

An UML Based software Automatic Test Case Generation: Survey

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Abstract - Software testing is important activity in software Engineering concerned to Software Development Life Cycle (SDLC). To reduce cost of physical testing as well as to growth consistency of it, scholars and experts have hands on to automate it. One of the essential activities in testing background is to generate test case automatically. This Literature based paper focuses on a survey of UML based automatic test case generation methods that are originate in the recent networks.

Key Words: Test case generation, Automatic UML Test case generation

1. INTRODUCTION

Software organizations use huge share of their budget in testing and associated activities. Robust tested software will be definite by the customer before taking acceptance. The success of this verification as well as validation practice is determined by the number of bugs found and resolved before release. From the last few years' numbers of several approaches have been suggested for generating test cases. One of the most derived from use cases. Likely one of the method is test cases also be generated from system requirements. One of the benefit of generating test cases from design and specifications can be produced prior in the SDLC also be set to use in advance to the programs code are to be created. As well, once the test cases are present early, Software Engineers can find a lot conflicts and doubts in the specification and design requirements. Such technique will certainly get down the budget of constructing software

2. WORK SURVEY

Numerous approaches are suggested for test case auto generation, generally 1) random, 2) goal-oriented, 3) path-oriented and intelligent methodologies. Random approach defines test cases generation based on rules concerned to error distribution. Goal-oriented approach recognizes test cases targeting a certain goal such as a flow statement or module.

Path-oriented approach normally usage control flow of data to detect a fixed path to be focused as well generates the correct test cases used for these paths. It is further

being categorised as static as well as dynamic. Static methods are frequently created and base on symbolic implementation, while dynamic methods achieves from there quires data by implementing and executing the code under test suite. Intelligent methods of automated test case generation depend on complex structure and to recognise test cases. Modeling languages used to acquire the specification requirements and generate test cases for specified documentation. Meanwhile UML (Unified Modeling Language) is the greatest usually used language; numerous scholars using UML diagrams that are use-case diagrams, class diagram, sequence diagrams, activity diagram, state-chart diagrams, etc to generate test cases.

This takes led to Model based test case generation form UML diagram. In this paper survey work carried out during the last 5 years, where maximum of the scholars have focused on Model based test case generation.

However several approaches have recommended, by means of the initiation of modelling tools such as Rational Rose, Star UML, Magic Draw. For easy understanding test case generation approaches mainly classified into two types – Specification based test case generation and Model based test case generation.

3. SPECIFICATION BASED TESTCASE GENERATION

Md azaharuddin Ali, Kasimshaik, Shreyansh Kumar June in 2014 IJCA [1] have presented paper in the field of software testing. They have proposed a innovative technique that get used to predefined state based specification to generate test cases from UML State-Chart diagrams. The transformation of state diagram to finite state which stores information for test case generation using pre and post conditions. The conclusion of the authors was Different UML diagrams are used effectively to generate Test cases. Author suggest state diagram to generate Test Case. Methodology to transform UML to Finite state Machine where each node represents state and arrow represent transition.

BipinPandey, Rituraj Jain in April 2014 IJCTA [2] have proposed work Importance of Unified Modelling Language for Test Case Generation in software testing the scope of work was exploring few approached based on the UML diagrams to generate test cases for effective software testing. Authors were came to wrap up Study and review

of different work done in modelling techniques based on UML can be used for automated testing.

Swati Tahiliani, PallaviPandit in Sept 2012 IJECR [6] have proposed A Survey of UML Based approaches to testing the scope of work was Survey of UML for designing the test case on various levels will give high quality results in early stages of SDLC.

Emanuela G Cartaxo, Francisco G. O. Neto, Patricia D.L. machado in March 2013 UFCG [5] have proposed work Test Case Generation by means of UML sequence Diagrams and Labelled Transition Systems and scope of work was Systematic procedure of functional test case generation for feature testing. Techniques that translate UML Sequence diagram into Labelled Transition Systems. It is a research work for Motorola Corporation that initiative for automation for test case generation, selection and evaluation for prescribed application.

Specification Based testing defined by Marlon E Viera et al [8] uses UML state chart diagrams as the base in addition to automatically generate test case so to confirm the component under test. The Tester point to the java class for testing and the parallels state-chart design used for the class behaviour, as well as describes the illustration charting by linking code to the requirement. Objective is to state better-quality requirement based attention standards meet for testing Object Oriented systems as well as to develop methods designed for test case using slight human interface for automation.

Vinaya Sawant, Ketan Shah in 2011ICTSM [10] defined Automatic Generation of Test Cases from UML Models that having the scope for Using UML the diagrams Graph is created to store necessary information and scanning of graph generate Test Case. The objective of the author is to use UML diagram that transform to sequence diagram graph (SDG) to store necessary information in nodes that are scanning SDG to generate test case using Object Constrained Language.

2. MODEL BASED TESTCASE GENERATION

Continuous research and experiment in Model Based approach led by many scholars to extend their work from system level analysis using UML diagram, sequence diagram and state-chart diagrams to integration level analysis using algorithm. An algorithm has stood designed to make sure that tests fulfil the proper testing bench marks as well as benefit the tester to find the paths. On behalf of investigational valuation the authors have modelled standard software, which included Class diagrams, State-chart diagrams and Sequence diagrams to generate uniform durable as well as consistent test cases. Also some authors planned to integrate UML specification with OCL (Object Constraint Language).

A framework for model level testing of UML models was proposed by A.V.K. Shanthi, G. MahanKumar in Sept 2012EJSR [7]. Tabu Search algorithm has been used for automatic generation of test cases. Test cases are optimised and that cases are validated by prioritization with result to show that this method has better performance the input to this frame work is an UML sequence diagram exported to tool independent sequence dependency table format. Transformation table which can hold a rich data set of UML data, in-order to maintain methodology release for tools. As a result UML plan can be experienced tested as well as design fault can be detected in modelling phase of development process prior to any implementation activities saving a considerable amount of cost and effort. This is novel approach to test to the initial stage so that it will easy for software tester to test to test software in later stage.

A.V.K. Shanthi,G. MahanKumar in ICSCA 2012[8] proposed work Automated Test Cases Generation from UML Sequence diagram using Rational Rose that Focus on the test case generation by means of UML sequence diagram using genetic algorithm. Proposed system having mainly UML Sequence diagram, Genetic algorithm, Rational rose MDL file and Sequence Dependency Table. This approach used to identify the fault in the implementation, to reduce testing efforts. Gives better performance and reduce efforts for tester in early stage of development. In previous [9] authors suggested Automated Test Cases Generation for Object Orientated Software that Valid test cases generation scheme which is fully automated and the generated test cases used to satisfy the transition switch path coverage criteria. The DFS, Binary Tree and Genetic algorithm has been used and implemented to bring out all possible valid cases of given class diagram. The proposed work mainly focus on UML Class diagrams, data mining techniques, genetic algorithm for validation, specification based test case generation.

3. CONCLUSION

Various techniques existing are available for generating test cases to fulfil test analysis standard. A random test case auto generator may possibly create voluminous test data; but might miss the mark to discover test case to satisfy software requirements. The path oriented move towards recognises path for which test case has to be generated, still the path might be situated infeasible, and the test data generator influence be unsuccessful to catch an input that will pass through the path. An intelligent approach generates test case rapidly but is relatively multipart. Relating through these methods, Model based testing is appreciated one; meanwhile it generates bendable, beneficial test computerization from almost first day. Models are easy to modify, generate numerous test sequences as well as permit the testers to get additional testing expert in shorter period.

Even though various test case generation methodologies are available, model based testing approach has involved many scholars and still research is actuality carried out to enhance the generation of automatic test cases with minimum human effort and cost.

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BIOGRAPHIES

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