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Editors' introduction special issue on multilingual knowledge management

To compete in today's fast-changing business environment, organizations around the globe have undertaken various initiatives to manage their most valuable yet volatile asset: knowledge. Knowledge originates in the minds of individuals [1] and is usually embedded in organizational repositories as well as routines, processes, practices and, norms [2]. Knowledge management refers to the systematic process for creating, retaining, organizing, sharing, reusing, assimilating, and protecting tacit and/or explicit knowledge to enhance organizational performance and adaptability [3,5,6]. Knowledge management research is multidisciplinary. It involves information technology, artificial intelligence, information science, cognitive science, and management science.

Over the last decade, various knowledge management technologies have been investigated and developed to facilitate creation and management of organizational knowledge repositories, improve knowledge access and transfer, and enhance knowledge environment. Most of existing technologies focus on supporting knowledge management in monolingual environments. Due to advances of World Wide Web, information available in languages other than English in the global information systems is increasing significantly [7]. The trend of globalization also leads to a multilingual environment in which organizations undertake their knowledge management endeavors. Intelligent and efficient processing of multilingual information is important for decision-making in global enterprise to manage their business across different cultures, languages, legal regulations, and markets. Multilingual knowledge management is even more prevalent in those countries that have more than one official language [8]. For example, Chinese and English are official languages of Hong Kong; French and English for Canada; and Dutch, French, and German for Belgium.

While broadening knowledge sources from single language to multiple languages and enriching knowledge content managed by organizations, multilingual knowledge management faces the technical challenge of linguistic interoperability. Moreover, multilingual content also introduces additional complexities to user interface design and management practices. From the technological perspective, multilingual knowledge management uses natural/statistical language processing, multilingual information retrieval and processing, and machine translation as potential building blocks. It involves multilingual concept space learning [4], multilingual text mining, multilingual ontology learning and integration, multilingual knowledge extraction and summarization, etc.

In this special issue on multilingual knowledge management, we have selected seven papers, which are summarized as follows.

Lyu et al. propose a cross-lingual alignment technique for Taiwanese spoken documents and Mandarin text documents. The authors develop a speech recognition technique to transcribe the speech to a tonal syllable sequence in Taiwanese. On the other hand, a cross-lingual translator is developed to translate Mandarin text documents to a tonal syllable sequence in Taiwanese as well. The authors apply the DTW algorithm to align the pairs of tonal syllable sequences. An alignment accuracy of 82.5% is achieved.

Segev and Gal propose an ontology-based model for multilingual knowledge management. The model utilizes a manually-designed global ontology that combines multiple ontologies and captures the cultural and lingual differences. Experiments are conducted on the eGovernment application, QUALEG.

Lu et al. present a cross-lingual medical information retrieval system, MMODE. The system utilizes a Chinese–

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English medical thesaurus to support users searching English medical information using Chinese queries. The Chinese–English medical thesaurus is compiled by knowledge engineers with the help of the Chinese–English medical subject headings (MeSH) that is developed through a semi-automatic term translation method.

Yang et al. present an associate constraint network approach to construct cross-lingual thesaurus using the Web as resource. They develop the forward evaluation algorithm, which outperforms the backmarking algorithm, for the associate constraint network. It also shows that the associate constraint network approach performs better their previously proposed Hopfield network approach. Such automatic cross-lingual thesaurus can support cross-lingual information retrieval and multilingual document classification for multilingual knowledge management.

Wei et al. develop a Latent Semantic Indexing (LSI)-based multilingual document clustering technique. The proposed technique employs the LSI analysis of a parallel corpus to construct a multilingual indexing system. As a result, the target multilingual documents are indexed in the language-independent LSI space and monolingual document clustering technique can be utilized to cluster the target multilingual documents. Their empirical evaluation results show that the proposed technique achieves satisfactory clustering effectiveness and is capable of maintaining a good balance between monolingual and cross-lingual clustering effectiveness.

Chau et al. present a toolkit, SpiderRUs, for multilingual search engine creation. The tool consists of a spider module, an indexer module, an index structure, a search module, and a graphical user interface module. A case study has been conducted to demonstrate the capability and flexibility of the proposed architecture of SpiderRUs.

O'Leary discusses a case study of Food and Agriculture Organization (FAO) and World Agriculture Information Centre (WAICENT) multilingual knowledge management systems. The authors provide an analysis of the key capabilities of multilingual systems.

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Dr. Chen was ranked #8 in publication productivity in Information Systems (CAIS 2005) and #1 in Digital Library research (IP&M 2005) in two recent bibliometric studies. He serves on ten editorial boards including: *ACM Transactions on Information Systems*, *ACM Journal on Educational Resources in Computing*, *IEEE Transactions on Intelligent Transportation Systems*, *IEEE Transactions on Systems, Man, and Cybernetics*, *Journal of the American Society for Information Science and Technology*, *Decision Support Systems*, and *International Journal on Digital Library*. Dr. Chen has served as a Scientific Counselor/Advisor of the National Library of Medicine (USA), Academia Sinica (Taiwan), and National Library of China (China). He has been an advisor for major NSF, DOJ, NLM, DOD, DHS, and other international research programs in digital library, digital government, medical informatics, and national security research. Dr. Chen is founding director of Artificial Intelligence Lab and Hoffman E-Commerce Lab. The UA Artificial Intelligence Lab, which houses 40+ researchers, has received more than $20M in research funding from NSF, NIH, NLM, DOD, DOJ, CIA, DHS, and other agencies over the past 17 years. The Hoffman E-Commerce Lab, which has been funded mostly by major IT industry partners, features one of the most advanced e-commerce hardware and software environments in the College of Management. Dr. Chen is conference co-chair of ACM/IEEE Joint Conference on Digital Libraries (JCDL) 2004 and has served as the conference/program co-chair for the past eight International Conferences of Asian Digital Libraries (ICADL), the premiere digital library meeting in Asia that he helped develop. Dr. Chen is also (founding) conference co-chair of the IEEE International Conferences on Intelligence and Security Informatics (ISI) 2003–2007. The ISI conference, which has been sponsored by NSF, CIA, DHS, and NIJ, has become the premiere meeting for international and homeland security IT research. Dr. Chen's COPLINK system, which has been quoted as a national model for public safety information sharing and analysis, has been adopted in more than 200 law enforcement and intelligence agencies in 20 states. The COPLINK research had been featured in the New York Times, Newsweek, Los Angeles Times, Washington Post, Boston Globe, and ABC News, among others. The COPLINK project was selected as a finalist by the prestigious International Association of Chiefs of Police (IACP)/Motorola 2003 Weaver Seavey Award for Quality in Law Enforcement in 2003. COPLINK research has recently been expanded to border protection (BorderSafe), disease and bioagent surveillance (BioPortal), and terrorism informatics research (Dark Web), funded by NSF, CIA, and DHS. In collaboration with Customs and Border Protection (CBP), the BorderSafe project develops criminal network analysis and vehicle association mining research for border-crosser risk assessment. The BioPortal system supports interactive geospatial analysis and visualization, chief complaint classification, and phylogenetic analysis for public health and biodefense. In collaboration with selected international terrorism research centers and intelligence agencies, the Dark Web project has generated one of the largest databases in the world about extremist/terrorist-generated Internet contents (web sites, forums, and multimedia documents). Dark Web research supports link analysis, content analysis, web metrics analysis, multimedia analysis, sentiment analysis, and authorship analysis of international terrorism contents. The project was featured in the Discover magazine, Arizona Republic, and Toronto Star, among others. Dr. Chen is the founder of the Knowledge Computing Corporation, a university spin-off company and a market leader in law enforcement and intelligence information sharing and data mining. Dr. Chen has also received numerous awards in information technology and knowledge management education and research including: AT&T Foundation Award, SAP Award, the Andersen Consulting Professor of the Year Award, the University of Arizona Technology Innovation Award, and the National Chaio-Tung University Distinguished Alumnus Award.

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