



THE METHOD OF SOFTWARE RELIABILITY EVALUATION AND PREDICTION BASED ON THE MODEL WITH DYNAMIC INDEX OF PROJECT SIZE

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Abstract: The software reliability evaluation and prediction method based on the model with dynamic index of project size is examined in this article. The support decision making procedure during software production which is based on the adequacy criterion of software testing is developed. The example of developed method based on testing data of industrial software product is proposed.

Keywords: software reliability, software life cycle, reliability model, model assumption, software engineering.

1. INTRODUCTION

In the modern stage of the software engineering development the requirements to software reliability are enhancing, appears the need in cost shortage in testing and accordingly in evaluation and prediction of developed software reliability. The adequate analysis and prediction of software reliability is not possible without taking into account the characteristics and parameters of real software product in reliability models.

The aim of this paper is to develop the method of the software reliability evaluation and prediction, and the decisions support procedures at the main stages of software life cycle on the basis of proposed model. The usage of method is illustrated by the example based on experimental testing data of industrial software product.

2. THE METHOD OF THE SOFTWARE RELIABILITY EVALUATION AND PREDICTION BASED ON DEVELOPED MODEL

The general procedure of choosing the model of software reliability and the process of decision-making is overviewed in [1]. The procedure is general and permissive, not tied to the concrete model, and gives the general recommendations about the choosing process of software evaluation reliability model.

We consider the software reliability evaluation and prediction and the procedure of decision-making

during the software product development based on the model [2]. The scheme of this method is shown in Figure 1 and consists of seven steps.

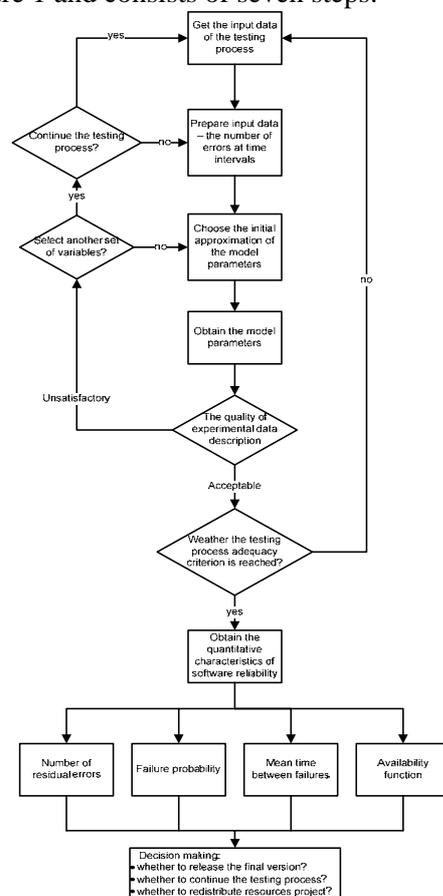


Fig. 1 – The illustration of the software reliability evaluation and prediction method

3. THE EXAMPLE OF PROPOSED METHOD USAGE ON THE BASIS OF EXPERIMENTAL DATA

We apply experimental data, which are described in [1], for illustration of proposed method usage and for comparison of the software reliability models. The program product is the management system in a real time, which was invented by Bell Laboratories. The testing data are the outcomes of determined faults during the 25-hours system testing in processor time. In the paper [1] Goel–Okumoto non-homogeneous Poisson process model [3] has been used due to its simplicity and wide use in software reliability research.

As we see, by means of too high prediction quantity of remained failures the model [2] can mislead concerning needed resources for program product testing. However, the adequacy criterion of software testing is the vivid indicator of the fact that the model's predictions should be treated with caution, and the testing process is not finished, besides, it is possible that on this stage the process of failure determination has not Poisson characteristic [4].

On the basis of these data we can make conclusion about the program project, which should consider the requirements of product's reliability. So, as if the input criterion of the program in realization is the presence of some less number of predicted remain failure or average time of non-stop running is more than some meaning. We can get quantitative confirmation of made solution, based on the data of the model.

At practice, the time determination of product realization, the resource redistribution, the performance of additional testing and etc. are basing on more significant thoughts than the number of remain failure. The results of reliability model usage give input information for making decisions about program projects.

So, built in [2,4] model with dynamic index of project size gives quantitative characteristic for support process of making decisions in program product production – the adequacy criterion of testing process.

4. CONCLUSIONS

In this paper we developed of software reliability evaluation and prediction method based on the reliability model with dynamic index of project size.

We researched this method on the example of experimental data of the commercial program product and the comparison of decision-making process, based on this model comparing with other reliability models.

The described method can be used for description of failure appearance process behavior, and for determining of additional testing resources, readiness time of system for industrial realization and making other managerial decisions.

The presence of adequacy criterion of testing process in model with dynamic index of project size gives the opportunity to modify the decision-making process at program product production and to insert a new quantitative characteristic, which makes this process more justified. Developed method illustrates more ways of using of adequacy criterion of software testing process in the decision-making process at program product production.

On the basis of experimental data of testing process of commercial program product the advantages and peculiarities of developed method usage with detailed illustration of making-decision process at software production have been shown.

5. REFERENCES

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