CHAPTER 11

COMPUTER SCIENCE

Doctoral Theses

121. AGARWAL (Shikha) nee SHIKHA GUPTA
Semantically Enhanced Proactive News Recommender System.
Supervisor : Dr. Archana Singhal
Th 22392

Abstract

Information Overload is a general problem that consumes precious time of users and also effects decision making. Recommender systems are active information filtering systems that appear as an interesting solution for selecting relevant and useful information. Objective of proposed approach is to improve Knowledge Management and Information Retrieval of online news, to focus on personalization in online media. In today's busy world, online news industry needs to represent news in a manner, using which end user can access specific news of their interest and need. This can be achieved using semantic web technologies. Limitations of different filtering approaches and synergy of hybrids motivated us to adopt hybrid approach for information filtering which makes use of features computed by content based, collaborative and knowledge based recommenders. A semantically enhanced proactive news recommender system has been designed based on proposed hybrid approach. A semantically enriched news domain ontology (SENDO) has been designed based on the news industry standards given by International Press Telecommunications Council, IPTC. For evaluation of proposed approach, headlines and very short description of RSS (Really Simple Syndication) feed news items from various trusted sources are automatically aggregated daily and recommended using proposed approach. The proposed approaches can be extended further to handle the issue of big data. The user's interests can also be elicited from various social networking sites like Twitter and Facebook. Decision making of users can also be improved by cross domain recommendations like magazines, journals and books. Designed system can be deployed on IP enabled portable devices outside the scope of direct Web access. Once these features are incorporated to design a fully developed system it may provide recommendations which are not only desired but help in decision making in many areas also.

Contents

1. Introduction 2. Background and related work 3. Semantically enriched news domain ontology: Sendo 4. Semantic item profiling for news recommender system 5. Focused semantic user profiling 6. Grouping user for semantically diverse and serendipitous recommendations 7. Conclusions and future work. Annexurese and references.

122. CHATURVEDI (Krishna Kumar)
Bug Severity Assessment and the Complexity of Code Changes Based Prediction Models.
Supervisor : Dr. V. B. Singh
Th 22391

Abstract

Software development and maintenance produces source code, change logs, bug reports, email archives, discussion forums and messages. An extensive review has been conducted to identify the mining tasks, tools, datasets and emerging issues. A theoretical framework, Bug Tracking and Reliability Assessment System (BTRAS) for bug tracking/reporting and reliability assessment of the software has been presented in the thesis. BTRAS helps in reporting the bugs, assigning bugs to the developer for fixing, monitoring the progress of bug fixing by various graphical/charting facility and status updates, providing reliability, bug prediction and bug complexity measurements. The bug reports have been analyzed to predict the severity level of the reported bugs using text mining and machine learning techniques. The continuous changes make source code complex and their effect decayed over a period of time. The code change is measured using the proposed complexity of code change metrics. These metrics help in predicting the bugs occurring due to code changes by developing regression based models. A diffusion model is developed to predict the potential complexity of code changes that helps in determining the changes yet to be diffused in the software. The bug prediction modelling approaches, namely Time vs Entropy and Entropy v's Bugs have been developed and compared with existing Time vs Bugs (software reliability growth models) approach. The developed models have been validated using open source project's source code and reported bugs. The performance of the models has been assessed using various statistical performance measures. The present study will be useful for the software managers in monitoring the code change activities to lower down the upcoming bugs and monitoring the bug fixing process to identify the frequently changed files .

Contents

1. Introduction 2. Software repositories and mining tools 3. Bug severity assessment 4. Complexity of code changes metrics based bug prediction 5. Diffusion of the complexity of code changes 6. Bug prediction modelling 7. Conclusion. Appendix and references.

123. CHAWLA (Shailey)
Web Specific Goal Driven Requirements Engineering.
Supervisor : Dr. Sangeeta Srivastava
Th 22390

Contents

1. Introduction 2. Literature review 3. Classification of web applications and their requirements 4. Enhancement of user requirements notation for web applications 5. Framework for web specific goal driven requirements engineering (WebGRE) 6. WebGRE framework: Reasoning and evaluation 7. Implementation of webGRE framework with WebURN tool 8. Conclusion and future work. References. List of Publications.

124.　GOEL (Samiksha)
Nature Inspired Intelligence for Natural Terrain Understanding.
Supervisor : Dr. Arpita Sharma
Th 22389

Abstract

Living nature is full of engineering marvels. It has already gone through billions of years of trial and error to find elegant and amazing solutions to process and design problems. The present research work is an attempt to translate nature's inspiration into technology of tomorrow in the domain of geospatial terrain understanding. The guiding principle of nature inspired techniques is to attain robustness, tractability and low cost solutions even if the system is embedded with uncertainty, imprecision, approximation and partial truth. The thesis aims to develop nature-inspired terrain analyzers to understand the natural terrains present in satellite images of a region. An architecture for the terrain analysis from image acquisition to the thematic map generation has been formalized for the same. In remote sensing parlance this problem is known as Landuse/ Landcover feature extraction. These crucial and decisive geospatial features leverages decisions in every field related to the society. The terrain knowledge attained by developed anayzers is further enhanced by the fusion of knowledge obtained from these terrain analyzers. Finally, the thesis presents an application where this enhanced knowledge about terrains is used for the intelligent preparation of the battlefield by anticipating enemies troop's deployment strategies and mapping the optimal path to the target location. The rapid development in computing techniques, a huge amount of spatial data needs to be managed more efficiently. This creates a current requirement of judicious combinations of image analysis techniques emulating the visual interpretation of human beings and the need to move from the experimental to the operational applications. The present mechanisms provide a base for this by proposing intelligent methods for handling uncertainty, vagueness and incompleteness of available data. Proposed techniques can be used for producing thematic maps automatically, which further leverages decisions in various affairs like disaster management, natural/man-made calamities, agriculture and economy.

Contents

1. Introduction 2. Terrain understanding: A remote sensing perspective 3. Nature inspired meta-heuristics 4. Prposed BBO based terrain analyzers 5. Comparitive study of terrain analyzers 6. Decision level fusion of terrain analyzers 7. Battleground application 8. Conclusion and future work.

125.　JAIN (Deepali)
Optimization of Trust Based Recommender Systems.
Supervisor : Dr. Harmeet Kaur
Th 22377

Abstract

While traveling on a today's wide information highway, to reach destination in a faster and smarter way, one needs a well guided route map which may be in the form of Recommender Systems. Recommender Systems assist its users by offering personalized suggestions based on their preferences. Proposed recommender system incorporates a trust network known as Web of Trust among its users. In the course of utilizing recommender systems to alleviate the problem of information overload our

dissertation focuses on two main queries: From whom to take recommendations From how many to take recommendations Two phases are entailed in the proposed work, phase I includes a process to determine suitable recommenders according to the current context who can deliver useful and valuable recommendations. Phase II encompasses a procedure of ascertaining the optimal number of recommenders from whom recommendations should be congregated. Various optimization strategies employed in the proposed work are as follows: In phase I, trust based personalized recommendations for products are taken from immediately connected recommenders rather than transitively exploring the Web of Trust every time a recommendation is required. In phase II, an appropriate range of number of recommenders is suggested, and maintenance of the number of recommenders within this range is achieved by: Contraction of neighborhood Expansion of neighborhood: In the process of expansion of neighborhood, an upper limit on number of hops to find new trustworthy recommender is determined. A case study of apartment recommender system is chosen to generate recommendations for selection of appropriate apartment to live in. The dataset used for experiments was derived from web community of Apartmentratings.com. Various evaluation metrics including precision, recall and mean absolute error were computed by varying the parameters of the system to show the validity of the presented system.

Contents

1. Introduction 2. Recommender systems 3. Knitting web of trust 4. Context level trust based recommendations generation for multiple independent domains 5. Optimizing number of neighbors 6. Neighborhoods expansion 7. Conclusions. List of publications. Annexure I. References.

126.   MANSOURI (Parvaneh)
Design and Application of Bio-Inspired Algorithms for Solving Numerical Optimization Problems.
Supervisor : Dr. Neelima Gupta
Th 22504

Contents

1. Introduction. 2. Numerical optimization. 3. Bio-inspired algorithms 4. Applying artificial bee colony algorithm to find roots of nonlinear equations 5. MABC : The modified version of artifical bee colony algorithm to solve real optimization problems 6. An approximation algorithm for fuzzy polynomial interpolation with artificial bee colony algorithm 7. The Combination of bisection method and artificial bee colony algorithm for solving fixed point problems 8. More application of MABC 9. Concluding remarks.

127.   THUKRAL (Ruchika) NEE RUCHIKA CHUGH
Framework for Web Services in Education Management.
Supervisor : Dr. Anita Goel
Th 22503

Abstract

Management information system are an integral part of organizations–be it business, hospital, hotel, airline or education. Education Management Information System(EMIS) is used by education system to provide information that facilitates decision and policy makers in implementing strategies and managing the resources. EMIS functionality is

broadly divided into three phases-Data collection: to collect data from data providers; Data processing: to process the collected data to generate annual reports, summary reports etc. and; Data dissemination: to disseminate the processed data. The collection of voluminous data and the dissemination of data for further processing requires provision of direct data transfer in a heterogeneous computing environment. As a result of the absence of application to application data transfer, there are issues involved during data collection, processing and dissemination. We focus on the issue of application to application data transfer required during the different phases of education management-Data Collection, Data Processing and Data dissemination. Due to absence of application to application data collection, the task of data entry in the EMIS is difficult and tedious. The education system generates fixed reports, for which queries are pre-defined. Due to absence of data processing based on the end user's requirement, the end users get complete report which contains abundance of data which is always not required. The process for data dissemination via direct data transfer requires special infrastructure and professional expertise. It requires applications, database drivers and connecting strings at both the ends i.e. EMIS and end user's to be compatible which increases the cost and time. We develop a framework for web service based data collection, data processing and data dissemination for the education system. The framework presents the steps that are required to be performed at different layers of the 3-tier client-server architecture during the phases of EMIS.

Contents

1. Introduction : Framework for web services in education management 2. EMIS and web service. 3. Web service based data collection 4. Web service based data processing 5. Web service based data dissemination 6. Functional model for education management 7. Framework for education management 8. Conclusion and future work. 9. Frame for phases in EMIS 9 Study of education system 10. Indian School education management. References.