CHAPTER 30

MATHEMATICAL SCIENCES
OPERATIONAL RESEARCH

Doctoral Theses

290. ARCHANA KUMAR
Study in Software Reliabilitty Growth Modelling Under Distributed Development Environment.
Supervisor : Prof. P K Kapur
Th 15371

Abstract

Proposes the concept of Change Point and Testing Effort Control on Delayed S-Shaped SRGM. The model was developed under different sets of assumptions but the initial modelling framework and the solutions were similar. The results of the model are fairly encouraging when compared to Delayed S-Shaped SRGM (Yamada, Ohaba and Osaki 1983). The model persented further provides a trade-off analysis between additional testing effort requirement and aspriration level for number of faults removed. The results obtained show better fit and wider applicablity of the model to different types of failure datasets. The applicability of SRGM in Distributed Systems has also been studied.

Contents

291. BORKAKATY (Bidisha)
Transient Analysis of Non-Markovian Queues : Lattice Path Approach.
Supervisor : Prof. Manju Lata Agarwal
Th 15368

Abstract

In this thesis, transient soluthion of some non-Markovian queueing models through LP Approach have been presented. The method used has proved to be very efficient and (i) has changed the outlook of obtaining transient solutions of queueing models, in explicit computational form which are practically implementable. (ii) is a reasonable alternative to other methods of transient analysis like transform solutions, root finding technique and others. (iii) is more transparent since it gives the step by step formulation of the behaviour of the system in any time interval (0, t). (iv) is most helpful in modeling any real life scenario, for example:n industrial assembly line, road traffic flow, arrival of aircraft passengers, communication system, manufacturing system etc. and has made the calculation of difficult queueing models quite easy.

Contents

292. GUPTA (Anu)
Some Contributions to Flexible Software Reliability Growth Modelling
Supervisor : Prof. P. K. Kapur
Th 15369

Abstract

Discusses few new reliability growth models combined under the head 'Generalized models based on the Power logistic function'. The flexibility of these models has been established by working out parameter estimation for different types of failure data sets. the results were found to be better than many other

well-established models. Its use has been extended to portray the fault removal process not only for testing phase but also for operational use of the software. Power logistic functions are not limited to the software reliability but they can also be used for the mathematical modelling in other areas like marketing etc. The other major studies carried out in this thesis are change point analysis; testing effort control problem; discrete software reliability growth modelling, classification of faults on the basis of their severity and two types of imperfect debugging. All these different software development models have their own advantages and disadvantages. Nevertheless, in the contemporary commercial software development world, the fusion of all these methodologies is incorporated.

Contents

1. Emerging field of software reliability. 2. Generalized modelling with power function 3. Change point analysis and testing effort control. 4. Discrete modelling and categorization of faults. 5. Discrete modelling with imperfect debugging. Conclusion and scope for future research. References.

293. POOJA MOHAN
Reliability Analysis of Consecutive-*k* Systems : Gert Approach
Supervisor : Prof. Manju Lata Agarwal
Th 15370

Abstract

Reliability analysis of various consecutive-k systems and generating functions of the waiting time distributions of various patterns have been studied using GERT. It is observed that these systems could be analysed in a much easier way than the minimal cutset methods. This is so since GERT besides providing visual picture of the system makes it possible to analyse the given system in a less inductive manner. One the W function based on MGF using mason's formula is obtained, which is independent of n, the number of components in the system, the reliability of the system can then be computed directly for any value of n. Besides, numerical computation reveal the efficiency of GERT, owing to its significantly low computational time and easy implementation, in comparison to the other techniques used in the literature. GERT can be used to analyze more general systems i.e. incorporating more than one type of failures, Markov dependent failures, Multi-state systems. Further, the systems can also be cxtended to circular case. Using

GERT we can also obtain the generating functions of the waiting time distributions of various other patterns involving Homogenous and other types of Markov dependence.

Contents

1. Introduction to Consecutive-*k* Systems. 2. GERT analysis of m-Consecutive-*k* Systems 3. GERT analysis of Consecutive-*k* Systems with dependence. 4. GERT analysis of other Consecutive-*k* Systems 5. GERT analysis of multi-state Consecutive-*k* Systems. 6. Waiting time distributions of patterns using GERT. 7. Future scope. References.

M.Phil Dissertations

294. GOYAT (Poonam)
Study of Mathematical Models on Media Planning.
Supervisor : Dr. Amit Kumar Bardhan

295. RAVI KUMAR
Relating Software Reliability Growth Modelling and Innova tion Diffusion Model in Marketing for Operational Use.
Supervisor : Prof. P.K. Kapur

296. VISHAL KUMAR
Inventory Management of Deteriorating Items.
Supervisor : Dr. Chandra K. Jaggi