Software Reliability Modeling using Fuzzy Logic

Anu

Assistant Professor (Resource Person), Department of Computer Science, UIET, MDU, Rohtak, Haryana, India

---

ABSTRACT

Software reliability modeling has been one of the greatly engrossed study domains in software engineering. Software reliability method recommend reusable, less difficult software program, to carry out a hard and fast of a success process along with his characteristic inside a furnished moment and surroundings. Software designers are encouraged to increase dependable, reusable and useful software. In beyond, Object-Oriented Programming System (OOPS) concept is to be used in purpose of reusability but they're now not presenting powerful to cope with the successive converting as according to requirements of ongoing applications. After that Component Based Software system (CBSS) is in floor. It is based on reusability of his issue with much less complexity. This paper gives a new approach to research the reusability, dependency, and operation profile in addition to utility complexity of issue-based software gadget. We concentrate in this paper is to provide a model for software reliability estimation. We apply the fuzzy logic approach to estimate the reliability of software.

Keywords: Object-Oriented Programming System (OOPS), Component Based Software system (CBSS), Fuzzy Inference System (FIS), Reliability etc.

INTRODUCTION

Software reliability is the probability measure to represent the failure – free software operation for a certain time period in a distinctive environment. The reliability of a software product is normally defined to be "the possibility of execution without failure for some specified programming language of natural devices or time" [1]. Software reliability is depends on performance of a hit operations and characteristic as well as less complexity, maintainability, portability, flexibility and so on. In a binary form we are able to say that if software is accurate and failure-loose then its reliability is 1 else 0. Reliability continues to be predict probabilistically as Software Reliability = [1-probability of failure] Software reliability is basically depending on reusability of the software due to the fact reliability of software is directly proportional to its reusability programming machine (OOPS) concept is appear for software improvement. But he changed into no longer a success as consistent with requirement. After that another concept is appear in improvement floor that is Component Based Software System.

Component Based Software System (CBSS) is a paradigm that pursuits at building and designing systems the usage of a predefined set of software components explicitly created for reuse. Component based software program development is most promising approach for software improvement nowadays. This approach is based on the concept that software systems can be evolved by using deciding on suitable off-the-shelf additives and then assembling them with well-defined software structure [2].

This new software program development approach could be very extraordinary from the conventional approach wherein software program structures can handiest be applied from scratch. This paper offers tender computing techniques for reliability estimation for the thing based software device. Here we will use fuzzy logic for estimating the reliability of the software program. Fuzzy good judgment presents logical talents as well as getting to know skills for choice making. Logically selection this is Fuzzy Inference System (FIS) primarily based on fuzzy rule and gaining knowledge of functionality based totally on education for choice making that is Adaptive Nero Fuzzy Inference System (ANFIS). In this paper we can use each type of facilities are adopted with distinct range of membership feature for estimation thing based software program machine and analysis that which one is offer higher reliability for each the fashions.

RELATED WORK

Over the past few years, many open source software have been developed and this is still a continuing effort. As in [1] provides the criteria for software reliability estimation and their systematic study with reliability functions. As in [2] author studied the various reliability models and there theory to applying a particular model in the specified environment. As in [3, 4] author explains the software reliability estimation models, reliability matrices and agile development, usage in reliability estimation. As in [5-9] author explain the object oriented metrics of reliability estimation and an algebra of reliability calculation. As in [10,11] author gives an alternative method of fuzzy system to measure the reliability. D. chhabra [12] designed the Fuzzy Logic Controller for Active Vibration Control of Cantilever Plate with Piezo - Patches as Sensor /Actuator. V. Kumar and A. Kumar[13] optimised the vibration of the plate with the help of Adaptive neuro-fuzzy inference system (ANFIS) controller. Varun Kumar[14] control the vibration of the plate with the help of fuzzy logic controller. A finite element model of a two-dimensional cantilever plate instrumented with a piezoelectric patches sensor-actuator pair is derived.

Proposed Model
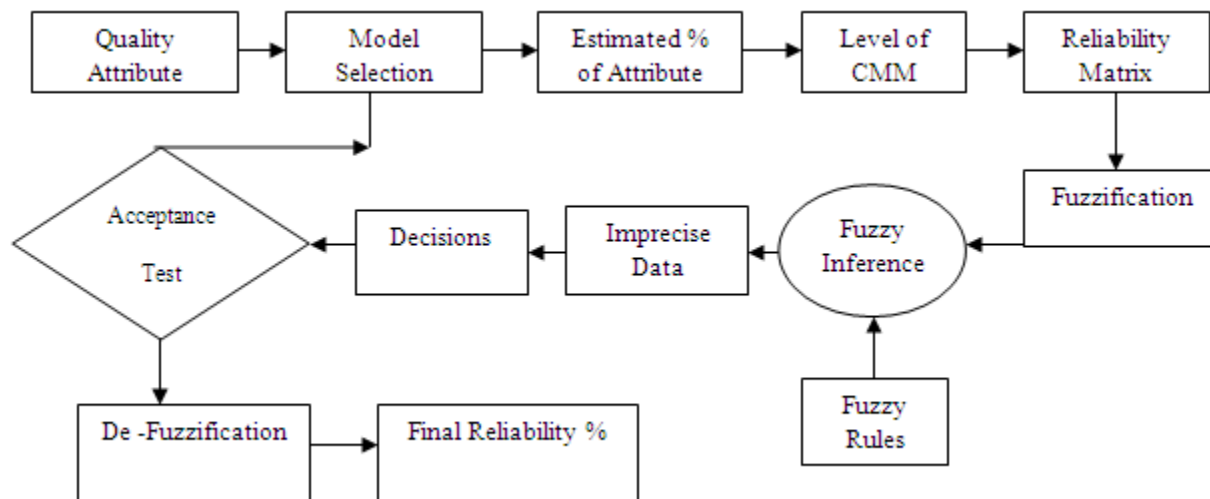
In this we will use fuzzy logic for the estimation of software reliability. Fuzzy logic are based upon the IF –THEN rules. They will provide capability for decision making.

Fuzzy logic is the methodology to solve problems which are too complex to be understood. It is based on fuzzy set theory. Fuzzy set can effectively used to represent linguistic values such as low, young and complex.

Software reliability depends upon various attributes. These attributes are listed below

- Usability
- Motility
- Maintainability Aesthetic
- Reusability

Software imprecisely state constraint set that can be established and by applying fuzzy ranges and verifying every constraint strength for association to these ranges. Rules can be well-known to offer clear-cut considerable level of scaling to user demands conversion to software needs. Fuzzy data set and answer straddling ranges can be specified for other remaining parameters for assumed case. Furthermore output function can determine different three categories as necessary necessities, pleasing requirements and tardy requirements. Fuzzy logic is a form of countless treasured logic that deals with fairly accurate, rather than permanent and strict way of thinking. Compared to traditional binary logic (where variables may take on true and false values), fuzzy logic variables may have a truth value that ranges in degree between 0 and 1. Fuzzy Logic with its offerings of a powerful linguistic representation can represent imprecision in inputs and outputs, while providing a more expert knowledge based approach to model building.

RESULTS

In this paper our goal is to improve the reliability of software using fuzzy system. The figure shows the modeling of estimated quality of software using fuzzy system using Mat Lab. We can implement it with the help of various tools like Mat lab, QTP etc.
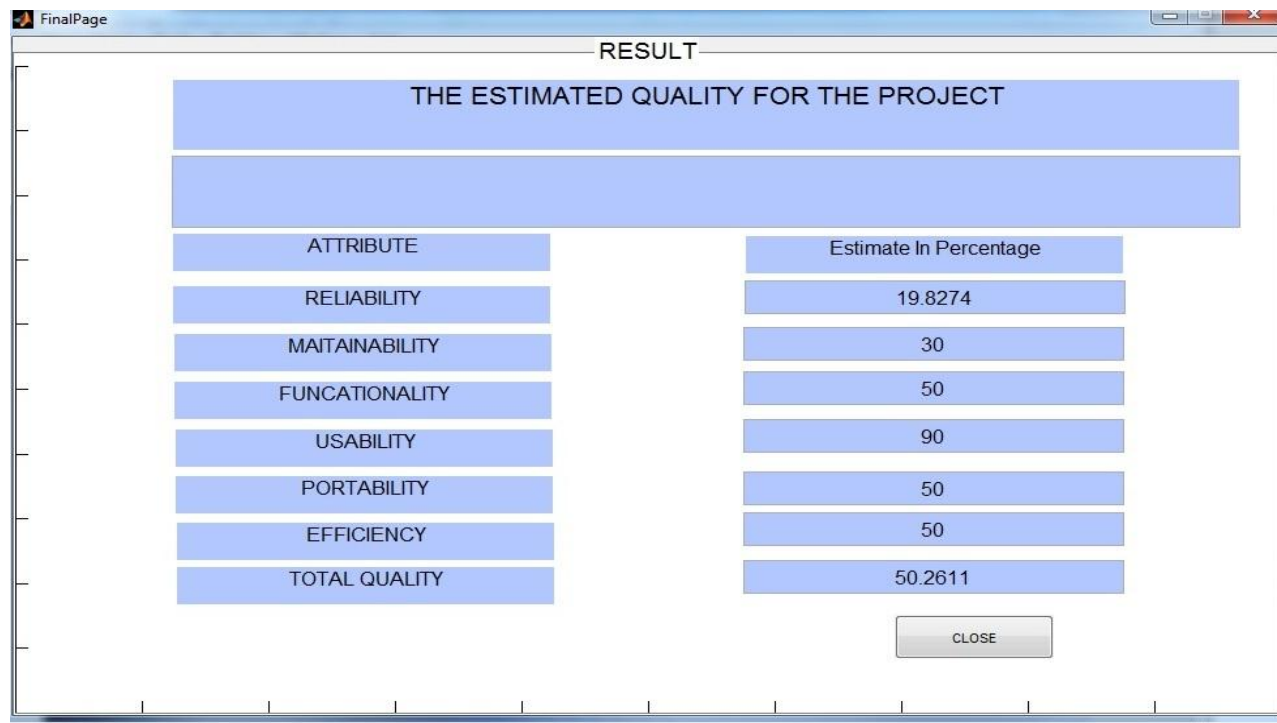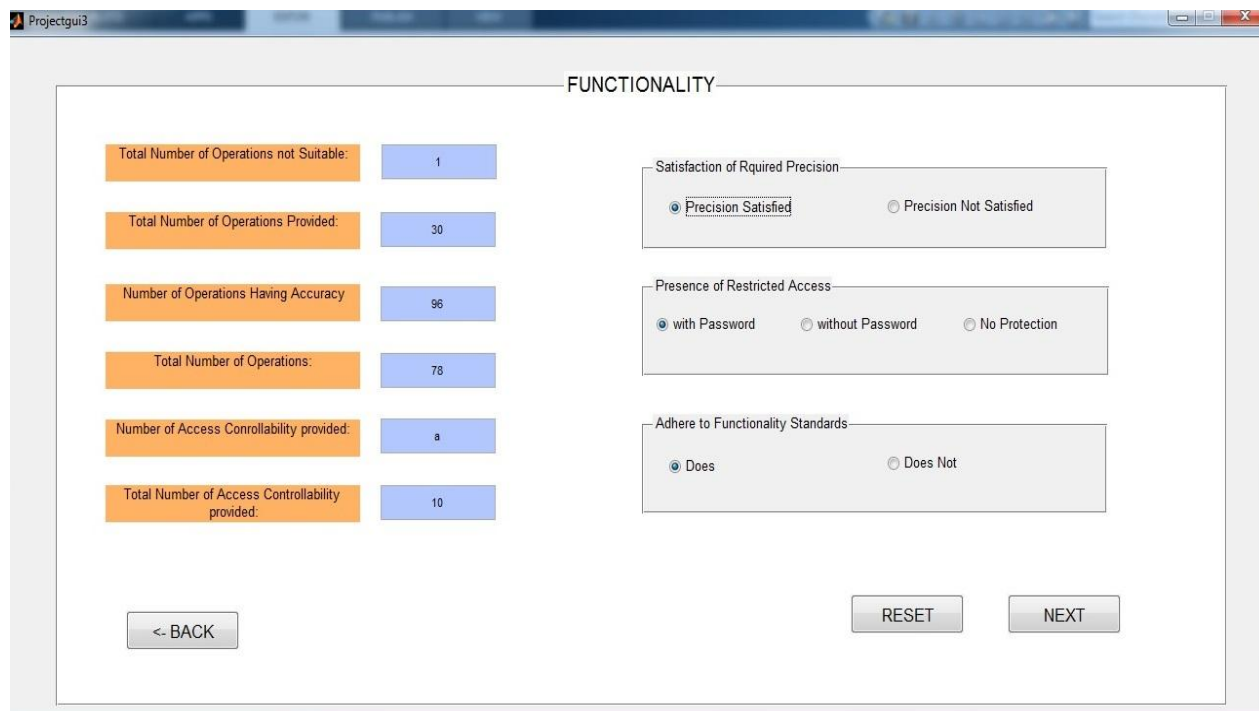

Fig. 1 Estimated % of Quality
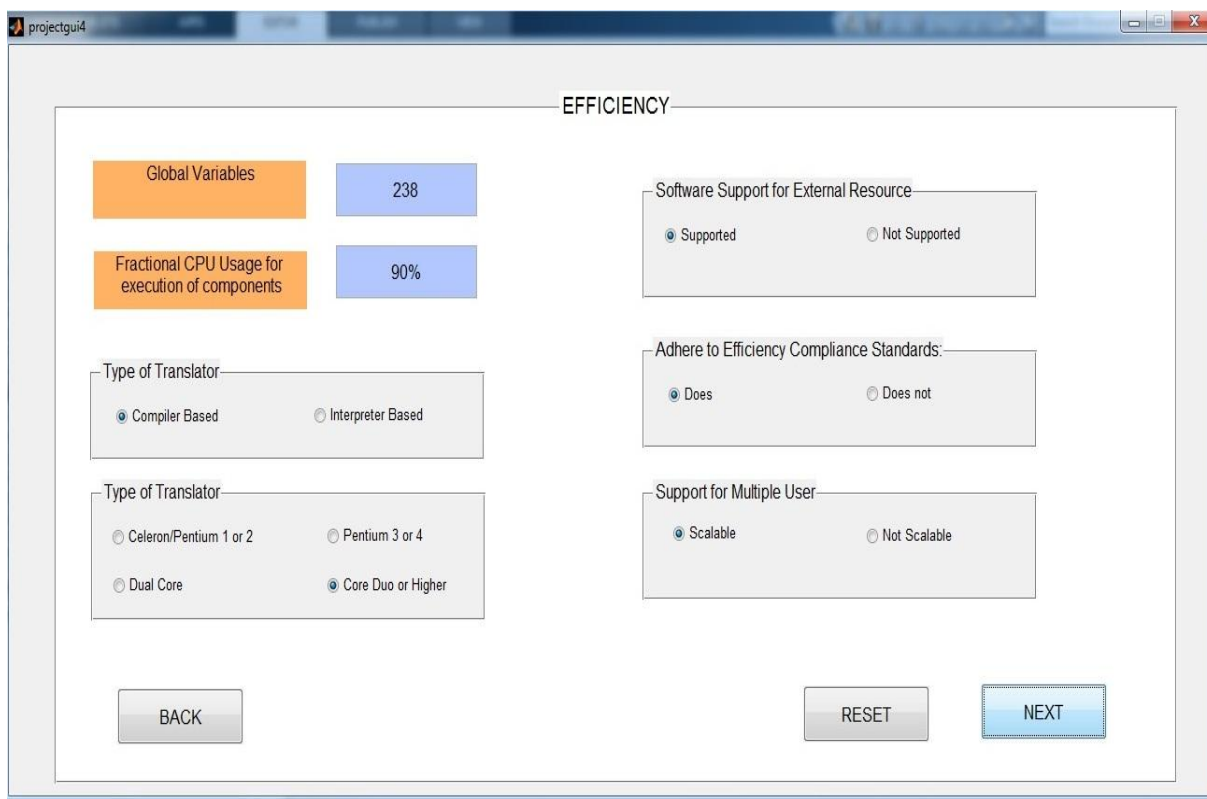
Fig. 2 Functionality of software

Fig.3 Efficiency
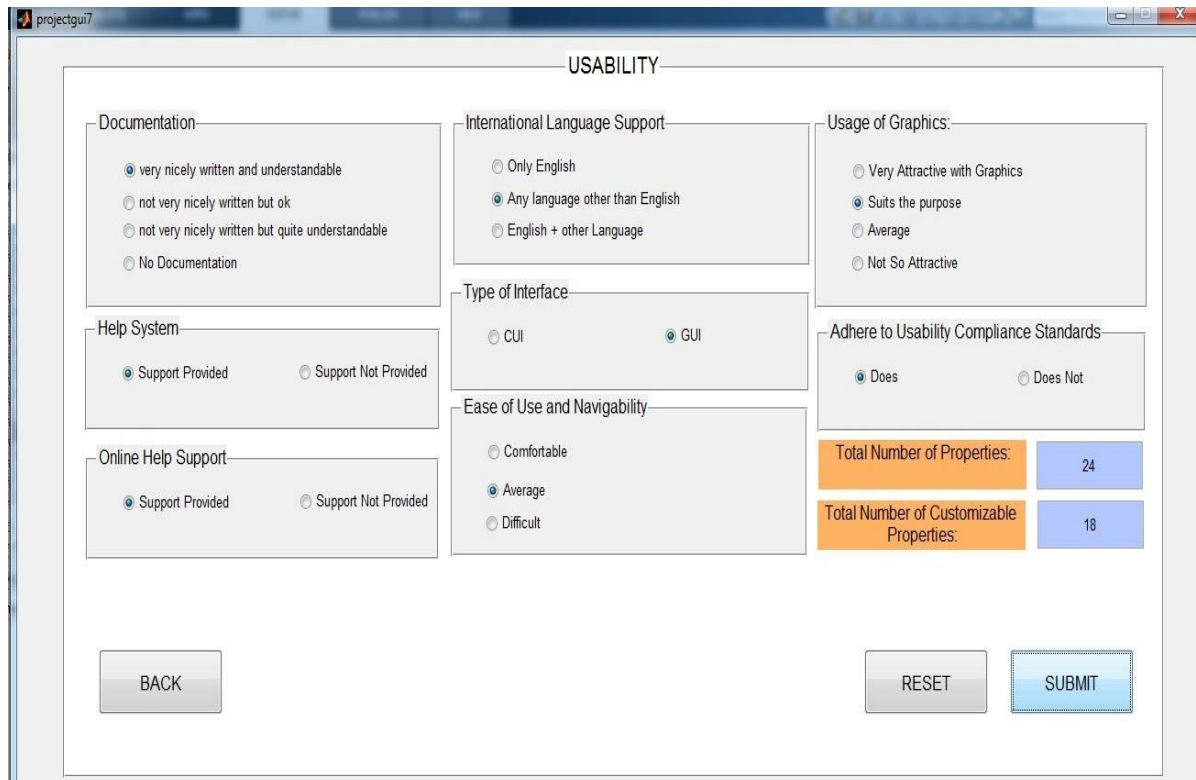

Fig. 4 Maintainability

Fig. 5: Usability

CONCLUSION

It is necessary to identify the same level of objective being implemented for the betterment of the research work. It is always suggested that the research work gives a great amount of the improvement that a single user will not be able to do so. Thus with the identification of results it will be easier. Also in this research paper we find out that the software reliability is improved up to some extant using fuzzy logic. Software reliability is based on maintainability, usability and portability.

REFERENCES

[1]. Shooman, M., 1976. Structural models for software reli-ability prediction, proceeding of the Second International Conference on Software Engineering, San Francisco, CA, pp. 268–280.
[2]. Cheung, R.C., 1980. A user oriented software reliability model. IEEE Trans. Softw. Eng. 6 (2), 118–125.
[3]. Popostojanova, K.G., Trivedi, K.S., 2001. Architecture based approach to reliability assessment of software sys-tems. Perform. Eval. J. 45 (2), 179–204.
[4]. Yacoub, S., Cukic, B., Ammar, H., 2004. Scenario based reliability analysis approach for component based sys-tems. IEEE Trans. Reliab. 53 (4), 465–480.
[5]. Deepak Arora, Pooja Khanna, AlpikaTripathi, Shipra Sharma, Sanchika Shukla (2011) "Software Quality Estimation through Object Oriented Design Metrics", International Journal 100 of Computer Science and Network Security, Volume 11, No.4.
[6]. Huang, N., Wang, D., Jia, X., 2008. FAST ABSTRACT: an algebra-based reliability prediction approach for com-posite web services, 19th International Symposium on Software Reliability Engineering, pp. 285–286.
[7]. Dimov, Aleksandar, Sasikumar, Punnekkat, 2010. Fuzzy reliability model for component-based software systems, 36th EUROMICRO Conference on Software Engineer-ing and Advanced Applications, pp. 39–46.
[8]. Tyagi, K., Sharma, A., 2012. A rule-based approach for estimating the reliability of component-based systems. Adv. Eng. Softw. 54, 24–29
[9]. R.Chinnaiyan and Dr.S.Somasundaram,2008, "RELIA-BILITY ASSESSMENT OF COMPONENT BASED SOFTWARE SYSTEMS USING TEST SUITE - A RE-VIEW", Journal of Computer Applications, Vol – 1, No.4, Oct – Dec 2008, 34-37.
[10]. Fazal-E-Amin, et al., "A Review of Software Component Reusability Assessment Approaches," Research Journal of Information Technology, vol. 3, pp. 1-10,20 1 1.
[11]. Seth, K., Sharma, A., Seth, A., 2010. Minimum spanning tree-based approach for reliability estimation of COTSbased software applications. IUP J. Comput. Sci. 4 (4), 13–21.

[12]. Varun Kumar and Deepak Chhabra, "Designed the Fuzzy Logic Controller for Active Vibration Control of Cantilever Plate with Piezo -Patches As Sensor /Actuator" International Journal of Emerging Research in Management &Technology, Volume-2, Issue-8,pp.34-44,2013.

[13]. Varun Kumar and Amit Kumar 'Design of Adaptive neuro-fuzzy inference system (ANFIS) Controller for Active Vibration control of Cantilever Plate with Piezo -Patches as sensor /actuator' INTERNATIONAL JOURNAL OF R&D IN ENGINEERING, SCIENCE AND MANAGEMENT vol.1, issue I, AUG.2014.

[14]. Varun Kumar, 'An Emerging Controlling Process of Vibration with help of Fuzzy Logic Controller for a Cantilever Plate' International Journal of Enhanced Research in Science Technology & Engineering, ISSN: 2319-7463 Vol. 2 Issue 12, December-2013, pp: (144-151).