IMPROVING RELIABILITY AND TESTABILITY USING ENHANCED DYNAMIC METRICS

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ABSTRACT

Software engineering metrics allow us to quantitatively define the degree of success or failure for a product. Traditional static metrics alone may be insufficient in evaluating the dynamic behaviour of an application at runtime, as its behaviour will be influenced by the execution environment as well as the complexity of the source code. Dynamic metrics are the class of software metrics that capture the dynamic behaviour of the software system and are usually obtained from the execution traces of the code. The proposed research is to develop enhanced dynamic metrics for improving reliability and testability of software's.

Keywords: Static Metrics, Dynamic Metrics, Reliability, Testability.

I. INTRODUCTION

Software engineering metrics allow us to quantitatively define the degree of success or failure, for a product, a process, or a person, making meaningful and useful managerial and technical decisions, and make quantified and meaningful estimates [1]. Thus, incorporating metrics into development plans is a simple step towards creating better systems.

The most popular and time-honoured software metrics are LOC (lines of code) and Cyclomatic Complexity. These measures are originally defined for procedural programs and later incorporated for object-oriented systems. The LOC metric is a measure of a size of a module and Cyclomatic Complexity measures logical complexity of a module [2]. Chidamber and Kemerer addressed the need for new and modified metrics for object-oriented systems by introducing a set of metrics.

Static metrics focus on static properties of the software and a number of static metrics have been proposed in literature for the measurement of coupling, cohesion and other attributes of object-oriented software using design or source code of the software, which are static in nature.

Traditional static metrics alone may be insufficient in evaluating the dynamic behaviour of an application at runtime, as its behaviour will be influenced by the execution environment as well as the complexity of the source code. Object-oriented features such as polymorphism, dynamic binding, inheritance and common presence of unused ("dead") code in commercial software, render the static metrics imprecise, as they do not precisely reflect the runtime situation of the software [1]. Moreover, the complex dynamic behaviour of many real-time applications motivates us to focus on dynamic metrics in place of traditional static metrics [3].

Dynamic metrics are the class of software metrics that capture the dynamic behaviour of the software system and are usually obtained from the execution traces of the code or from the executable models. Major dynamic metrics proposed are for the measurement of coupling, cohesion, and complexity [4]. The proposed research is to develop enhanced dynamic metrics for improving reliability and testability of software's.

II.ROLE OF TESTING AND RELIABILITY

Now a day's software quality metrics are used. These metrics are used to detect the quality of the various software products. Quality of the software product depends upon the features added. Suppose a product has the high features than the other one then it becomes the best quality product. But there are many other problems it has to face. As the product with high features declared as the best quality product, but nobody wanted to know either the features are reliable to that particular product or not so with this the problem of reliability occurs. With the additional features the performance of the product also effects. Hence the need of testability is also required here [5]. The proposed work is about increasing the performance of dynamic metrics by adding the factors which increase the functionality of the software system.

In the proposed methodology, the research work contributes to develop enhanced dynamic metric by adding some factors like testability and reliability in the existing dynamic metrics.
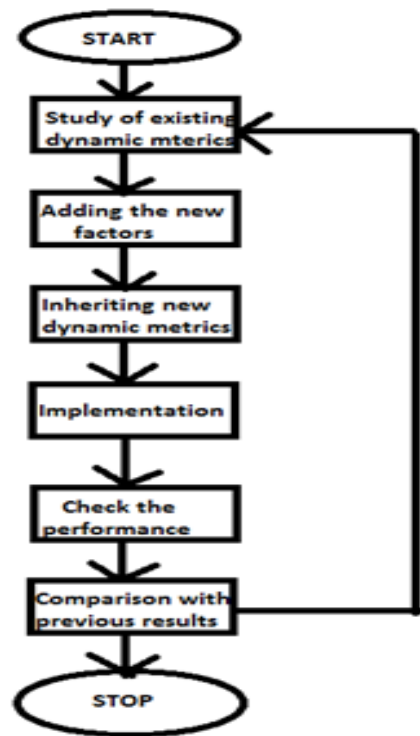
2.1 Testability

Testability is necessary in the Dynamic metrics. It is the non-functional requirement. Testability allows the component to be tested in separation [6]. When the testability takes place in the system, the customer reports the smallest amount number of defects. Testability is also significant for the maintainability of software product. When software is tested, firstly a piece of code is tested. The errors are established in that piece of code. After that the whole system is tested. Hence testability increases the maintainability of the system.

2.2 Reliability

The system's ability of breakdown free operation to the extent to which the system fails is reliability. It is calculated by the Mean Time between Failures. The verification of a system aims to notice defects and then take away them there by making it more dependable [7]. A frequent change introduces the defects into the software affecting the reliability. Testing must be done to confirm that no defects have been introduced by the change after it has been implemented. The effect of an alteration on software reliability can be indirectly calculated by measuring its effect on the complication of the software and also can be calculated when the change is prepared.

III. OBJECTIVES AND RESEARCH METHODOLOGY

Objective of this proposal is to study existing dynamic metrics and then develop enhanced Dynamic Metric for improving reliability and testability. In the proposed methodology, the research work contributes to enhance dynamic metric by adding some factors like testability and reliability in the existing dynamic metrics. Proposed metrics are evaluated using different test cases. Fig 1 shows the process of research methodology.

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Fig. 1: Procedure for Research Work

In the proposed methodology the genetic algorithm will be used. Genetic algorithm is computational model that is inspired from the biological inspiration. Genetic algorithm has been used in many of the research works related to optimization of the test cases. The Genetic algorithm has been proposed to use in software engineering because it solves the optimization problems.

IV. CONCLUSION AND FUTURE WORK

In the proposed enhanced dynamic metrics genetic algorithm is used to optimize the results. In this work the focus is to improve reliability and testability of software's with enhanced dynamic metrics. In future research can also applied on polymorphism and inheritance factors which makes it useful in real environment.

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