

CHAPTER 59

TECHNOLOGY

COMPUTER ENGINEERING

Doctoral Theses

01. AGGARWAL (Gargi)
Defining Validating Quality Metrics For Early Data Warehouse Design.
Supervisor: Dr. Sangeeta Sabharwal
Th 23626

Contents

1. Introduction 2. Literature survey 3. Coupling metrics object-oriented data warehouse design 4. Theoretical and empirical validation of coupling metrics for object-oriented data warehouse design 5. Formal validation of data warehouse complexity metrics using distance framework 6. Empirical analysis of metrics for object-oriented multidimensional model of data warehouse using unsupervised machine learning techniques 7. Assessment of data warehouse quality using machine learning techniques 8. Conclusion and future work. List of publication. References.

02. AGARWAL (Manju)
Test Case Generation from Combinatorial Testing Using Computational Methods.
Supervisor : Prof. Sangeeta Sabharwal
Th 23697

Abstract (Verified)

Combinatorial (t-way) testing is based on the observation that a large number of faults are caused by interactions of a few input parameters. Hence, tests are created such that every combination of values of any t parameters is covered by at least one test case. t is also known as the strength of coverage or interaction strength. In this work, an approach is proposed to generate 2-way (pairwise) test sets using Genetic Algorithms. The performance of the algorithm is improved by creating an initial solution using the overlap coefficient and improved mutation strategies. The proposed approach generates faster results by achieving higher percentage coverage in less number of generations. Further, it is observed that in most of the systems a maximum of 4-way to 6-way interactions exist. An optimal value of interaction strength can substantially reduce the testing costs without compromising fault detection capability. Also, for some real applications we may not have uniform interaction strength. For such systems, Variable Strength Covering Arrays are used. In this work, an approach is proposed to identify the interactions that exist in the source code, thereby reducing the count of interactions to be tested. Our approach significantly reduces the count of interactions to be tested without significant loss of fault detection capability. Also, it is proposed to model the problem of generation of Variable Strength Covering Arrays as a Multi Objective Optimization problem and then apply Multi Objective Genetic Algorithm to solve it. Experimental results indicate that the proposed approach generates results comparable to or better in some cases as compared to that of existing approaches. Lastly, prioritization of combinatorial test set is proposed using data flow technique. Different methods of prioritization criterion are proposed. The prioritized t-way test set achieves better fault detection rate as compared to unordered t-way test set.

Contents

1. Introduction 2. Related work 3. Test generation for pairwise testing using genetic algorithms 4. Variable strength interaction test set generation using multi objective genetic algorithms 5. Identifying interactions for combinatorial testing using data flow techniques 6. Deriving interactions for combinatorial testing for modular programs with multiple functions 7. Combinatorial test set prioritization using data flow techniques 8. Conclusions and scope for future work. List of publications. References. Appendix.

03. DEVENDER KUMAR

Design and Analysis of User Authentication Schemes.

Supervisors: Prof. Satish Chand and Prof. Bijendra Kumar

Th 23374

Abstract (Not Verified)

Due to the advancement in computer and network technologies, the quality of online services has been enhanced. In worldwide, people can access the remote services and resources through Internet at any time and from anywhere, which makes their daily lives much easier. The users use many services and resources for their requirements such as online bills payment, online banking, e-commerce, shopping, etc. Normally a user communicates to a server over an insecure channel. User authentication is a mechanism that provides the security to the data sent over the insecure channel. It authenticates a user and a server each other over an insecure channel. The aim of this thesis is to design user authentication schemes using various approaches like public key cryptography, elliptic curve cryptography, chaotic maps based cryptosystem, and hash function. We may classify our proposed methods into three categories. In the first category, we have proposed four new user authentication schemes for single server environment. In the second category, we have proposed a new user authentication scheme for multiserver environment. In third category, we have proposed two new user authentication schemes for wireless sensor networks. We have analyzed the security of our proposed schemes and compared their performance with the other related schemes. We have used AVISPA and ProVerif tools to prove that they are resistant to the active and passive attacks. We have used BAN logic to show that they provide mutual authentication and session key agreement securely and used the random oracle model for their formal security analysis. Further, the informal security analysis has been carried out to show that they are resistant to the various known attacks. We have evaluated the performance of our schemes in terms of security features, communication cost, computational cost and storage cost and they have performed better than the existing schemes.

Contents

1. Introduction 2. Literature survey 3. Authentication schemes for single server environment 4. User authentication scheme for multiserver environment 5. Authentication schemes for wireless sensor networks 6. Conclusion and future scope. List of publications. Bibliography.

04. GEETA RANI

Web User Profiling and Recommender Systems.

Supervisors: Prof. Shampa Chakraverty

Th 23740

Contents

1. Introduction 2. Survey of literature 3. Biclustering based web user profiling 4. Rough set based web user profiling 5. Global web recommender system with feedback 6. Multi-mode adaptive web page recommender system using collaborative trie 7. Conclusion. References. Publications.

05. MANJU

Design of Energy – Efficient Algorithms in Wireless Sensor Networks.

Supervisor : Dr. Satish Chand and Dr. Bijendra Kumar

Th 23698

Abstract (Verified)

Coverage in wireless sensor networks is usually interpreted as how well a sensor network monitors a set of targets. Sensor are having limited energy, therefore, only a subset of the sensor nodes (called cover set), which can cover all the targets can be made active. In this thesis, we propose the following energy-efficient target coverage heuristics. The first work is *energy-efficient heuristic for target coverage and K-coverage*. While generating cover sets, we avoid selecting more sensors which are covering critical target (least covered). For rest of the uncovered targets, we give priority to those sensors that have more remaining energy and cover maximum uncovered targets. We have extended this method for target Kcoverage, where a target is said to be covered if it covered by atleast K-number of sensors in cover set. The second work is *Evolutionary based heuristics for target coverage problem*. The first heuristic under this technique is based on the *Genetic algorithm* paradigm. To derive the fitness function, we select minimum number of sensors to cover the critical targets. The second evolutionary heuristics is based on *Learning Automata* for solving the target coverage problem. The third work is *Energy based heuristics for partial coverage*. The partial coverage is a variant of the target coverage where a fraction of targets can be left uncovered in each cover set. Our heuristic we keep alive those sensors for longest possible time which cover the critical targets. Further, we have designed another heuristic for the same partial coverage in which we wisely select the fraction of targets which will be left uncovered in each cover set instead of random ones. The last work is *heuristic for coverage and connectivity using clustering*. Our heuristic not only provides coverage but also provide a way to send the collected data to the base station.

Contents

1. Wireless sensor networks 2. Literature review 3. Energy based heuristic for target coverage in WSNs 5. Energy based heuristics for partial coverage in WSNs 6. Coverage preserving clustering protocol in WSNs 7. Conclusion and future scope. Reference. List of publications.

06. SIDHU (Parneeta)

Methodology for Learning and Detecting Concept Drift in Data Streams.

Supervisor : Dr. M. P. S. Bhatia

Th 23739

Contents

1. Introduction 2. Literature survey 3. Extended Dynamic weighted majority learning system 4. Diversified dynamic weighted majority learning system 5. Diversified online ensembles detection learning system 6. Recurring dynamic weighted majority system 7. Recurrent diversified dynamic weighted majority learning 8. Conclusions and future work. Publications. References.