Special Issue of Selected papers of ICAEE 2011 and ICCIT 2011

Guest Editorial

In this contemporary world, computers and information technology (IT) are the key factors influencing the growth by accelerating innovations in almost all sectors. Introduction of new computational methodologies and architectural optimizations in the hardware and software arena is leading to more powerful automations in both industrial and public sectors shaping economic, social and cultural growth. The optimum use of emerging technological developments in the area of computers and information technology also play an important role in supporting human health care and medical sciences. The availability of advanced modelling methodologies with high performance algorithms and data processing techniques provides an appropriate platform for understanding natural phenomena and environmental issues. These are becoming possible due to outcomes of various research and development activities being conducted by scientific communities around the world. These research findings should be shared with the public for enabling further developments. Since 1998 the series of International Conferences on Computer and Information Technology (ICCIT) being organized by different public and private universities in Bangladesh has been successful in bringing together academics, researchers, IT professionals and IT managers to disseminate state of the art research activities and outcomes in these fastest growing fields.

This Special Issue of the Journal of Computers presents nine papers. Two of these papers are selected from the first International Conference on Advances in Electrical Engineering (ICAEE) held at Independent University, Dhaka, Bangladesh in December 2011. The remaining seven papers are selected from the Fourteenth International Conference on Computer and Information Technology (ICCIT 2011) held at the American International University (AIU), Dhaka, Bangladesh during December 22-24, 2011. The first one of the ICCIT conference series was held at Bangladesh University of Engineering and Technology in 1998. Since then the ICCIT conference has grown into one of the largest computer and IT related research conferences in the South Asian region, with participation of academics and researchers from many countries around the world. Authors are required to submit full length papers to the conference for review. A double blind review process is followed whereby each paper is reviewed by at least two independent reviewers of high international standing. The acceptance rate of papers in recent years has been around 35% or less. This is an indication of the quality of work presented in the papers accepted for the conference. The proceedings of ICCIT have been included in IEEExplore since 2008, enhancing the visibility of research activities of the participating researchers with possible citations in a wider sense.

In 2011, a total of 353 full papers were submitted to the ICCIT conference of which 126 were accepted after reviews conducted by an international program committee comprising of 85 members from 16 countries. From the 126 papers accepted for the conference, 19 highly ranked papers were invited for the special issue. The authors were invited to enhance their conference papers significantly, with at least 30% extension, and submit the same for review. Only nine papers were successful in meeting the expectations of the review process and have been selected for inclusion in this special issue. The authors of these papers represent academic and/or research institutions from Bangladesh, USA, India and Japan. These nine papers cover four domains of computing namely efficient algorithm design, optimisation, control and innovative software development for various applications.

The first two papers in this special issue cover the areas of *analytical modelling and motor control*. The first paper is titled *"Solar Adsorption Cooling: A Case Study on the Climatic Condition of Dhaka"*, and is authored by Rifat. A. Rouf, K. C. A. Alam, Md. Abdul. H. Khan, Tasnuva Ashrafee and Mohammed Anwer. This paper has presented an analytical investigation on the performance of an adsorption chiller driven by solar collector panel for the climatic condition of Dhaka. Authors used a set of mathematical model and simulation technique to investigate the system performances of solar driven basic adsorption chiller with silica gel-water as adsorbent/adsorbate pair. Through their investigation, authors found that the collector size can be reduced by optimizing cycle time and chilled water outlet temperature can be controlled by setting an appropriate chilled water flow rate.

The second paper is in the area of efficient induction motor control. The paper is titled "*Design, Simulate and Development of a Computer Controlled Three-Phase Inverter for Precise Speed Variation of a Three-Phase Induction Motor*", and is authored by Md Aziz Ul Huq, Md Abul Bashar and Farruk Ahmed. The authors presented a three-phase inverter for precise speed variation in which input parameters can be easily varied through proper software program and computer interfacing hardware. In the proposed scheme, the authors have introduced a special delay circuit to ensure non short circuit situation. It is indicated that though the frequency of the inverter can be varied over a wide range, the inter-phase separation always remains 1200, yielding a true pattern of a three-phase power supply. It is also demonstrated that the proposed scheme is accurate and reliable in terms of accurate and complex speed control of the motor.

Next four papers are on efficient *algorithm design or software development*. The first paper in this group is in the bioinformatics area, titled "*Improving the performance of a genome sorting algorithm with Inverted Block-Interchange*", and is authored by Deen Md Abdullah, Wali Md Abdullah and M. Sohel Rahman. In this paper, the authors addressed a classic problem in comparative genomics to find a shortest sequence of evolutionary operations that transform one

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genome into another. The authors considered reversals and block-interchanges simultaneously and incorporated inverted block-interchange in a heuristic algorithm, which inverts one or both of the two swapped segments of a block-interchange. Their experimental results confirmed that incorporation of inverted block-interchange always results in a better (or at least equal) sorting sequence. The next paper is on self-healing, titled "*Static Analysis, Code Transformation and Runtime Profiling for Self-healing*", and is authored by Mohammad Muztaba Fuad, Debzani Deb and Jinsuk Baek. In this paper, the authors have presented a new technique of finding self-healing actions by matching a fault scenario to already established fault models. They have indicated that by statically analyzing the code and transforming it in a way to allow the program to profile itself, it is possible to capture runtime parameters and execution pathways during runtime. Authors noted that the transformed program then can establish stable execution models that can be used later to match with an unstable execution scenario. Finally, the authors conclude that even with additional overheads, this technique can prove beneficial for autonomically healing faults and reliving system administrators from repeated and routine troubleshooting situations. The third paper in this category is on efficient encoding scheme, titled "*An Efficient Encoding Scheme to Handle the Address Space Overflow for Large Multidimensional Arrays*", and is authored by Sk. Md. Masudul Ahsan and K. M. Azharul Hasan. In this paper, authors propose a new solution against the essential problem of address space overflow for handling large scale multidimensional datasets using their implementation model. The authors also proposed a record encoding scheme based on their model for representing relational tables using multidimensional array. The authors evaluated the proposed scheme by comparing with Traditional Multidimensional Array (TMA) for different operations and found a reasonable delay of address space overflow with no retrieval penalty. They also compared the encoded scheme with traditional scheme and found that proposed encoded scheme performs better on range retrieval for sparse array. The fourth paper in this group is on plagiarism detection, titled "*BAENPD: A Bilingual Plagiarism Detector*", and is authored by Mohammad Shamsul Arefin, Yasuhiko Morimoto and Mohammad Amir Sharif. In this paper, the authors have presented a bilingual plagiarism detection system that can be used to detect plagiarism from electronic Bangla and English documents. The authors have used two different methods for detecting plagiarism: (i) analysis of individual contents of the documents and (ii) technique to perform several statistical analyses of the documents. Finally, the authors have evaluated the proposed scheme by real documents. It was found that their system can efficiently detect plagiarism between English and Bangla documents as well as from the documents of same language.

The last three papers in this special issue cover diverse areas of *hybrid search methods, machine translation and compression.* The first paper in this group is on optimal scheduling, titled "*Hybrid Local Search Methods in Solving Resource Constrained Project Scheduling Problem*", and is authored by Partha Pratim Das and Sriyankar Acharyya. In this paper, the authors have presented the Resource Constrained Project Scheduling Problem (RCPSP) as a Combinatorial Optimization Problem (COP), which can be categorized as a NP-hard problem. The authors have proposed five new methods developed by combining Simulated Annealing and Tabu Search and applied them for solving a benchmark instance of this problem. As an outcome, the authors showed that the Simulated Annealing incorporated with Tabu List, Greedy Selection Heuristic and aspiration criteria (GTSA_AC_RCP) outperforms other methods in getting optimal results with maximum hit and minimum fluctuations.

The next paper is on English to Bangla translation, titled "*Translation of Unknown Words for English to Bangla Machine Translation Using Transliteration*", and is authored by Khan Md. Anwarus Salam and Tetsuro Nishino. In this paper, the authors have proposed a novel approach for Example-Based Machine Translation (EBMT) using WordNet and International-Phonetic-Alphabet (IPA) based transliteration to improve translation quality for Bangla language. Their proposed scheme first tries to find semantically related English words from WordNet for the unknown word. From these related words, the authors have chosen the semantically closest related word whose Bangla translation exists in English-Bangla dictionary. If no Bangla translation exists, the system uses IPA-based-transliteration. If the unknown word is not found in the English IPA dictionary, the system uses Akkhor transliteration mechanism. The authors have implemented the proposed approach in EBMT and demonstrated that this improved the quality of good translation by 16 points.

Finally, the last paper in the special issue is on compression enhancement, titled "*H-HIBASE: Compression Enhancement of HIBASE Technique Using Huffman Coding*", and is authored by Ahsan Habib, A. S. M. Latiful Hoque and Md. Russel Hussain. In this paper, the authors present investigations on (i) developing a dictionary by applying the principle of Huffman coding, (ii) compressing the relational storage of HIBASE by applying dynamic Huffman coding, (iii) developing algorithm to perform query operation on the compressed storage and iv) analyzing the performance of the proposed system in terms of both storage and queries. The authors have developed a compression technique with an outcome that the enhancement of HIBASE technique using HUFFMAN coding (H-HIBASE) offers improved compression capability.

Thirty reviewers from nine countries assisted the guest editors in reviewing the papers submitted to the Special Issue during two rounds of review. They have contributed immensely to the process by responding to the guest editors in the shortest possible time and by dedicating their valuable time to ensure that the Special Issue contains high-quality papers with significant contributions. The guest editors would like to express their sincere gratitude to all the reviewers, namely, A. H. M. Zahirul Alam, W. Al-Assadi, S. M. A. Bhuyian, Russell Brinkworth, Saber M. Elsayed, M. Y. El-Sharkh, Mohammed H. Haque, Mohammed S. Hasan, Afzal Hossain, Tasadduq Imam, Md. Fakhrul Islam, Abusaleh M.

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Mohammad S. Alam is a Professor and Chair of the ECE Department at the University of South Alabama (USA). His research interests include ultrafast computing architectures and algorithms, image processing, pattern recognition and tracking, biometric recognition, infrared imaging systems, and smart energy management and control. He is the author or co-author of over 475 publications, including 179 articles in refereed journals, over 285 conference publications, 14 book chapters, a book on IPTV (IEC Press), and edited a reference book of selected papers on Pattern Recognition Using Joint Transform Correlation (SPIE Press) as well as several conference proceedings. He received numerous excellences in research, teaching and service awards including the 2005 Outstanding Scholar of the Year award from the USA Alumni Association and 1998 Outstanding Engineer Award from Region IV of IEEE.

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