J Inf Process Syst, Vol.13, No.2, pp.197~203, April 2017
https://doi.org/10.3745/JIPS.00.0004

ISSN 1976-913X (Print)
ISSN 2092-805X (Electronic)

EDITORIAL

JOURNAL OF INFORMATION PROCESSING SYSTEMS JIPS

Advances in Algorithm, Multimedia, and Network for Future IT

Jong Hyuk Park*
Editor-in-Chief, *JIPS*

1. Introduction

The *Journal of Information Processing Systems* (*JIPS*) is the official international journal of the Korea Information Processing Society (KIPS). As a leading and multidisciplinary journal, *JIPS* is indexed in ESCI (Emerging Sources Citation Index), SCOPUS, EI COMPENDEX, DOI, DBLP, EBSCO, Google Scholar, and CrossRef. As information processing systems continue to progress at a rapid pace, KIPS is committed to providing researchers and other professionals with the academic information and resources they need to keep abreast of these ongoing developments. *JIPS* aims to be a leading source that enables researchers and professionals all over the world to promote, share, and discuss all of the major research issues and developments in the field of information processing systems and other related fields.

This issue contains 14 peer-reviewed papers, including ones that cover the areas of advanced technologies and applications for systems, communication, image processing, geo-spatial data processing WSNs, platforms and security, artificial intelligence, and an invited paper by Professor Yi Pan and his colleagues. It also includes experience reports, experiments that involve the implementation and application of new theories, and tutorials on state-of-the-art technologies related to information processing systems.

JIPS newly introduced six special sections in 2017 with each of section topics. The purpose of the special sections is to solicit the state-of-the-art researches and original papers on the section topics. Submission for each section starts in every other month and all papers submitted to the special sections will be processed as Fast-track B.

The title of the first special section is "Advanced Technologies, Services, and Applications for Cloud Computing and Big Data." This section aims to solicit original papers on methodologies, models, technologies, systems, services, tools, applications, work in progress, and experiences that are focused on convergence technologies and applications in the areas of cloud computing and big data. The purpose of this special section is to provide a forum that brings academic researchers, engineers

Corresponding Author: Jong Hyuk Park (jhpark1@seoultech.ac.kr)
* Dept. of Computer Science and Engineering, Seoul National University of Science & Technology (SeoulTech), Seoul, Korea (jhpark1@seoultech.ac.kr), http://www.parkjonghyuk.net

working in the industries listed above, and the government together so that they are able to interact with each other and exchange ideas on the topics. Professor Joon-Min Gil of Catholic University of Daegu and Professor Jaehwa Chung of Korea National Open University served as editors for the first section. The tentative publication date for the papers accepted for this section will be in the 2nd quarter of 2017.

The title of the second special section is "Advanced Research on IoT, Cloud Computing, Biotechnology, and Mobile Computing (ICBM)," and Professor Gangman Yi of Dongguk University and Professor Min Choi of Chungbuk University serve as editors for this special section. This section aims soliciting original papers on recent research being carried out in the area of Internet of Things (IoT), cloud computing, biotechnology, and mobile computing. This special section will serve as a great platform that allows researchers in various academic and industrial fields to share their latest research ideas and results, development activities, and emerging industry technologies on IoT, cloud computing, biotechnology, and mobile computing.

The other four special sections will be about to prepare soon with regard to "Advanced Cryptography, Security, and Privacy;" "Deep Learning and Social Computing;" "5G and Future Internet;" and "Blockchain Technologies and Services for FinTech."

2. Related Works

Including an invited paper, this issue published 15 original papers. We would like to introduce their approach and contributions for each of included papers. First, Yu et al. [1] surveyed deep neural network (DNN) technologies in relation the field of bioinformatics with their limitations in terms of data representation, architecture, hyper-parameters, optimization and activation, and overfitting. In this paper, they address the issues and challenges regarding its applications, especially in genomic analysis and medical image analytics. Their analysis suggests directions for DNN technology, such as automation, scalability, individuality, mobility, integration, and intelligence warehousing.

Amghar and Fizazi [2] introduce hybridizing the radial basis function (RBF) neural network and bacterial foraging optimization algorithm (BFOA) scheme for image classification to maximize the classification rate while minimizing the objective function value. Through the performance analysis with an accent on the variation of the number of bacteria in the population, the number of reproduction steps, the number of elimination-dispersal steps and the number of chemotactic steps of bacteria, this paper shows the suggested hybrid approach produced good classifications. Moreover, the proposed approach is found to be very robust and can be clearly prolonged for other optimization problems with the experimental results gained.

The third paper is by Gilani et al. [3] and addresses the issue of traditional wireless network architecture that suffers from mobility management problems caused by the rapid growth of smart devices. They also propose an architecture, named SN-FMIA, for wireless access network based on software-defined network (SDN) and the advantage of network function virtualization (NFV). For rapid access to the Internet services and synchronizes the programmable control plane, this paper establishes five objectives that are to eliminate the intermediate bases (middlebox), to concern NFV, to improve QoE, to converge of the layer-based Internet architecture and to enhance the mobility functions. Finally, Gilani et al. discuss their proposed architecture in the context of three mobility scenarios of service-oriented mobility, user-based mobility, and centralized mobility.

The fourth paper is about the stereo matching technique, which is aimed at obtaining three-dimensional (3D) information from a stereo image pair captured by a stereo camera in computer vision field. Lee and Moon [4] point out the drawbacks of the adaptive census transform (ACT) stereo matching algorithm and propose an improved stereo matching algorithm that not only enhances matching accuracy but that is robust to noise. Based on the existing ACT, their proposed algorithm adopts the truncated absolute difference (TAD) and the multiple sparse windows (MSWs) methods to achieve better matching accuracy and robustness to noise. TAD and MSW enhance the reliability of the matching cost of the sparse window (SW) and to aggregate the matching costs of the adjacent SW to calculate one matching cost. The experimental results show that the proposed algorithm reduces the error rate and is robust to noise compared to the existing ACT.

Benziane and Benyettou [5] propose a decision support system that gets an electronic signature from hand for the purpose of identification/authentication. In order to fulfill objectives, a complete image pre-processing chain, which consists of ROI extraction, grayscale normalization, an anisotropic diffusion filter, and contrast-limited adaptive histogram equalization, is proposed. Their proposed dorsal hand vein biometric system extracts the dorsal veins from the images that were acquired via an infrared device and represents the veins vector in the form of shape descriptors. Based on the descriptors, the classification step is taken place. After classification, optimization decision system settings match the choice of threshold that allows to accept/reject a person, and selection of the most relevant descriptors, to minimize both FAR and FRR errors.

Cho and Choi [6] studied the estimation of fuel consumption mileage using the driving patterns extracted from the digital tachographs (DTGs) big data of commercial vehicles. Instead of using the conventional means of measuring fuel consumption by using the On-Board Diagnostics II (OBD-II) device, they used actual DTG data and OBD-II fuel consumption data. Then, they applied the parallel processing of the Hadoop MapReduce mechanism for the benefit of fast processing to analyze the data correlation between DTG data. Cho and Choi derived the formula of the fuel mileage estimation by regression analysis using 38 driving pattern variables and figures out 8 major variables contribute to the fuel consumption estimation.

Zhang et al. [7] propose a self-adaptive and bidirectional dynamic subset selection (SBDSS) algorithm that can dynamically select the subset size for each calculation point for the field of digital image correlation (DIC), where the selection of the subset size is of great importance to the accuracy. Whereas, a constant subset size is used for computing the entire image, which overlooks the differences among local speckle patterns of the image in the traditional DIC, the SBDSS algorithm varies the subset sizes according to their local speckle patterns, which ensures that every subset size is suitable and optimal. In order to verify the accuracy and adaptability of the SBDSS algorithm, several numerical and laboratory experiments were performed, and images with different speckle distributions, deformations, and noise were calculated by using both the traditional DIC and the proposed algorithm in a numerical experiment.

Benhabib and Fizazi [8] propose generating optimal training data using the multi-objective TRIBES (MO-TRIBES) to improve the performances of the OC-SVM. MO-TRIBES is a parameter-free optimization technique that manages the search space in tribes composed of agents. It makes different behavioral and structural adaptations to minimize the false positive and false negative rates of the OC-SVM. This research has applied the MO-TRIBES/OC-SVM approach to the extraction of interest from satellite images. The results described in their paper suggest that their proposed method outperforms

both OC-SVM and BAGGING/OC-SVM.

Lalani and Doye [9] introduce a method that take the image characteristics for watermark insertion and an optimal solution for the dilemma between robustness and transparency into consideration. First, they designed a fussy interface system (FIS) based on just-noticeable distortion (JND) in order to achieve maximum transparency and robustness. The fuzzy system is based on two inputs, which are the JND matrix of the original image and the actual watermark matrix. Then, they propose a watermark embedding algorithm and a watermark extraction algorithm. Their research achieved a 99.98% retrieval efficiency for an image blurring attack and counterfeits other attacks.

Kim and Hwang [10] suggest a new component for a controller area network (CAN), which has a number of advantages in supporting more accurate controls and in improving the performance and fuel efficiency of a vehicle by drastically reducing the number of wires in a vehicle. Their proposed component can manage the integrated information of each node in the same Bus. They also introduce a new CAN framework that enhances unpredictable transmission delays with respect to real-time messages that should be transmitted within a certain time frame and that enables to get higher priorities by newly defining urgent messages using the new ID region. It also improves Plug and Plug functionality by exploiting dual identifier deployment.

Inspired by the extension of the orthogonal matching pursuit (OMP) technique for block OMP (BOMP), Qi et al. [11] present their work on a new iterative algorithm, called the block backtracking based adaptive orthogonal matching pursuit (BBAOMP) method, for reconstructing block sparse signals. This method first chooses atoms adaptively and then removes some atoms that were incorrectly chosen in the previous step by using the backtracking procedure, which promotes the reconstruction property. Therefore, compared with other existing methods, the BBAOMP method can create some flexibility between computational complexity and reconstruction properties by using the backtracking step. Another advantage of the BBAOMP algorithm is that it can be done without another information of signal sparsity.

Amel and Fizazi [12] look at the Shuffled Frog-Leaping Algorithm (SFLA) technique for image segmentation, which is the most important operation in an image processing system. The SFLA is a memetic meta-heuristic algorithm that is based on frog populations that are searching for food. The authors propose a new method of unsupervised image segmentation based on the SFLA method, which segments an image with the best split according to an objective function, and is applied to different types of images. The advantage of this approach is that it can segment the image with the best split according to an objective function.

Zhang et al. [13] present an improved fragile watermarking method based on a local binary pattern (LBP) for blind tamper location in images. In this method, a binary watermark is generated by the LBP operator, which is often utilized in face identification and texture analysis. In order to guarantee the safety of the proposed algorithm, the Arnold transform and a logistics map are used to scramble the authentication watermark. Then, the least significant bits (LSBs) of original pixels are substituted by the encrypted watermark. Since the authentication data is constructed from the image itself, no original image is needed in tamper detection. The LBP map of the watermarked image is compared to the extracted authentication data to determine whether it is tampered or not.

Baniya and Lee [14] propose an approach for automatic emotion classification based on the rough set (RS) theory. Since the output after rule generation process is classification rules, this approach can be inherently characterized as a kind of categorical approach in emotion recognition. In their proposed

approach, four different sets of music features, representing dynamics, rhythm, spectral, and harmony, are extracted. From each of the four frame-based features, four statistical parameters for condition attributes of mean, variance, skewness, and kurtosis have been extracted. In addition, the inclusion of covariance components of pairwise features is proposed within the same group of features.

Finally, Zhou and Zhao [15] present their research on the power allocation problem to each cognitive user to maximize capacity of the cognitive systems subject to the constraints on the total power of each cognitive user and the interference levels of the primary user. They present a power allocation algorithm based on a variational inequality (VI) problem in cognitive radio networks, and they solve the problem from the perspective of mathematics. The advantage of their proposed algorithm is that there are many kinds of solution for solving the VI problem. Also, their proposed algorithm can improve cognitive system capacity and quickly reach the Nash-equilibrium point.

We would not be able to continue to expand the growth of *JIPS* without the efforts made by these authors. As such, I would like to express my sincere appreciation and gratitude to them for their continued hard work and dedication to *JIPS*. It is my great pleasure to introduce the outcomes of their research to our readers.

3. Conclusions

In this issue, we present 15 important and original papers from around the world. We introduce varied and state-of-the-art topics ranging from deep-learning algorithms to the security problems that exist in various technical environments. However, we first and foremost want to express our gratitude to all of the authors who have contributed to this issue by sharing their valuable research results with us. We also want to sincerely thank all the reviewers who kindly accepted our review invitations. Without their hard work, putting together this high-quality journal would not be possible.

References

[1] N. Yu, Z. Yu, F. Gu, T. Li, X. Tian, and Y. Pan, "Deep learning in genomic and medical image data analysis : challenge and approach," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 204-214, 2017. http://doi.org/10.3745/JIPS.04.0029.

[2] Y. T. Amghar and H. Fizazi, "A hybrid bacterial foraging optimization algorithm and a radial basic function network for image classification," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 215-235, 2017. http://doi.org/10.3745/JIPS.01.0014.

[3] S. M. M. Gilani, T. Hong, Q. Cai, and G. Zhao, "Mobility scenarios into future wireless access network," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 236-255, 2017. http://doi.org/10.3745/JIPS.03.0069.

[4] I. Lee and B. Moon, "An improved stereo matching algorithm with robustness to noise based on adaptive support weight," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 256-267, 2017. http://doi.org/10.3745/JIPS.02.0057.

[5] S. H. Benziane and A. Benyettou, "Dorsal hand vein identification based on binary particle swarm optimization," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 268-284, 2017. http://doi.org/10.3745/JIPS.03.0066.

[6] W. Cho and E. Choi, "DTG big data analysis for fuel consumption estimation," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 285-304, 2017. http://doi.org/10.3745/JIPS.04.0031.

[7] W. Zhang, R. Zhou, and Y. Zou, "Self-adaptive and bidirectional dynamic subset selection algorithm for digital image correlation," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 305-320, 2017. http://doi.org/10.3745/JIPS.02.0056.

[8] W. Benhabib and H. Fizazi, "A multi-objective TRIBES/OC-SVM approach for the extraction of areas of interest from satellite images," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 321-339, 2017. http://doi.org/10.3745/JIPS.02.0054.

[9] S. Lalani and D. D. Doye, "Discrete wavelet transform and a singular value decomposition technique for watermarking based on an adaptive fuzzy inference system," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 340-347, 2017. http://doi.org/10.3745/JIPS.03.0067.

[10] S. Kim and K. Hwang, "Design of real-time CAN framework based on plug and play functionality," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 348-359, 2017. http://doi.org/10.3745/JIPS.03.0071.

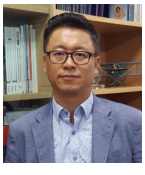
[11] R. Qi, Y. Zhang, and H. Li, "Block sparse signals recovery via block backtracking-based matching pursuit method," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 360-369, 2017. http://doi.org/10.3745/JIPS.04.0030.

[12] T. Amel and H. Fizazi, "Unsupervised segmentation of images based on shuffled frog-leaping algorithm," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 370-384, 2017. http://doi.org/10.3745/JIPS.02.0055.

[13] H. Zhang, C. Wang, and X. Zhou, "Fragile watermarking based on LBP for blind tamper detection in images," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 385-399, 2017. http://doi.org/10.3745/JIPS.03.0070.

[14] B. K. Baniya and J. Lee, "Rough set-based approach for automatic emotion classification of music," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 400-416, 2017. http://doi.org/10.3745/JIPS.04.0032.

[15] M. Y. Zhou and X. H. Zhao, "A power allocation algorithm based on variational inequality problem for cognitive radio networks," *Journal of Information Processing Systems*, vol. 13, no. 2, pp. 417-427, 2017. http://doi.org/10.3745/JIPS.03.0068.



James J. (Jong Hyuk) Park http://orcid.org/0000-0003-1831-0309

He received Ph.D. degrees in Graduate School of Information Security from Korea University, Korea and Graduate School of Human Sciences from Waseda University, Japan. From December 2002 to July 2007, Dr. Park had been a research scientist of R&D Institute, Hanwha S&C Co., Ltd., Korea. From September 2007 to August 2009, he had been a professor at the Department of Computer Science and Engineering, Kyungnam University, Korea. He is now a professor at the Department of Computer Science and Engineering and Department of Interdisciplinary Bio IT Materials, Seoul National University of Science and Technology (SeoulTech), Korea. Dr. Park has published about 200 research papers in international journals and conferences. He has been serving as chairs, program committee, or organizing committee chair for many international conferences and workshops. He is a founding steering chair of some international conferences—MUE, FutureTech, CSA, UCAWSN, etc. He is editor-in-chief of *Human-centric Computing and Information Sciences (HCIS)* by Springer,

The Journal of Information Processing Systems (JIPS) by KIPS, and *Journal of Convergence (JoC)* by KIPS CSWRG. He is Associate Editor / Editor of 14 international journals including 8 journals indexed by SCI(E). In addition, he has been serving as a Guest Editor for international journals by some publishers: Springer, Elsevier, Wiley, Oxford University press, Hindawi, Emerald, Inderscience. His research interests include security and digital forensics, human-centric ubiquitous computing, context awareness, multimedia services, etc. He got the best paper awards from ISA-08 and ITCS-11 conferences and the outstanding leadership awards from IEEE HPCC-09, ICA3PP-10, IEE ISPA-11, and PDCAT-11. Furthermore, he got the outstanding research awards from the SeoulTech in 2014. Dr. Park's research interests include human-centric ubiquitous computing, vehicular cloud computing, information security, digital forensics, secure communications, multimedia computing, etc. He is a member of the IEEE, IEEE Computer Society, KIPS, and KMMS.