Regression Testing we have proposed to suggest an approach to prioritize test cases. In order to accomplish efficient Test cases, we will improve a prioritization technique based on fire fly algorithm.

3.1 Regression Test Case Generation -The principal objective underlying our approach will be to produce efficient test cases. In this phase, test cases will be produced for the input case study. The test case generation is one of the significant steps applied to find the most important test cases in the study.

3.2 Factors Identification - In this phase, some factors will be regarded in order to prioritize the test cases. The factors exploited here will be time, trace events, behavioral dependency and responsibility. In order to make out the prioritized test cases, these factors will be used

3.3 Clustering for Test Case Prioritization- The K-means clustering algorithm will be applied to divide the related test cases from unrelated test cases in this research. Relevant test cases indicate the prioritized test cases which will be in this phase.

3.4 Optimization of Prioritized Test Cases- Finally in last phase, in order to optimize it with Hybrid Fire Fly Algorithm (HFFA) we will reflect on only this related test cases resultant from the clustering algorithm.

The firefly algorithm is a meta-heuristic algorithm; it is excellent in flashing behavior of fireflies. The unique work for a firefly's flash is to perform as a signal system to draw other fireflies. HFFA efforts by the hybridization of Artificial Bee Colony (ABC) Algorithm and Fire Fly (FF) Algorithm. ABC algorithm is a swarm based meta-heuristic algorithm which is motivated by the sharp foraging behavior of the honey bees. It contains three components namely, employed bees, onlooker bees and scout bees. The number of food sources indicates the probable solutions of optimization problem and the nectar amount of a food source indicates the quality of the solution. The FF will be practiced inside the scout bee component of ABC in our HFFA Optimization Algorithm,

which leads to rapid convergence and restricted search space controlled based optimization. As a result we will get Effective prioritized test cases.

Our approach will be implemented on Java program with a hospital management case study as an input and the presentation will be assessed with different evaluation metrics. For assessing the superiority Average of the Percentage of Faults Detected (APFD) will be the major evaluation metric applied. Performing the test cases based on our prioritization algorithm will significantly give efficient test cases. The suggested technique will be competent in prioritizing the regression test cases. The implementation will be done in JAVA.

IV. CONCLUSION

A hybrid firefly-ABC based prioritization with four phase's test case generation, factors identification, test case prioritization and test case optimization. The test case generation techniques aim to generate test cases which maximize cover for each scenario. From that test case we are performing factors identification the factors utilized here will be time, trace events, behavioral dependency and responsibility. These factors will be employed to identify the prioritized test cases. Then the test cases are prioritized by using a hybrid firefly-ABC technique. The evaluation measures of APFD were evaluated for our proposed method. The test case prioritization time and taken memory space are discussed and is very high by presenting very good outcomes and also the prioritization of test case is gives very accurate outcomes. From the outcomes, we have showed that the hybrid firefly-ABC utilized in our proposed work outperforms the other classifiers by facilitated very good accuracy. Thus, we can observe that our proposed work is better than other existing works for the regression test case prioritization.

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