CHAPTER 30

MATHEMATICAL SCIENCES
OPERATIONAL RESEARCH

Doctoral Theses

285. GUPTA(Rashika)
Reliability Optimization of Complex Systems : Heuristic and Genetic Algorithms.
Supervisor : Prof. Manju Lata Agarwal
Th 14740

Abstract

Presents efficient heuristic and genetic algorithms developed to obtain optimal nearly optimal solutions for highly constrained reliability optimization problems. The algorithms are applied to complex BSS and, series-parallel MSS. Adaptive penalty functions are designed to guide the heuristics and GA's to make the optimal search. During the search if an excursion to the infeasible region is made, then it tries to improve the solution moving towards the feasible region. Excursions prove to be helping as the optimal solution lies near the boundary of the feasible and infesaible regions and alleviate the risk of being trapped in alocal optimum. The algorithms are applicable to general coherent systems without any restrictions on objective, and constraint functions on resources such as cost, weight, and power etc. For MSS heuristics a sensitivity factor is defined and is used to solve redundancy allocation problem where component capacity is the performance measure.The objective here is to minimize the cost subject to system-level performance constraints(to provide a desired level of reliability). The performability analysis of a single unit MSS operating under variable demand is also studied. The general time distributions involved are approximated by 2-phase Cox distributions to enable us to model the system as a markov process. Programming language C^{++} and software package mathematica are used to carry out the computational experiments.

Contents

1. Introduction to reliability optimization. 2. Heuristic

algorithms for binary state complex systems. 3. Heuristic algorithms for multi state parallel systems. 4. Genetic algorithms for binary and multi state systems. 5. Performability analysis of multi state systems. Bibliography and Appendices.

286. MITTAL (Rubina)
Interface Between Marketing, Inventory and Software Reliability.
Supervisors : Prof. P. K. Kapur and D. R. Aylawadi
Th 14747

Abstract

The global marketplace has become fiercely competitive where schedule, quality and cost are parameters with which competence is measured. These three factors are intimately related to each other but are in fact in conflict with each other. The situation calls for tradeoffs between conflicting objectives under system constraints. The methods of operational research viz. Modeling and optimization have the potential to find the optimal tradeoffs for such complex problems. One of the fields where modeling, particularly stochastic modeling and optimization have vastly been applied is reliability. The subject has traditionally been attached to hardware systems, where the literature is fairly well developed. But with ever increasing use of computers in present times software reliability has also emerged as a discipline of its own where operational researchers can meaningfully contribute. The models and optimization methods contained in the thesis can help in development of qulity software in a cost effective manner. These techniques are primarily aimed at the testing phase of the software development life cycle(SDLC).

Contents

1.Introduction. 2. Software reliability growth and innovation diffusion models. 3. Flexible software reliability growth models. 4. Allocation of promotional resource for multi products ina segmented market. 5. Inventory management and marketing: An interface. Conclusion and scope for further research.

287. SANJEET SINGH
On Multiparametric Sensitivity Analysis in Mathematical Programming.
Supervisor : Prof. Davinder Bhatia
Th 14741

Abstract

Studies the multiparametric sensitivity analysis for the mathematical programming problems, namely, the generalized fractional programming problem and the minimum cost network flow problem.

Contents

M.Phil Dissertations

288. SRIVASTAVA (Rajesh Kumar)
Inventory Management of Multi Storage Problem.
Supervisor : Dr. Chandrak Jaggi

289. TRIPATHI (Manish)
Developing Software Reliability Growth Modelswith Change-Point and Testing Effort Control.
Supervisor : Prof. P.K. Kapur