International Journal of Engineering Research & Management Technology
ISSN: 2348-4039
Sep-Oct-2022 Volume 9, Issue-5
Email: editor@ijermt.org www.ijermt.org

"A study on the dependability theory's Mathematical exceptional Periodic restore for First-Order States"

Bipul Chakrabarty
Research Scholar, Department of Mathematics, Sunrise University Alwar, (Raj)
bipulchakrabarty1@gmail.com

Dr. P. K. Dwavedi
Assistant Professor, Department of Mathematics, Sunrise University Alwar, (Raj)

Abstract

Quality is built into the Mathematics; it does not just happen to be there because the developers did a good job. Quality assurances practices are concurrent with all process activities. Quality is defined as "the degree of excellence of something". This implies a subjective factor; any project can be found lacking if measured against a vague notion of what high quality is. Mathematics quality in the context of Mathematics engineering measures how well Mathematics is designed (*quality of design*), and how well the Mathematics conforms to that design (*quality of conformance*) [Musa et al., 1990], (quality of design) measures how valid the design and requirements are in creating a worthwhile product [Triantafyllos et al., 1995] whereas (quality of conformance) is concerned with implementation. Mathematics quality is measured via a set of attributes that are characteristics of high-quality Mathematics. Then we build into the requirements the attributes that are desired in the final product. The desired quality attributes are the part of the standard for measurement on the project. It is not always possible to measure each attribute directly, but some form of relative measurement must be made. Common among the characteristics are: completeness, correctness, dependability, efficiency, reliability, maintainability, portability, robustness (the ability to minimize the impact of external factors, such as user errors or adverse environmental conditions), testability, and usability, but the list is not limited to these.

***Keyword: -** Assurances, Excellence, Completeness, Efficiency, Testability.*

Introduction

Mathematics reliability is an important facet of Mathematics quality. It is defined as "the probability of failure-free operation of a computer program in a specified environment for a specified time" [Gillies et al., 1992]. Mathematics cannot be seen nor touched, but it is essential to the successful use of computers. It is necessary that the reliability of Mathematics should be measured and evaluated, as it is in hardware. One of reliability's distinguishing characteristics is that it is objective, measurable, and can be estimated, whereas much of Mathematics quality is subjective criteria. This distinction is especially important in the discipline of Mathematics Quality Assurance. These measured criteria are typically called **Mathematics metrics.**

There are many different models for Mathematics quality, but in almost all models, reliability is one of the criteria, attribute or characteristic that is incorporated. The IEEE defines reliability as "The ability of a system or component to perform its required functions under stated conditions for a specified period of time." To most project and Mathematics development managers, reliability is related to correctness, that is, they look to testing and the number of "bugs" found and fixed. While finding and fixing bugs discovered in testing is necessary to assure reliability, a better way is to develop a robust, high quality product through all of the stages of the Mathematics lifecycle. That is, the reliability of the delivered code is related to the quality of all the processes and products of Mathematics development; the requirements documentation, the code, test plan, and testing.

Since computers are being used increasingly to monitor and control both safety-critical and civilian systems, there is a great demand for high quality Mathematics products. Reliability is a primary concern for both Mathematics developers and Mathematics users. Mathematics reliability engineering (SRE) has generated quite a bit of interest and research in the Mathematics community. One particular aspect of SRE that has received the most attention is Mathematics reliability modeling.

A Mathematics Reliability Growth Model (SRGM) is a relationship between the number of faults removed from a Mathematics and the execution time/CPU time/calendar time. Several attempts have been made to represent the actual testing environment through SRGMs [Goel, 1985; Kapur and Garg, 1990; Kapur et al., 1999, Yamada et al., 1986]. These models have been used to predict the fault content, reliability and release time of Mathematics. SRGMs have also been used to manage the testing phase. This chapter will present some of the important models that have appeared in the recent literature. But before considering the models we'll first provide a historical perspective of the development of this field and some needed theoretical results from reliability theory, which we'll use in model development. We'll then go into the models.

Review of Literature

Mathematics reliability modeling has, surprisingly to many, been around since the early 1970s, with pioneering works by [Mora, Shoo, Cout]. The approach is to model past failure data to predict future behavior. This approach employs either the observed number of failures discovered per time period or the observed time (actual wall clock or some measures of computer execution time) between failures of the Mathematics. The models therefore fall into two basic classes, depending upon the types of data the model uses.

1. Failures per time period

2. Time between failures

These classes are, however, not mutually disjoint. There are models that can handle either data type. Moreover, many of the models for one data type can still be applied even if the user has data of the other type.

Model Classification Scheme

To aid in our development of the models in the ensuing sections, we'll need to discuss a model classification scheme that was proposed by Musa and Okumoto. It allows relationships to be established for models within the same classification groups and shows where model development has occurred. For this scheme Musa and Okumoto classified models in terms of five different attributes. They are:

1. **Time Domain** Wall clock versus execution time
2. **Category** The total number of failures that can be experienced in infinite time. This is either finite or infinite, the two subgroups.
3. **Type** The distribution of the number of the failures experienced by time *t*. The important type that we will consider is Poisson.
4. **Class** (Finite failure category only) Functional form of the failure intensity function expressed in terms of time.
5. **Family** (Infinite failure category only) Functional form of the failure intensity function expressed in terms of the expected number of failures experienced.

Models for Quantitative Evaluation of Mathematics

There have been many Mathematics Reliability models developed in the last two decades. Most of these are based upon historical failure data collected during the testing phase. These models have been utilized to evaluate the quality of the Mathematics and for future reliability predications. They have further been used in many management decision making problems that occur during the testing phase. But none of these models can claim to be the best and hence there is a need for further research. In this section different modeling approaches are briefly discussed.

When a Markov process represents the failure process, the resultant model is called Markovian model. The Mathematics can attain many states at any particular time with respect to number of faults remaining or number of faults already removed. The transition between states depends on the current state of the Mathematics and the transition probability. The memory less property of the Markovian process implies that the time between failures follows an exponential distribution. Hudson [1976] proposed a Markovian birth-death model to describe the errors in a Mathematics program. Numerous attempts have been made to develop Markovian models; especially in earlier days due to similar theory in hardware reliability was already well developed. One of the popular reliability models developed by Jelinski and Moranda [1972] is a Markov process model. Little wood [1979, 1987, and 1973] proposed a model based on Semi-Markovian process to describe the failure phenomenon of Mathematics with module structure. Cheung [1980] has also proposed a Markovian model to describe module-structured Mathematics. Kremer [1993] proposed birth-death model, which incorporates the probabilities of fault removal and introduction. Goel [1985] modified Jelinski-Moranda model by introducing the concept of imperfect debugging. Xie and Bergman [1980] proposed a model relating the fault detection probability to the fault size. Kapur et al. [1993] proposed a model incorporating imperfect debugging and fault introduction with upper bound on the number of faults.

Statement of the Problem

Reliability and availability of various industrial systems such as Rice, Steel, and Poly tube manufacturing plant with constant failure and repair rates have been partly discussed by several authors. In-depth investigations to see how reliability and availability will be affected with variable repair and failure rates are very much in need. Therefore, we intend to address some of these problems in the present study. We propose to investigate the following problems:

Significance of the Study

The significant work has been done on the reliability and availability of some industrial systems. In practice, repair and failure rates of industrial systems have been considered to be constant. Only few authors have made an attempt up to a certain extent to study the time dependent case and the case of variable failure and repair rates. Still lot of work needs to be done as far as process industries are concerned.

Objective the Study

The observer chooses to model a phenomenon as stochastic or deterministic. The choice depends on the observer's purpose; the criterion for judging this choice is always the model's usefulness for the intended purpose. To be useful, a stochastic model must reflect all those aspects of the phenomenon under study that are relevant to the question at hand. In addition, the model must allow the deduction of important predictions or implications about the phenomenon.

Using this analysis, one could generate a new sequence of statistically similar weather by following these steps:

1. Start with today's weather.

2, given today's weather, choose a random number topic tomorrow's weather.

3. Make tomorrow' sweater "today' sweater" and go back to step.

Research Methodology

It's also worth noting that the issue of discrete versus continuous repair transitions is not unique to Markov models. For example, the very same issue arises in fault trees analysis, when we assign to each basic component, with failure rate and exposure time T, a failure probability of first order state. This represents the probability attained at the very end of the interval T, whereas the average probability during that interval is actually about half of this value, i.e., the average would be given by using an exposure time of T/2 instead of T. Nevertheless, it's very common to use the full exposure time T in fault trees, with the understanding that this is conservative. If three events are AND' together in a fault tree and each of them uses and exposure time of T instead of T/2, the joint probability is conservative by a factor of 8. Similar results apply for Markov models if we simply use 1/T instead of 2/T for all the periodic repair transition rates.

Limitation of the Study

Research activities in Mathematics reliability engineering have been conducted and a number of NHPP Mathematics reliability growth models have been proposed to assess the reliability of Mathematics. In fact, Mathematics reliability models based on the NHPP have been quite successful tools in practical Mathematics reliability engineering. These models may consider the debugging process as a counting process characterized by its mean value function. Mathematics reliability will be estimated once the mean value function will be determined. Model parameters will be estimated using either the maximum likelihood method or regression. Different models will be built upon different assumptions.

Allowing both the error content function and the error detection rate to be time dependent, a generalized Mathematics reliability model and an analytical expression for the mean value function will be presented. Numerous existing models based on NHPP will also be summarized.

Conclusion

For reliability engineers who are learning how to create Markov models of fault-tolerant systems, this research effort is meant to act as a tutorial. There have been several methods proposed for creating fault-tolerant system dependability models. Different modelling approaches have been given in a methodical manner, progressing from straightforward systems to more intricate ones. There have been discussions on modelling strategies for certain elements including single-point failures, near-coincidence failures, transient fault recoveries, and cold spares. However, it must be understood that there is no one "correct" approach to system modelling. There are many legitimate approaches to model a given system, and deciding which approach will produce an effective, useful model can occasionally be more of an art than a science.

References

1. Akaike H.(1974), "A new look at statistical model identification", IEEE Trans. Automat. Cont., vol. AC-19, pp. 716-723.
2. Bittant S., Bolzern P., Pedrotti E., Pozzi M. and Scattolini R. (1988), "A flexible modelling approach for Mathematics reliability growth", In Mathematics reliability modelling and identification, Ed. S Bittani, Springer-Verlag, Berlin.
3. Caspi P.A. and Kouka E.F. (1984), "Stopping rules for a debugging process based on different Mathematics reliability models" .Proc.Int. Conf. on Fault-Tolerant Computing, pp 114-119.
4. Doob J.L. (1953), Stochastic Processes, John Wiley.
5. Ehrlich W., Prasanna B., Stampfel J. and Wu J. (1993), "Determining the Cost of a Stop-Testing Decision," IEEE Mathematics, pp. 33-42.
6. Forman E.H. and Singpurwalla N.D. (1977), "An empirical stopping rule for debugging and testing computer Mathematics", Jour. Amer. Stat. Asso..72. ,pp. 750-757.
7. Hou R.H., Kuo S.Y. and Chang Y.P. (1997), "Optimal Release Times for Mathematics systems with Scheduled Delivery Time Based on the HGDM," IEEE Trans. Computers, vol. 46, no. 2, pp. 216-221.