

Efficient Test Cases of Regression Testing Using Genetic Algorithm

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Abstract: Software Testing is the process of validation and verification of product to provide the quality and efficiency and regression testing is the process of validating the modified software to detect errors that have been introduced into previously tested code. The test cases need to be generated as the software is modified and size of test suites will also increase. In this case, there is need of prioritization of test cases to reduce the cost of regression testing. The genetic algorithm (GA) has been proposed for prioritizing the test cases on the basis of fault coverage and execution time. The proposed work will improve the effectiveness of algorithm with the help of genetic algorithm (GA). Total fault coverage with in time constrained environment on different examples is needed to prioritize the test cases and their finite solution should obtained. Through Genetic Algorithm technique, an approach has been identified to find a suitable population, which was further formulated by GA operations to make it more flexible and efficient. The theoretical approach has been discussed.

Keywords: Genetic Algorithm, Regression, Faults, Test Cases, Execution Time.

I. INTRODUCTION

Testing term is used for test or evaluates the system's components for the purpose satisfaction of specified requirements. It does not imply that is should check and detect the differences between required and existing conditions. The testing executes in order to find the any error or any missing requirements with respect to the actual and desire requirements. Software testing accomplishes with two terms known as validation and verification means to validate the software program and then proceed to verification which is necessary for identification and fixing of errors. The prime goal of testing is to deliver the good quality product to their users and clients. Software is expected to meet certain needs. During the software development, it is required to check that that it fulfils the requirements of client or not. In banking sector, the software is completely differs with other normal shop because of their needs and requirements.

The testing is the main part of software deployment. Software testing is needed to cover the risks of software implementation. Software testing helps to make sure that it meets the entire requirement it was supposed to meet.

- (i) It will bring out all the errors while using the software.
- (ii) Software testing helps to understand that the software that is being tested is a complete success.
- (iii) Software testing helps to give a quality certification that the software can be used by the client immediately.

Regression testing is frequently executed maintenance process used to revalidate modified software. Regression testing is one of the type of testing which works for find the new software bugs and regression where the functional and non functional areas of a existing system changes after the enhancements, configuration changes and patches have

been done [8]. The intention of the regression testing is to make ensure that the changes have been made does not include new faults and also needs to identify that the changes impact the other parts of software not. The basic methods of regression testing includes re execute or re run the previously successful completed tests and identify that the behaviour of changed software means the fixed bug should not re-emerge [3]. This kind of testing can be performed for the testing of system that it is working efficiently by selecting the related test cases for the purpose of recover the proper changes. It is also helpful for testing the correctness of software and for track the quality of output. In designing of compiler, the testing will analyse the code size, compilation time and simulation time of test cases.

The static analysis is used for find out the possible defect in particular code. Dynamic analysis involves executing the code and analysing the output. This testing implemented most of the time at development level. While coding there may be a lot of typing errors, syntax error, loop structure, code termination etc. This should be fixed by inspecting thorough reading of code.

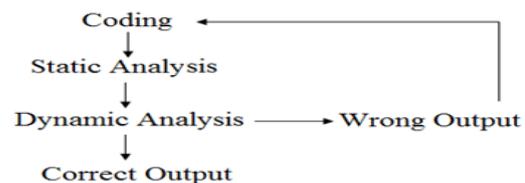


Fig1 Static and Dynamic Analysis

The program will run only after clearing all the coding defects by static analysis.

In dynamic analysis, it is needed to check out the program output whether it is the desired output or not. This is called as dynamic analysis in testing. This will compile the

program and check the output, and then will do the necessary changes in codes. In this paper, we proposed the Genetic Algorithm for prioritize the test cases with faults coverage and time as input parameters of regression testing.

II. GENETIC ALGORITHM

Genetic Algorithm (GA) is adaptive heuristic search algorithm premised on the evolutionary ideas of natural selection and genetic. The basic concept of GA is designed to simulate processes in natural system necessary for evolution. As such they represent an intelligent exploitation of a random search within a defined search space to solve a problem. To use a genetic algorithm, there is need to represent a solution to our problem as a genome (or chromosome). The genetic algorithm then creates a population of solutions and applies genetic operators such as mutation and crossover to evolve the solutions in order to find the best one. After an initial population is randomly generated, the algorithm evolves the through three operators:

- a) Selection Operator
- b) Crossover Operator
- c) Mutation Operator

III. LITERATURE REVIEW

In today's Research scenarios, there are many techniques, which have been discussed for efficient the cost of regression testing. In the test case prioritization methods or techniques, the test cases are scheduled for execution in order to increase the effectiveness and to meet the performance goal of system. The multiple goals are possible such as to measure the efficiency that how quickly faults can be detected in testing steps; another is the rate of fault detection. The faster rate of faults detection under testing can provide the better feedback on the system and if any faults found, then correct the faults as soon [1].

The author has been assimilated the knowledge and concept about the regression testing in terms of time and expenses. They explained that the efficient resources are required to re-execute the all test cases during the process of regression testing but there is less availability of resources. In such scenario, the test case prioritization method can improve the effectiveness of the testing process by re-ordering of the beneficial test cases suit and they will be executing first. The existing methods of regression testing has been focused on the greedy algorithm and is has been known that these algorithms may possibly generate suboptimal results for the reason that they may put up results that indicate only local minima within the exploration space. By distinguish, metaheuristic and evolutionary search algorithms are intend to keep away from such problems.

The Author presents outcome from an experiential study of the application of several greedy, metaheuristic, and evolutionary search algorithms to six programs which are ranging from 374 to 11,148 lines of code and it is for three choices of strength metric. Author also give details the

troubles of choice of fitness metric, classification of landscape modality, and determination of the most suitable search technique to apply [2].

In this, author has been explained the usefulness and significance of Regression testing. They explained that the regression testing is very expensive but significant procedure in software testing. It is possible that there can be unsatisfactory resources to allow for the re-execution of all test cases during regression testing. In such situation, the test cases prioritization techniques aspire to get better the efficiency of regression testing by categorize and order the test cases so the most advantageous are firstly executed. The author proposed a new test case prioritization technique using Genetic Algorithm (GA). The proposed technique prioritizes subsequences of the original test suite so that the new suite, which is run within a time-constrained execution environment, will have a superior rate of fault detection when compared to rates of randomly prioritized test suites [3].

The author explained that the Regression testing is a testing technique helpful for authenticate the customized software. There are numerous obtainable prioritization techniques organize the test cases on the basis of code exposure with respect to older description of the modified software. The regression test suite is characteristically huge and needs an intellectual method for decide the test cases which will detect all or maximum mistake at the initial. In author's approach, a new efficient Genetic Algorithm to prioritize the Regression test suite has been initiated that will prioritize test cases on the basis of absolute code coverage. The genetic algorithm has also programmed the process of test case prioritization. The results representing the usefulness of algorithms and presented with the help of an Average Percentage of Code Covered (APCC) metric [4].

With the rapid development of information technology, software testing, as a software quality assurance, is becoming more and more important. In the software life cycle, each time the code has changed there needs to be regression testing. The huge test case library makes running a full test case library being challenged. To this end, they designed a genetic algorithm-based test case prioritization algorithm and improved the genetic algorithm proposed software test case prioritization algorithm [5].

IV. OBJECTIVES

In the research scenario, the different approach has been followed for efficient regression suit prioritization which covers all the faults with time constraints.

- (i) To select and prioritize regression test suite within a time constrained environment
- (ii) To cover the total fault coverage.
- (iii) To implement efficient Genetic Algorithm (GA) for test cases that will cover major risks / faults in minimum time.
- (iv) To improve the success rate of Genetic Algorithm (GA).

- (v) Compare the efficiency of improved Genetic Algorithm with existing Results.

V. PROPOSED METHODOLOGY

For implement the genetic algorithm, the proper method need to be followed for generate the results. The steps are:

- (i) Study of existing Genetic Algorithm.
- (ii) Research on working of Genetic Algorithm Steps.
- (iii) Flow Development of new research and its Implementation in programming Language.
- (iv) Analysis of results.
- (v) Analysis the benefits of Genetic Algorithm.

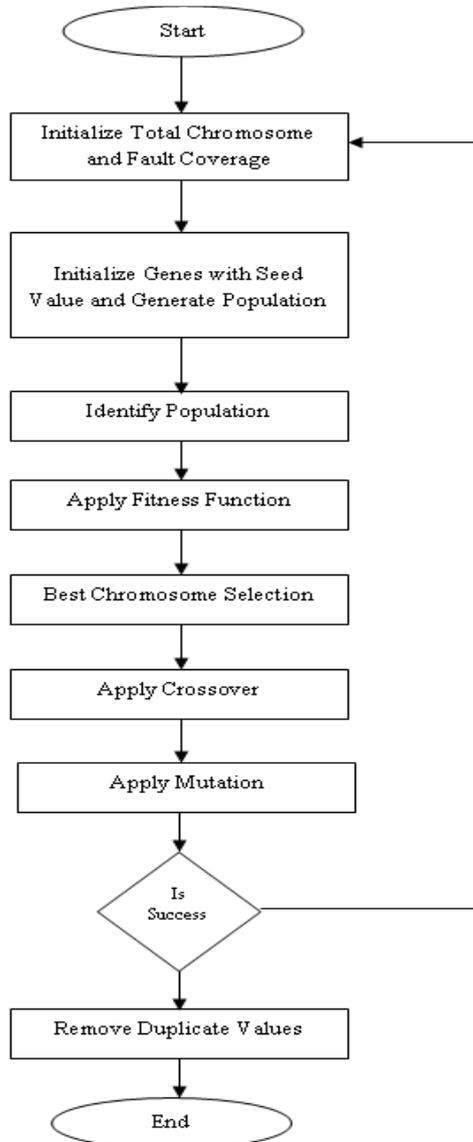


Fig 2 Genetic Algorithm for Efficient Test Case Prioritization

VI. CONCLUSION AND FUTURE WORK

In this paper, we have been proposed the genetic algorithm and methods which can be used for efficient test cases prioritization. The proposed is not implemented in this paper.

The implementation part will be covered in the next paper, which will demonstrate the real working of proposed algorithm.

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