Editorial

Special issue on Computational Intelligence in Information Retrieval

Information retrieval is finding information (usually documents) of an unstructured nature (usually text) or searching for documents themselves, searching for metadata which describe documents, or searching within databases, that satisfy an information need from within large collections (usually on local computer servers or on the world wide web). The Sixth International Conference on Intelligent Systems Design and Applications (ISDA 2006) gathered individual researchers who are also the world's most respected authorities on information retrieval, Web based information systems etc. This special issue comprising of ten papers is focused on the various aspects of information retrieval and its applications. Papers were selected on the basis of fundamental ideas/concepts rather than the thoroughness of techniques deployed. The papers are organized as follows.

In the first paper, *Xu et al. [1]* propose four intelligent classification techniques, including Bayesian belief networks, nearest neighbor, rough set and decision trees, to validate the usefulness of software metrics for risk prediction. Empirical results illustrate that when compared with metrics such as lines of code and cyclomatic complexity, which are traditionally used for risk prediction, Halstead program difficulty, number of executable statements and Halstead program volume are more effective metrics as risk predictors. It is also found that Bayesian belief networks are more effective when compared to the other three considered methods for risk prediction.

Jiang et al. [2] in the second paper introduce a novel subspace projection approach to improve the robustness of adaptive beamforming and direction finding algorithms. The cost function of the signal subspace scaled multiple signal classification is minimized in the uncertainty set of the signal steering vector, the optimal solution to the optimization problem is that the assumed steering vector can be modified as the weighed sum of the vectors orthogonally projected onto the signal subspace and the noise subspace. Using the estimated steering vector with small error to the true steering vector, the spectral peaks in the actual signal directions are guaranteed. Consequently, the problem of signal self-canceling encountered by adaptive beamforming due to steering vector mismatches is eliminated. Simulation results illustrate that the proposed method not only possesses high resolution performance, but also is robust to a few steering vector errors.

In the third paper, *Zheng et al.* [3] propose a knowledge-based approach that employs category theoretic models to formalize and mechanize object-oriented software design and synthesis by focusing on reasoning about the interdependency relationships at different levels of abstraction and granularity. The proposed approach provides an explicit semantics for formal object-oriented specifications, and therefore enables a high-level of reusability and dynamic adaptability. It also utilizes the ability of categorical computations to support automated software composition and refinement.

Girgis et al. [4] in the fourth paper propose a new biological environment and model for information retrieval that enhances the modeling concept from the mathematical formula that simulates the basic elements of information retrieval problem to their dual schemas in biology. Proposed framework is validated using some data sets.

In the fifth paper, *Cao et al.* [5] propose an approach for feature selection and classification of multi-source remote sensing images based on Mallat fusion and residual error. The fusion of multi-source images can provide a fused image which is more preferable for classification. Then a feature-selection scheme approach based on fused image is proposed, which is to select effective subsets of features as inputs of a classifier by taking into account the residual error associated with each land-cover class. A classification technique base on selected features by using a feed-forward neural network is investigated.

Luo et al. [6] in the sixth paper introduce a new three dimensional shape description method based on rotation. The first step is to sample points on the surface and compute normal vectors. Then Gauss mapping and rotate model is performed and at the same the Gauss sphere is rotated. Finally, normal distributions on the sphere surface are analyzed and then the Euclidean distance is computed, and finally a statistic histogram is constructed. Experiment results illustrate the effectiveness of the method.

In the seventh paper, *Pang et al.* [7] tackles the problem of identifying and assessing key project characteristics, which are crucial for a technology project's assessment. Authors introduce two aggregation operators in the technology project to deal with two situations of technology project assessment by including linguistic and subjective information. Examples show that the proposed method with the linguistic decision analysis is useful and could help the decision maker.

Luckner [8] in the eighth paper, discus the recognition of strongly noised symbols on the basis of non-disruptive patterns taking music symbols as an example. In the model described, non-disruptive symbols are used to generate a learning set that makes possible improved recognition as is presented on a real example of rests and accidentals recognition.

In the ninth paper, *Zhang et al.* [9] propose a clustering and hierarchical analysis to perform unsupervised learning. Original data is first pre-processed and then the potential variables are identified. Correlation among these variables is further analyzed using local global hierarchical analysis and qualitative and quantitative patterns are obtained and finally both of them are combined based on some criteria. The model is validated using some medical data sets.

Tamee et al. [10] in the last paper present a novel approach to clustering using a simple accuracy-based learning classifier system. With a slight modification in the fitness function of the original classifier system, it has been found to perform better for the identification of less-separated data sets. The developed method could accurately describe clusters without prior assumptions as to their number within a given dataset.

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References

[1] Zhihong Xu, Xin Zheng, and Ping Guo, Empirically Validating Software Metrics for Risk Prediction Based on Intelligent Methods.

[2] Biao Jiang, Qianliu Cheng and Guomin Ling, Robust Adaptive Beamforming with SSMUSIC Performance Optimization in the Presence of Steering Vector Errors.

[3] Yujun Zheng, Jinyun Xue, and Qimin Hu, Knowledge-Based Support for Object-Oriented Software Design and Synthesis: a category theoretic approach.

[4] Moheb R. Girgis, Abd El-Mgeid A. Aly, Bahgat A. Abdel Latef, Boutros R. El-Gamil, Biological Model For Information Retrieval.

[5] Dongdong Cao, Qian Yin, and Ping Guo, Multi-Source Remote Sensing Classification Based on Mallat Fusion and Residual Error Feature Selection

[6] Hao Luo, Shu-Chuan Chu, Jeng-Shyang Pan, Zhe-Ming Lu, Rotation-based Three Dimensional Shape Descriptor.

[7] Xiu-Li Pang, Yu-Qiang Feng, Wei-Jiang, Linguistic Decision Analysis Based Technology Project Assessment.

[8] Marcin Luckner, Recognition of Noised Patterns Using Non-Disruptive Learning Set.

[9] Yihao Zhang, Mehmet A. Orgun Weiqiang Lin, Unsupervised Learning Aided by Clustering and Local-Global Hierarchical Analysis in Knowledge Exploration.

[10] Kreangsak Tamee, Larry Bull, Ouen Pinngern, YCSc : A Modified Clustering Technique Based On LCS.

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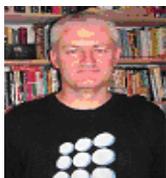
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