CHAPTER 29

MATHEMATICAL SCIENCES
OPERATIONAL RESEARCH

Doctoral Theses

01. NIJHAWAN (Nidhi)
Some Contributions to Discrete Modeling of Multi-Releases in Software Reliability.
Supervisors: Prof. Anu G. Aggarwal and Prof. Chandra K. Jaggi
Th 23179

Abstract
(Not Verified)

The present software development environment is highly advanced. Smart users need an efficient and accurate software. Considering current competitive situation and the limited resources, software companies do not put forward complete products in single attempt. They prefer to roll out new versions one after another with added functionalities. The phenomenon of delivering latest releases of a product in a market with new features and functionalities to the existing products is called multi up-gradation. The successive versions of software such as MS Windows, MS Office, Matlab, Adobe are few examples following this practice. Software Reliability Growth Models (SRGMs) are the tools used to estimate and predict the software reliability with respect to time (CPU time, calendar time or execution time) and testing effort. In real life situations most of the data is collected at discrete time points so there arises a need for the discrete modeling framework. In this thesis our focus is on developing discrete time models for multi release software systems under different set of assumptions which include severity of faults, time lag between fault detection and fault removal process, imperfect debugging, concept of change point. The process of multi release software development in OSS has been emerged only recently but has grown tremendously for offering rapid yet reliable and upgraded versions of software. In this thesis reliability growth analysis for multi-release closed as well as Open source systems has been studied. For validation we have used real life fault data sets of closed and open source software systems with multiple releases. Optimal release policies have been formulated to determine release time of upgraded version of the software and illustrated with numerical examples. Conclusions of the present work, scope for future research and a comprehensive list of references are presented at the end of the thesis.

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02. SHRIVASTAVA (Avinash Kumar)
Analytical Study of Pricing, Warranty, Release and Testing Stop Time of a Software.
Supervisors: Dr. Ompal Singh and Prof. P. K. Kapur
Th 22932

Abstract
(Verified)

The study in the thesis is focused to help software firms to take some crucial decisions of pricing, warranty, release, updating and testing time of a software during the software development lifecycle. Chapter 1 provides an overview of the related work done in the thesis. In chapter 2 we have discussed optimization model to determine optimal price and release time of a software under warranty under different conditions. In chapter 3 we have further investigated the marketing and production problem for a software firm considering price and warranty as simultaneous dynamic decision variables under the condition of a dynamic demand to derive optimal price and warranty policies. In chapter 4 we have discussed a time and effort based two stage fault detection and correction model in the presence of two types of imperfect debugging for multiple releases of a software. In chapter 5 we discussed the optimal software release time of a software in case of single and multiple version using multi attribute utility theory while considering the cost, reliability and detection rate attributes. In chapter 6 we have discussed a multi-up gradations modeling framework for removal of software fault in a distributed environment and related cost model to obtain optimal release time for each version. Current practices in software industry involves the strategy of early release and post release testing phase. In chapter 7 we discussed a generalized framework of optimal scheduling policy to determine optimal software release, patching and testing stop time separately, to minimize overall testing cost under reliability and budget constraints. We have used SPSS for estimating the parameters and MAPLE & MATLAB software's in order to solve the optimization problems. Conclusion of the work done, directions for future research and an elaborate list of references are presented at the end of the thesis.

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