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Preface

In recent years the involvement of Information Technology in business, governments, and education has increased dramatically. More and more research works have been conducted in different areas of Information Technology such as Artificial Intelligence, Database Managements, Algorithms, Web Technologies, Computer Graphics, Networks, etc. In recognizing the importance and major advances, Information Technology has been chosen to be the theme of this special issue of the Information Science Journal.

This special issue contains six original research papers from different perspectives, and covering different areas of Information Technology. All of the articles are the original or extended versions of the best research papers selected from 255 contributions presented at the *International Arab Conference on Information Technology (ACIT'2002)*, organized by Abdulhamid Sadiq, Abdulhamid Marafia, Ahmad Hasnah and Jihad M. ALjaam, and held at the University of Qatar in Doha, the capital of the State of Qatar, during the period of 16–19 December 2002. We mention that, the ACIT'2002 conference was aimed to bring academia and industry together, from cross-section of disciplines, to present, review, discuss and exchange the latest methodologies and applications related to Information Technology. The conference was attended by approximately 350 participants from around 27 different countries.

The first paper entitled, *Appropriate Lemmae Discovery*, is in the area of automated theorem proving and mathematical inductions. It proposes a method for generating lemmatae automatically in order to find appropriate instantiations for non-induction variables in the inductive step. The second paper, *Development of a Multi-Resolution Framework for NUBS*, presents a multi-resolution model for non-uniform B-splines (NUBS) which uses the control point decimation strategy for decomposing NUBS curves. It compares the proposed model with another existing one based mainly upon knot decimation. The third paper, *Conceptual Reduction of Fuzzy Context Using Lukasiewics Implication*, uses fuzzy formal concept analysis to remove redundant data in fuzzy relational database. It proposes a fuzzy extension of a previous algorithm used for crisp data reduction without loss of knowledge. The fuzzy Galois connection based on Lukasiewics implication is also used in the closure operator. The fourth paper, *Consistency Problem in ER-Schemas for Database Systems*, proposes a tool for reasoning about a set of cardinality constraints in database design. It treats the

general coherence of the cardinality constraints using some mathematical programming technique. It also uses the Fourier–Motzkin elimination in order to analyze and detect invalid sub-schemas. The fifth paper, *An Approach for Constructing Complex Discriminating Surfaces Based on Bayesian Interference of the Maximum Entropy*, presents a general procedure for the classification tasks based on the Maximum Entropy approach. It then uses this procedure to develop an efficient algorithm to construct non-linear discriminating surfaces. The advantages of these techniques are also discussed in the paper. Finally, the sixth research paper, *Towards Scalable Collective Communication for Multi-computer Interconnection Networks*, introduces a broadcast algorithm for the mesh network, which is able to handle broadcasts operations with a fixed number of message-passing steps irrespective of the network size. It also discusses the performance of this algorithm and compares it to some well-known algorithms.

We hope that this special issue would provide a useful resource of ideas, techniques, and methods for further research in the development and applications of Information Technology.

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Our sincere thanks to Paul P. Wang, editor-in-chief of Information Sciences, who accepted to publish a special issue, dedicated to ACIT'2002 conference. We were also honored by his presence during ACIT'2002 conference period and by the remarkable and original seminar he has presented.

Finally, we gratefully acknowledge the sponsorship of the University of Qatar, Qatar Petroleum, RasGas, Qatar Gas, OXY of Qatar, Qatar Telecom Q-tel, QAFCO, QAFAC, QAPCO, Qatar National Navigation and Transports, and others for their contribution and support in the organization of ACIT'2002 conference.

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