

Editorial Preface:

Special issue on Digital Information Management

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The rapid growth and widespread use of data acquisition technologies together with advances in computing and communications proves the need for better methods of insuring the security and reliability of digital data. Protecting confidential information is a business requirement, and in many cases also an ethical and societal requirement. The field of information security has grown and evolved significantly in recent years due to a truly explosive growth in the number, size and diversity of potentially useful digital information sources. However, semantic heterogeneity and distributed nature of digital data present significant hurdles in protecting the confidentiality, integrity and availability of computers and the information they store, process and transmit. Naturally, issues on information security paradigms have become crucial in a large number of professional domains and indeed require various improvements and major modifications of the current techniques and tools to be provided to the end-user. Currently, there is notable number of research work on security approaches to design and implement advance techniques for protecting information and information systems from unauthorized access, disclosure, use, disruption, modification or destruction. The ability for current scholarship to follow, anticipate and dialogue with these important questions in the ICT community will prove an important foundation for the next generation of technological advances.

This special issue seeks to contribute new insights on these issues and challenges in order to better address the evolution of data acquisition technologies and computing advances. The papers included here stem from the second annual IEEE International Conference on Digital Information Management (ICDIM) held in Lyon-France in 2007.

This edition of ICDIM successfully achieved its goal of bringing scholars from academia, research laboratories and industry to the proverbial table to discuss their work and share their experience both theoretically and practically. The forum served as a collaborative platform to address the emerging issues of the digital society and solutions in

information science and technology. We believe that their insight contributes to a greater understanding of these important questions that are in the forefront of scholarship and intellectual inquiry in the ICT community.

Not only did the following papers receive accolade from conference participants, they were chosen at the end of a special procedure to be shared in this published format after a very tight review process in which eight extended papers out of forty-four papers presented were selected for inclusion in this special issue after two rounds of reviews. The acceptance rate was thus 18.18% and the selected works reflect the high standards for excellence used by the many esteemed members of the editorial board who contributed to this special issue. Their contributions are greatly appreciated. This special issue is organized as follows.

The first paper is entitled “*Spam Filtering with SVM and Data Compression*”, in which *Gilles Richard, Sihem Belabbès* introduce a new method for spam filtering, skipping the classical text analysis in use with standard techniques. Starting with the Kolmogorov complexity theory as background, the authors focus on the measure of the informative content of a message to classify it as spam or ham (legitimate e-mail): the main idea is that there is a hidden subjacent structure allowing to discriminate between ham and spam. Using the information distance between e-mails and compression measure as Kolmogorov complexity estimation, they first validate their idea with a simple k-nearest neighbors algorithm: tests show that they can accurately classify without any pre-processing or analysis of the incoming e-mails. Working with standard spam repository, they get accuracy rates in the range of 85% to 90%. In order to achieve better classification, they also introduce a more sophisticated training component: Support Vectors Machines. Each e-mail is represented as a multi-dimensional real vector with the help of a small set of typical ham and spam. The final experiment and tests show accuracy rates in the range of 93% to 97%.

The second paper is entitled “*Context-Aware Security Service in RFID/USN Environments using MAUT and Extended GRBAC*” by *Kiyeal Lee, Seokhwan Yang, Sungik Jun and Mokdong Chung*. In essence, this paper proposes a context-aware security service providing multiple authentications and authorization from a Security Level which is decided dynamically in a context-aware environment. It helps developers build secure services efficiently. A security service in a dynamic environment uses Multi-Attribute Utility Theory and extended Generalized Role-Based Access Control. The system uses attribute values in GRBAC to calculate the Security Level, and extend the GRBAC.

The third paper, “*Several methods of ranking retrieval systems with partial relevance judgment*”, authored by *Shengli Wu and Sally McClean*, focuses on the problem of effectiveness evaluation of information retrieval systems (IRS). In essence, some measures such as average precision over all relevant documents and recall level precision are considered as good system-oriented measures, because they concern both precision and recall that are two important aspects for effectiveness evaluation of IRS. However, such good system-oriented measures suffer from some shortcomings when partial relevance judgment is used. In this paper, the authors discuss how to rank retrieval systems based on partial relevance judgment, which is common in major retrieval evaluation events such as TREC conferences and NTCIR workshops. Four system-oriented measures, which are average precision over all relevant documents, recall level precision, normalized discount cumulative gain, and normalized average precision over all documents, are discussed. The investigation shows that with partial relevance judgment, the evaluated results can be far from accurate and incomparable across queries. In such a situation, averaging values over a set of queries may not be the most reliable approach to rank a group of retrieval systems. Some alternatives such as Borda count, Condorcet voting, and the Zero-one normalization method, are investigated. Experimental results are also presented for the evaluation of these methods.

Authored by *Lino Coria, Panos Nasiopoulos, Rabab Ward and Mark Pickering*, the fourth paper addresses “*An Access Control Video Watermarking Method that is Robust to Geometric Distortions*”. Here, a new video watermarking algorithm for access control is introduced. This method is content-dependent and uses the dual tree complex wavelet transform (DT CWT) to create a watermark that is robust to geometric distortions and lossy compression. The watermark is a random array of 1's and -1's. A one-level DT CWT is applied to this watermark and the coefficients of this transformation are embedded into selected frequency components of the video sequence. The robustness of this method is tested against a joint attack, which involves rotation, scaling, cropping and H.264 video compression.

The fifth paper is dedicated to “*Minimality Quality Criterion Evaluation for Integrated Schemas*”. *Maria da Conceição Moraes Batista and Ana Carolina Salgado* deal here with integrated access to distributed data. A data integration system provides a unified view for users to submit queries

over multiple autonomous data sources. The queries are processed over a global schema that offers an integrated view of the data sources. Much work has been done on query processing and choosing plans under cost criteria. However, not so much is known about incorporating Information Quality analysis into data integration systems, particularly in the integrated schema. In this work, the authors present an approach of Information Quality analysis of schemas in data integration environments. They discuss the evaluation of schema quality focusing in the minimality aspect and define some schema transformations to be applied in order to improve schema design.

Authored by *Youakim Badr and Jean Stephan*, the sixth paper addresses “*Security And Risk Management in Supply Chains*”. In essence, the reduction of risk constitutes a pillar of success in business. A crucial concern in any business activity includes the variable of risk due to security threats in information systems. Risks increase as the business increases in success and profit. Risk Management becomes a crucial part of every successful business model to deal with uncertain and risky socio-economic changes. Security concerns are a major player in minimizing risk in businesses by protecting its intangible resources and knowledge. The emergence of supply chains which coordinate organizations, people, activities, information and resources, dramatically increases risk crises. Efforts have resulted in process reference models, such as the Supply Chain Operations Reference (SCOR) which measures total supply chain performance. Although the SCOR model is designed to support supply chains of various complexities across multiple industries, it does not provide a basis for Risk Management in terms of the security of exchanged information and access control. Quantifying security risks in supply chains becomes a central challenge to be considered in risk management. This paper attempts to propose a framework to bridge the gap between security concerns and risk management in a supply chain, typically, the SCOR model. The framework extends risk management with security awareness by proposing roles for each process in SCOR. Its underlying approach focuses on the types of threats in SCOR implementation projects and applies empirical benchmarks to measure risks in processes with respect to the security-oriented framework.

In “*Proposed Secure Mechanism for Identification of Ownership of Undressed Photographs or Movies captured Using Camera Based Mobile Phones*”, *Samir B. Patel and Shrikant N. Pradhan* focus on the problem of grandiose claims within the media about the potential misuse of phones with camera capability. Unfortunately some of these claims are not proved by available facts resulting into confusion and misunderstanding. It may suffice to say that some digital cameras are smaller, convenient and technology superior in image quality. This makes them easier to use in an unacceptable manner. Camera phones are designed to provide a means of transferring images via mobile phone to complement voice or text based communication for business or personal reasons. Normally the youth gets attracted towards the sexual photography and watching movies on the mobile devices. Sometimes such movies get broadcast on the network like wild fire and it is available to all the

community. It is indeed a difficult task to identify the user who has captured these photographs or movies and made it public. This paper focuses on a technique through which this problem can be solved. This technique, if implemented, on a mobile phone can really help the concerned authority to identify the culprits.

The last paper in this special issue focuses on “*Bootstrapping Security in Personal Area Networks*” and deals with providing key pre-distribution in personal area networks (PANs). Several key pre-distribution schemes have been proposed for use in PANs, but these schemes only support key management within a PAN. In a ubiquitous environment, however, users with multiple personal wireless devices are likely to form mobile ad hoc networks, requiring key management between PANs. Moreover, PANs cannot rely on the universal accessibility of an online trusted third party, and PAN users are unlikely to delegate security operations to an external trusted party for privacy reasons. The author, *Jihoon Cho*, aims to propose a provably secure

self-organizing key pre-distribution scheme for use both within and between PANs.

We hope this special issue motivates researchers to take the next step beyond building models to implementing, evaluating, comparing, and extend proposed approaches. Many people worked long and hard to help this issue become a reality. We would first like to gratefully acknowledge and sincerely thank all the reviewers for their timely and insightful valuable comments and criticism of the manuscripts that greatly improved the quality of the final versions. Of course, thanks are due to the authors, who provided excellent articles and timely extended revisions. Finally, we are grateful to the editors of the Journal of Information Assurance and Security for their trust in us, their efforts, patience, and painstaking editorial work during the production of this special issue.

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Guest Editor Biographies

Dr. Richard Chbeir received his PhD in Computer Science from the University of INSA- FRANCE in 2000. The author became a member of IEEE since 1999. He is currently an Associate Professor in the Computer Science Department of the Bourgogne University, Dijon-France. His research interests are in the areas of distributed multimedia database management, XML similarity and rewriting, spatio-temporal applications, indexing methods, multimedia access control models, security and watermarking. Dr. CHBEIR has published (more than 40 peer-reviewed publications) in international journals and books (IEEE Transactions on SMC, Information Systems, Journal on Data Semantics, Journal of Systems Architecture, etc.), conferences (ER, WISE, SOFSEM, EDBT, ACM SAC, Visual, IEEE CIT, FLAIRS, PDCS, etc.), and has served on the program committees of several international conferences (ICDIM, IEEE SITIS, ACM SAC, IEEE ISSPIT, EuroPar, SBB, etc.). He has been organizing many international conferences and workshops (ICDIM, CSTST, SITIS, etc.). He is currently the Chair of the French Chapter ACM SIGAPP.

Dr. Youakim Badr received a Doctorate in Information Systems from the French National Institute for Applied

Sciences in Lyon (INSA of Lyon). In 2004, he joined the faculty of the INSA of Lyon as Assistant Professor of Computer Science. Dr. BADR has worked extensively in the field of coupling XML documents and Object-Relational Databases. Through his research he has acquired skills in fields such as Interoperability, Modeling, System Architectures and Networking, and their application to various domains such as Business Processes, Supply Chains, Productions Systems and Virtual Enterprises. His current academic research interests include systems in both the service sector and ICT. In particular, he studies the ecosystem of services and the multidisciplinary modeling approach to design services through the

integration of ICT, strategy and processes. He leads the Service-Oriented Enterprise research team which combines industrial and computer engineering approaches. In this context, he actively participates in national and international projects (COPILOTES, INTERPROD, SEMEUSE, SIMSYPROD, etc.). Dr. BADR is vigorously involved in a series of international conferences. He served as General Co-Chair of ICDIM'07, CSTST'08 and the Web Technology Track of SAC 2008, and International Program Member of IAS'08, NOTERE'08, SITIS'07, JFO'07, WCNC'07 and ECWS'06