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Practical Applications of Intelligent Systems

Proceedings of the Sixth International Conference on Intelligent Systems and Knowledge Engineering, Shanghai, China, Dec 2011 (ISKE2011)
We would like to extend our warmest welcome to each conference attendee. The 2011 International Conference on Intelligent Systems and Knowledge Engineering (ISKE2011) is the sixth in a series of ISKE conferences, which follows the successful ISKE2006 in Shanghai, ISKE2007 in Chengdu, and ISKE2008 in Xiamen, China, ISKE2009 in Hasselt, Belgium, and ISKE2010 in Hangzhou, China. ISKE2011 will be held in Shanghai, China, during December 15–17, 2011. It has been our pleasure as Program Committee Co-Chairs and Conference Co-Chair to organize this impressive scientific and technical program and the technical proceedings. ISKE2011 emphasizes current practices, experiences and promising new ideas in the broad area of intelligent systems and knowledge engineering. It provides a forum for researchers and practitioners around the world to present their latest results in research and applications and exchange new ideas in this field. ISKE 2011 is technically organized by Shanghai Jiao Tong University, and co-sponsored by California State University, Southwest Jiaotong University, Belgian Nuclear Research Centre (SCK•CEN).

We received 605 submissions from 26 countries and regions. We are very pleased with this level of submission and international participation. From these 605 submissions, the program committee selected 262 papers (including 109 full papers and 153 short papers), based on their originality, significance, correctness, relevance, and clarity of presentation, to be included in the proceedings. The acceptance rate of full papers is 18%, which we are proud of. The acceptance rate of short papers is 25%. Besides the papers in the conference proceedings, we also selected 44 papers from the submissions to be published in the Journal of Shanghai Jiao Tong University and the Journal of Donghua University. All the accepted papers will be presented or posted at the conference. Each of them was reviewed by two or more reviewers and the authors were asked to address each comment made by the reviewers for improving the quality of their papers. The acceptance rate of all the papers in the proceedings is 43%.

The accepted papers in the proceedings are contained in three volumes respectively based on the topics of the papers. The proceedings include “Volume I: Foundations of Intelligent Systems”, “Volume II: Knowledge Engineering and Management” and “Volume III: Practical Applications of Intelligent Systems”. Topics covered by the accepted papers in each volume of the proceedings are as follows:

**Volume 1: Foundations of Intelligent Systems**

- Artificial Intelligence 46
- Pattern Recognition, Image and Video Processing 40
- Cognitive Science and Brain-Computer Interface 1
Accepted papers come from 23 countries, which shows that ISKE 2011 is a well-represented major international event, and their statistics (only papers of the proceeding, not include 44 papers which will be published in two journals) in terms of country are as follows:

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ISKE 2011 consists of a three-day conference which includes paper and poster tracks, three invited keynote talks and two tutorials. The keynotes, tutorials and technical sessions cover a wide range of topics in intelligent systems and knowledge engineering.

The three invited speakers are Witold Pedrycz, University of Alberta, Canada; Ronald R. Yager, Iona College, New Rochelle, USA; and Zhi-Hua Zhou, Nanjing University, China. Witold Pedrycz will give a talk on granular models of time series and spatiotemporal data under the title of “User-Centric Models of Temporal and
Spatiotemporal Data: A Perspective of Granular Computing.” He will discuss a new category of models in which the mechanisms of description, processing, and predicting temporal and spatiotemporal data are expressed in the language of information granules, especially fuzzy sets and intervals. Ronald R. Yager’s talk is entitled “Intelligent Social Network Modeling.” He will discuss an approach to enrich the social network modeling by introducing ideas from fuzzy sets and related granular computing technologies. Zhi-hua Zhou will discuss the current research results of his group in the machine learning area.

The two invited tutorial speakers are Gio Wiederhold, Stanford University and Jie Lu, University of Technology, Sydney (UTS), Australia. Gio Wiederhold’s tutorial entitled “What is Your Software Worth?” will describe how the value of software can be estimated, and emphasize that awareness of the value of the product of one’s knowledge and effort can help in making decisions on the design and the degree of effort to be made. Jie Lu’s tutorial entitled “Personalized Recommender Systems for e-Government and e-Business Intelligence” will introduce several recommendation approaches, including case-based recommendation, ontology-based recommendation, fuzzy measure based recommendation, trust social networks-based recommendation related approaches and, in particular, present the recent developments made by her group in recommender systems and their applications in e-government and e-business intelligence.

As Program Committee Co-chairs and Conference Co-chair, we are grateful to all the authors who chose to contribute to ISKE2011. We want to express our sincere appreciation to the Program Committee Members listed below and to the additional reviewers for their great and quality work on reviewing and selecting the papers for the conference. We also would like to thank the webmasters, the registration secretary and financial secretary for their hard work. Last but certainly not the least, we would like to thank all the people involved in the organization and session-chairing of this conference. Without their contribution, it would not have been possible to produce this successful and wonderful conference. At this special occasion, we would especially like to acknowledge our respects and heartfelt gratitude to Professor Da Ruan, the Conference Co-chair of ISKE 2011 and the leading initiator of the ISKE conference series, for his hard work to prepare for this year’s conference. Professor Da Ruan worked tirelessly for the conference until he suddenly passed away on July 31. Our thoughts and prayers are with his family. Besides of the above, we also thank all the sponsors of the conference, the National Science Foundation of China (No. 60873108, No. 60773088) and the Springer Publishing Company for their support in publishing the proceedings of ISKE 2011.

Finally we hope that you find ISKE2011 programs rewarding and that you enjoy your stay in the beautiful city of Shanghai.

December 15–17, 2011

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User-Centric Models of Temporal and Spatiotemporal Data: A Perspective of Granular Computing

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Abstract

One of the ultimate objectives of intelligent data analysis is to develop models of data that are user-centric. The human centricity of such pursuits means that a process of analysis along with the obtained results are made transparent to the user and come with a significant degree of flexibility, which helps achieve a sound tradeoff between accuracy and interpretability of results. The perception of data, as realized by humans, inherently invokes information granules (realized through numerous formal approaches including fuzzy sets, interval analysis, and rough sets) and their further processing. This helps establish a suitable level of abstraction at which the data are perceived, analyzed and their models are being formed. By casting the problem in the setting of Granular Computing, we develop a new category of models in which the mechanisms of description, processing, and predicting temporal and spatiotemporal data are expressed in the language of information granules, especially fuzzy sets and intervals.

In this talk, we show how a principle of justifiable information granularity leads to the realization of granular models of time series in which a construction of information granules is viewed as a certain optimization problem.

With regard to spatiotemporal data where their temporal facet as well as their spatial characteristics play a pivotal role, it is demonstrated how information granules are formed through an augmented collaborative clustering. The grouping is completed in the temporal and spatial domain in such a way an identity of relationships present in these two domains is retained. An auxiliary mechanism of information granulation is developed through an optimization of relational constraints (granular codebook) realized through a collection of information granules.

“(The full content will be available during the conference)”
Intelligent Social Network Modeling

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Abstract

Web 2.0 has provided for a rapid growth of computer mediated social networks. Social relational networks are becoming an important technology in human behavioral modeling. Our goal here is to enrich the domain of social network modeling by introducing ideas from fuzzy sets and related granular computing technologies. We approach this extension in a number of ways. One is with the introduction of fuzzy graphs representing the networks. This allows a generalization of the types of connection between nodes in a network from simply connected or not to weighted or fuzzy connections. A second and perhaps more interesting extension is the use of Zadeh’s fuzzy set based paradigm of computing with words to provide a bridge between a human network analyst’s linguistic description of social network concepts and the formal model of the network. Another useful extension we discuss is vector-valued nodes. Here we associate with each node a vector whose components are the attribute values of the node. Using the idea of computing with words we are then able to intelligently query the network with questions that involve both attributes and connections. We see this as a kind of social network database theory. We shall look at some dynamic structures of network particularly the small worlds network.

“(The full content will be available during the conference)”
Abstract

Much has been written about the cost of producing software, but that literature largely ignores the benefits of using that software. While software creators believe that their products are valuable, they are rarely called upon to quantify its benefits. Evaluation of software and its benefits in commerce is left to lawyers, economists, software vendors, or promoters. The results are often inconsistent.

This tutorial describes how the value of software can be estimated. The problem being addressed is that the value of software is essentially independent of the cost and effort spent to create it. A few brilliant lines of code can have a very high value, whereas a million lines of code that generate a report that nobody uses have little value. Awareness of the value of the product of one’s knowledge and effort can help in making decisions on the design and the degree of effort to be made.

The tutorial will survey methods for valuing software based on the income it can generate. A principal approach is based on software growth, caused by needed maintenance. The valuation is with the accepted framework for valuing intellectual property (IP) in general.


Participants in the tutorial are encouraged to read the available information and engage in discussion of this challenging topic.

“(The full content will be available during the conference)”
Abstract

Web personalisation is an interdisciplinary topic that has been discussed in the literature about information systems, web intelligence, customer relationship management and marketing. Web personalisation is defined as any set of actions that tailor the web experience to a specific user or set of users, anticipating user needs to provide them with what they want or require without having to ask for it explicitly. A number of e-business and e-government development stage models have been proposed in the literature that focuses on classifying functions and features offered by current e-business and e-government. Most of these models have a common final stage which concentrates on providing fully integrated and personalised e-services for their constituents.

Recommender systems have gained considerable attention in recent years and are the most successful implementation of web personalisation. Recommender systems use justifications to generate recommended products or services to customers and to ensure the customers like these products or services. These justifications can be obtained either from preferences directly expressed by customers, or induced, using data representing the customer experience. Recommender systems are achieving widespread success and have attracted researchers’ attention in the field of e-business and e-government applications.

Recommender systems use different types of information filtering techniques to automatically identify and predict a set of interesting items on behalf of the users according to their personal preferences. The most notable classes of recommender system approaches include: (1) Content-based filtering--mainly depends on items’ descriptions to generate personalised recommendations; (2) Collaborative Filtering (CF)--mainly depends on users ratings of items in a given domain, and works by computing the similarities between the profiles of several users on the basis of their provided ratings and generates new recommendations based on comparisons of user ratings; (3) Knowledge-based filtering--suggests items based on logical inferences about a user’s needs and preferences; (4) Semantic-based filtering--exploits the semantic information associated with user and item descriptions to generate recommendations; (5) Trust-based filtering--exploits the level of trust between users in a social trust network and uses that knowledge to generate trustworthy recommendations; (6)
Hybrids-based filtering--combines two or more recommendation approaches to exploit their strengths and reduce their weaknesses.

This tutorial will introduce these recommendation approaches and, in particular, present the recent developments made by our Decision Systems and e-Service Intelligence (DeSI) lab in recommender systems and their applications in e-government and e-business intelligence, including case-based recommendation, ontology-based recommendation, fuzzy measure based recommendation, trust social networks-based recommendation related approaches and their applications in telecom companies and government-to-business services.

“(The full content will be available during the conference)”