Software Testing Using Genetic Algorithm: A Review

Versha Sharma, Neha Bhatt, Parul Gandhi

Manav Rachna International Institute of Research and Science, Delhi Suraj Kund Road, Sector-43, Faridabad, Haryana 121004

Abstract— *Software testing focus on testing largely depends on test case generation, execution and evaluation. It helps designer to solve or handle the complexity of a program It also improves software performance, dependability and safety concerns. Software testing consume lot of time, cost, money. We are using soft computing techniques which are used to obtain solutions of problems quickly, accurately and acceptably but still we are finding which technique is most suitable and can be used globally. So in this paper we have provided an overview of existing techniques, and then critically analyzed the work done by the various researchers in the field of software reliability. Genetic algorithm provides the key to the problem of area of software testing.*

Keywords— *Software testing and genetic algorithm.*

I. INTRODUCTION

Software engineering is a discipline production of a good testing software which requires a good software which should be reliable, portable and usable and can be maintained properly. Software engineering is playing an important role in software life and there is always a need of a high quality. Software testing is check the function it is true or not. Software testing is remove the faults it the process of verification and validation. Verification testing is check the structure of program and Validation is check the function of program manual testing is not better then software testing Software testing is find out the errors .errors is solve the problems. Software testing is manage the program software requirement follow the steps and events input output and expected result. In our paper different type of genetic algorithm is completed genetic algorithm is generate the number of test cases.

II. GENETIC ALGORITHM

Mainly genetic algorithm is used to software reliability. GENETIC ALGORITHM is represented a solution of your problem. Which a program is helping to arrive at a desire goal. It is show he better result compare to neural network. It is search a fit solution. It is indicate the positive result.

- Genetic algorithm convert design space to genetic space.
- Genetic algorithm work with code of words.
- Genetic algorithm is incidental (unplanned).

ALGORITMS
STEP1:- Encoding the problem of binary string
STEP2:- unplanned creating of a population
STEP3:- find the fit solution
STEP4:- find pairs of fit string
STEP5:- generate new string with crossover and mutation
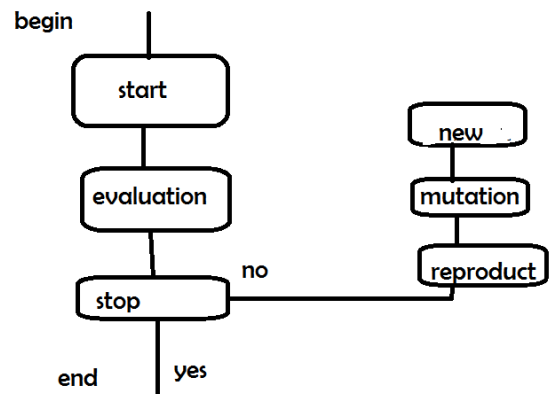　　　　Repeat step 2 to 5 content solution of the problem

ENCODING
Representing the process of solution in the form of string
Each bit process the form of 0 or 1
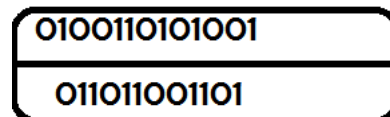
ASPECTS OF GENETIC ALGORITHM
➢ initialization
➢ fitness function
➢ selection
➢ crossover
➢ mutation

IT IS GENERATED THE THREE ASPECTS
It is machine learning scheme .for example NEURAL NETWORK. Genetic algorithm is create a model of architecture.

III. OPERATION OF GENETIC ALGORITHM

1:-SELECTION
2:-CROSSOVER
3:-MUTATION
*1:-SELECTION:-*it is based on fitness value 1st fitted value is defined capability of values it is determine the algorithm. It is generate the new value from old one. Selection is define the weight and edges.
2:-CROSSOVER:- After selection is the generate a new values. It is the pair if value sequence of bits generate of new population. It is cross the all value and find out the output.

For example:-
1:-AaBcCC
2:-45678
Value= aAb45 (one comes out of many)

3:-MUTATION:-it is perform all bit of values, every bit of value is generate offstring
For example:-
1:-aAbBcC
2:- 123456
Value:- aAbk56 (changing 4 to k).

IV. USING GENTIC ALGORITHM IN SOFTWARE TESTING

Genetic Algorithm is basically developed in 1970"s by Holland .Genetic Algorithm is used to performed various testing techniques. Software testing is used to improve the problem to minimize number of test cases and time, cost and labor. And also increase the quality of the software. Genetic algorithm used with black box and white box testing.

BLACK BOX TESTING:- Black box techniques is check the function of software. It is manage the requirements and specification. In black box testing we just concentrate on input and output of the software system.

The above black box testing can be any software system you want to test. Like- operating system.

Functions of Black Box Testing

Functional Testing:- Functional testing using genetic algorithm expected to generate fault test cases. We check the functionality of testing
fp= t li→li+1 k−1i

	A1	A2	A3	A4	A5	-----	An
A1	V1,1	V1,2	V1,3	V1,4	V1,5	-----	V1,n
A2	V2,1	V2,2	V2,3	V2,4	V2,5	----	V2,n
A3	V3,1	V3,2	V3,3	V3,4	V3,5	----	V3,n
A4	V4,1	V4,2	V4,3	V4,4	V4,5	----	V4,n
----							----
An	Vn,1	Vn,2	Vn,3	Vn,4	Vn,5	-----	V5,n

*Non Functional Testing:-*It is not related to specific functionality. But non-functional requirements such as task, usability,
*Regression Testing:-*Regression testing is type of software testing .it is perform recent code and tools and it is not change the existing features. it is selection of already executed test cases
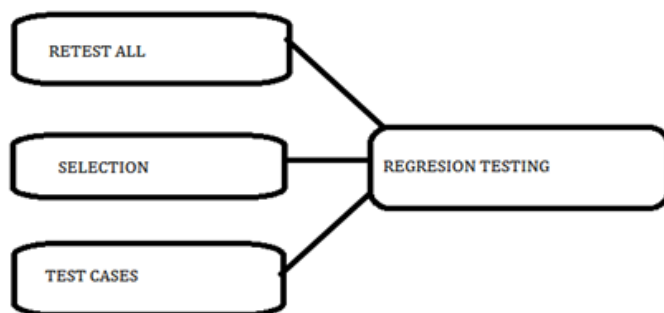
*White Box Testing:-*White box testing is structural testing. It is the internal part of system and perform the test cases. It is generate the levels and unit of the software testing. White box test design techniques are-
Path Testing:- Path testing using genetic algorithm is software quality control. It covers the each statement and branch. This techniques corresponds to testing all possible paths which means that each statement and branch is covered. it is a structure testing and it is based on code and algorithms.
1:-specification is correct
2:-data is run properly
3:-control flow
4:-independent path
*Data Flow Testing:-*Data flow testing is based on selecting path in the program. it covers the variable of path. it includes the
1:-test cases
2:-input of component
3:-variables of location
4:-path of program
Statement Testing:- This techniques focus on all exercising all programming statement with small tests.

V. CONCLUSION

Software testing is a problem of a solution. It detects much solution. It is covered by the black box testing and white box testing. In this paper we are discussing the techniques of genetic algorithm of software testing. Software testing is increase the time and complexity genetic algorithm is generated the test cases .it is also random test cases. Software testing is populated the test cases of genetic algorithm .it is number of value is increase in a genetic algorithm. It has been studied that genetic algorithm gives better results to increase quality of software. Software testing is applying the black box testing and genetic algorithm and values.

VI. ACKNOWLEDGEMENT

REFERENCE

[1] Maha Saleh Al-Zabidi, Dr. Ajay Kumar, and Dr. A. D. Shaligram, "Study of Genetic Algorithm For Automatic Software Test Data

Generation," *Galaxy, International Interdisciplinary Research Journal (GIIRJ)*, vol. 1, issue 2, pp. 65-74, 2013.

[2] Kulvinder Singh and Rakesh Kumar, "Optimization of functional testing using genetic algorithms," *International Journal of Innovation, Management and Technology*, vol. 1, no. 1, pp. 43-46, 2010.

[3] Patrick Kwaku Kudjo, Elias Nii Noi Ocquaye, and Wolali Ametepe, "Review of genetic algorithm and application in software testing," *International Journal of Computer Applications*, vol. 160, no. 2, 2017.

[4] Chayanika Sharma, Sangeeta Sabharwal, and Ritu Sibal, "A survey on software testing techniques using genetic algorithm," *IJCSI International Journal of Computer Science Issues*, vol. 10, issue 1, no. 1, 2013.

[5] Akshat Sharma, Rishon Patani, and Ashish Aggarwal, "Software testing using genetic algorithms," *International Journal of Computer Science & Engineering Survey (IJCSES)*, vol. 7, no. 2, pp. 21-33, 2016.