
Editorial

Kee-Hong Park

Department of Computer Information Engineering,
Kunsan National University,
1170 Daehak-ro,
Gunsan City, Jeonbuk, South Korea
Email: spacepark@kunsan.ac.kr

Jong-Chan Lee

Department of Computer Information Engineering,
Kunsan National University,
Gunsan 573-701, Jeollabuk-do, South Korea
Email: chan2000@kunsan.ac.kr

Eun-Mi Kim

Department of Computer Science,
Howon University,
Gunsan 573-718, Jeollabuk-do, South Korea
Email: ekim@howon.ac.kr

Biographical notes: Kee-Hong Park received his BS and MS in Computer Science from the Soongsil University, Seoul, Korea in 1982 and 1985, respectively, and his PhD in System Engineering from the University of Tokushima, Japan, in 1995. He is currently a Professor at the Department of Computer Information Engineering of Kunsan University. His research interests include software engineering and sensor networks.

Jong-Chan Lee received the MS and PhD degrees in Computer Science and Engineering from Soongsil University, Korea, in 1996 and 2000, respectively. From 2000 to 2005, he was a Senior Member of Engineering Staff in Mobile Telecommunication Research Laboratory, Electronics and Telecommunications Research Institute (ETRI). He has worked in the Department of Computer Information Engineering, Kunsan University as an Associate Professor. His current research interests are in the areas of resource management and handover for mobile multimedia networks.

Eun-Mi Kim received her BS and MS degrees in Department of Computer Science from Chonbuk University, Korea, in 1992 and 1994, respectively and PhD in Software Engineering from the Department of Information and Computer Science, Osaka University, Japan in 1997. She has worked in the Division of Computer & Game at How on University as a Professor. Her current research interests in the areas of software quality evaluation, object-oriented software development methodology and Image processing.

This special issue promotes exchange of opinions between experts working in different areas of the growing field of multi-data processing technologies and their applications in ubiquitous environments.

The main purpose of the special issue on *Sensor Networks, Ubiquitous and Trustworthy Computing* is to bring together the above communities to exchange latest results, to join efforts in solving the common challenges, but also to contrast the developments in the different communities.

The research and development of these systems, which exploit knowledge in the target domain, is at the forefront of modern researches.

The first paper, 'Double array structures based on byte segmentation for n-gram', by Masao Fuketa, Kazuhiro Morita and Jun-ichi Aoe, proposes retrieval algorithms and data structures that can be introduced to compact ubiquitous devices. In previous research for the double array, one-by-one-bytes character of the key traversed in the trie. This paper proposes retrieval algorithms by using every n byte. The proposed method is applied to the compact double array, which is the traditional compression method of the double array. From experimental observations, the size of the proposed method becomes 41% compared with that of the original double array and 63% compared with that of the compact double array.

The retrieval speed of the proposed method becomes 1.2 times faster than the original double array.

The second paper, 'A Kinect-based system for Arabic sign language to speech translation', by Mohammad Fraiwan, Natheer Khasawneh, Hosam Ershedat, Ibrahim Al-Alali and Hamza Al-Kofahi, tackles the problem of the transformation of Arabic sign language (in its Jordanian variant) to speech. They make use of commercial off-the-shelf components (i.e., the Xbox Kinect) to capture the sign language gestures. Graphical gestures are transformed into Arabic text, which in turn can be translated into any spoken language. Web services (such as Google Translate and Microsoft Bing Translator) are used to generate the proper spoken sounds. The majority of this paper is dedicated to explain the elaborate steps taken for hand and fingers identification. In addition, motion recognition is also detailed. The accuracy in identifying the implemented characters was shown to exceed 80%. As the market technology (hardware and web services) improves, so will the accuracy and usefulness of the system.

The third paper, 'Improved dialogue communication systems for individuals with dementia', by Kazuhiro Morita, Masao Fuketa, Jun-ichi Aoe and Kiyoshi Yasuda, presents a dialogue communication system for individuals with dementia by using cloud-based approaches. The presented method proposes a dialogue-controlling algorithm that can break communication if individuals with dementia become hyperexcitable. Videos with school songs are used to mitigate the impacts caused by hyperexcitability. In the cloud systems, a text mining module is combined in order to analyse personal orientation from communicated utterances of individuals with dementia. From experimental results for a total of roughly 327 individuals with dementia, it turns out that the presented method can make conversations smooth in comparison with the previous approaches. For the cloud system with text mining modules, it is verified that the presented system can achieve both high performance and low cost.

The fourth paper, 'A vote-based intrusion-tolerance algorithm for network latency estimation', by Cong Wang and Fengli Zhang, proposes a vote-based model for network latency estimation, which is categorised as a kind of the l_1 loss function optimising method. By taking the non-differentiability of the loss function into consideration, they introduce a variant of Rosenbrock algorithm to minimise this function and prove its convergence. The experiments show that, compared with the traditional model, their model can achieve not only higher accuracy in benign environment but also better robustness in serious unsafe environments with low computing cost, and shows a strong intrusion tolerance capability.

The fifth paper, 'Skin region segmentation using an image-adapted colour model', by Seok-Woo Jang, Kee-Hong Park and Gye-Young Kim, presents a new skin region extraction method that generates an image-adapted skin colour model and then segments skin areas using the model. The method first detects eyes by using an eye map

and then develops an image-adapted skin colour distribution model based on a skin map generated by reliably selecting true skin samples near the detected eyes. All skin areas over the entire image are then segmented with the generated skin model. While most of the existing skin detection methods use some pre-defined colour model, their skin model is adaptively constructed from each test image online so that it can overcome fundamental difficulties in extracting skin areas. Experimental results are given that their skin extraction method shows better results than other existing approaches.

The sixth paper, 'Categorising texts more accurately with field association terms', by Tshering Cigay Dorji, proposes a new text classification methodology based on field association terms – sets of terms that identify specific document fields. The methodology is compared against Naïve Bayes, kNN, Centroid-based classifier and SVM on a closed dataset of 3180 documents from Wikipedia dumps and an open dataset of 9449 documents from Reuters RCV1 Corpus, 20-Newsgroup and 4-Universities datasets. As expected, the performance of all classifiers was better in the closed dataset. With open dataset, the new method outperformed the other algorithms with a precision of 97% compared with Centroid-based 85%, Naïve Bayes 78%, kNN 48% and SVM 42%.

The seventh paper, 'An analysis of customer retention rates by time series data mining', by Masaki Tanaka and Setsuya Kurahashi, proposes a framework for time series data mining focused on the time order of a purchase history. The purpose of this study is to acquire the primary reason for a long-term relationship between an automobile dealer and a customer, using analyses of relationships between automobile maintenance records and customer retention rates. The authors attempt to clarify the characteristics of the high retention customers and improve the accuracy of the customer retention predictions as a result of the clustered customer obtained by machine learning. This research is able to show the usefulness of the service science through the application of the engineering methods in the service industry.

The eighth paper, 'Building Chinese field association knowledge base from Wikipedia', by Li Wang, Min Yao, Yuanpeng Zhang, Danmin Qian, Xinyun Geng, Kui Jiang and Jiancheng Dong, aims to build a Chinese FA knowledge base. This new knowledge base is tested through a system that can imitate the process whereby humans recognise the fields by looking at a few special terms. In doing so, a novel approach makes use of the structured knowledge in Chinese Wikipedia. A totally new Chinese FA knowledge base is built, including 115,696 FA terms added into 10 top fields, 110 medium fields and 793 terminal fields. The resulting FA knowledge from this knowledge base is applied to text categorisation in two data collections of different circumstances. The average accuracies, 97.7% and 89%, are both higher than values obtained by SVM. The experimental results and comparison show the presented method of building an FA knowledge base

automatically from Wikipedia is practical for the Chinese language.

The ninth paper, 'The optimal configuration method of software engineer to IT project', by Koji Tanaka, Chikako Morimoto, Yoshikatsu Fujita and Kazuhiko Tsuda, develops a visualisation technique to identify what type of business capability a human resource can exercise by mapping business capabilities, the skills required for the capabilities and the skills a resource possesses. They extracted relationships between business capabilities and required skills from the 'Skill Standards for IT Professionals' documents using Japanese text analysis. These relationships are visualised as a business capability map in a graph structure. Then, based on a questionnaire to determine the skills a human resource has, they mapped human resources on the business capability map. As a result, it became possible to determine the business capabilities and to identify appropriate tasks for each human resource.

The tenth paper, 'The estimate method of the omission of Japanese inquiry texts using an LDA algorithm', by Tomohiko Harada, Kazuhiko Tsuda, Nobuo Suzuki and Yoshikatsu Fujita, focuses on the frequently omitted noun 'B' in the noun phrase 'A NO B' (usually meaning B of A) seen in colloquial style inquiry text, and proposes a method

to predict the omitted noun 'B' from the context and knowledge using topic information. From the results of an evaluation experiment, they confirm that their method improved the prediction accuracy by 11.34% compared with the conventional method and predicted the omitted word with an accuracy of more than 75% using latent Dirichlet allocation (LDA).

The last paper, 'Web-based reading support system: assigning pronunciations to difficult words according to the vocabulary level of individual users', by Shoji Mizobuchi and Kazuaki Ando, proposes a system that helps a user to read a document on the web more easily by assigning pronunciations of difficult words in the document based on the vocabulary level of the user and the difficulties of characters in the document. The vocabulary level of a user and the difficulties of characters are estimated using the item response theory. A simulation was conducted to evaluate the estimation of the user vocabulary level. The results confirmed that a vocabulary level can be estimated reasonably accurately when the user operates the pronunciations of half of the words with difficulties are higher than his or her vocabulary level. The performance of the system was measured in terms of time and data size. The measurement results showed that the system performance was within an acceptable range.