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Security, Privacy, and Efficiency of Sustainable Computing for Future Smart Cities

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Abstract
Sustainable computing is a rapidly expanding field of research covering the fields of multidisciplinary engineering. With the rapid adoption of Internet of Things (IoT) devices, issues such as security, privacy, efficiency, and green computing infrastructure are increasing day by day. To achieve a sustainable computing ecosystem for future smart cities, it is important to take into account their entire life cycle from design and manufacturing to recycling and disposal as well as their wider impact on humans and the places around them. The energy efficiency aspects of the computing system range from electronic circuits to applications for systems covering small IoT devices up to large data centers. This editorial focuses on the security, privacy, and efficiency of sustainable computing for future smart cities. This issue accepted 17 articles after a rigorous review process.

Keywords
Privacy, Security, Smart City, Sustainable Computing

1. Introduction

Security and privacy issues are increasing rapidly with significant advancements in communication technologies. The current network architecture is designed with various protocols, and solutions have been proposed to meet the different requirements of users such as mobility and better content distribution. Internet of Things (IoT), mobile, and wireless smart devices have become active users, contributing to the communication process without human intervention. Emerging technologies refer to the power of data processing in the cloud with greener and sustainable computing infrastructure. Sustainable computing is a set of principles encompassing a range of policies, procedures, programs, and attitudes that span the entire length and breadth of any use of information technology. This issue focuses on novel work on security, privacy, and efficiency of sustainable computing for future smart cities.

The *Journal of Information Processing Systems* (JIPS) is the official international journal with indices such as ESCI, SCOPUS, EiCompendex, DOI, DBLP, EBSCO, and Google Scholar and is published by the Korean Information Processing Society (KIPS). There are four divisions: Computer System and Theory; Multimedia Systems and Graphics; Communication Systems and Security; and Information Systems and Application. This issue includes 17 peer-reviewed papers after a rigorous review process.

2. Security, Privacy, and Efficiency of Sustainable Computing for Future Smart Cities

Maity et al. [1] presented a multimodal recognition system for facial video surveillance using a biometric data source. They train the model using deep learning to learn features after extracting multiple biometric modalities from a single data source. To extract robust, non-redundant features automatically, they train supervised denoising auto-encoders.

Hu and Feng [2] proposed an improved fusion method of segmentation of the regions for the weighted density constraints of the two images in order to analyze the characteristics of the multifocal images. To get the initial fusion image quickly, they presented the improved static wavelet. Their experimental results have shown that the image processed by the proposed method will not lose definition and can help avoid the selection of complex fusion rules.

Koo et al. [3] designed a secure operating system architecture for unmanned aerial vehicles to protect against root exploits. The proposed system resists loss of connection resulting in loss of control, and it is able to use common applications based on Linux. They used a virtualized microkernel on the Linux operating system to isolate the communication roles and prevent the exploitation of the root.

Wang et al. [4] proposed an image improvement method based on bidirectional scattering to smoothen the flat region or the isolated noise region and refine the edge region in different types of defect images on aviation composites. The experimental results have shown that the proposed method improves the edge of the image and its contrast with other models.

Park and Huh [5] proposed an information security risk management model by analyzing the composition and weight of security control as well as the characteristics and corresponding service environment. They assessed the security cost allocation strategies based on the security vulnerability measure that takes into account the weight of security.

Zhou and Shan [6] presented a data aggregation method that preserves confidentiality and saves energy to reduce communication costs and preserve sensitive data. They improved the construction phase of the aggregation tree and the cutting phase and increased the data confirmation mechanism. They performed an experimental analysis on the basis of various metrics, and the results showed the effectiveness of the proposed model.

Ni et al. [7] presented a new system architecture to solve the problem of disclosure of sensitive information with the k-nearest neighbor query, dummy location technique, or data interfering in the location-based services. The proposed model used geographic coding technology to protect the confidentiality of location-based services. The results of the simulation have shown that the model offers acceleration of about 10 times compared to the conventional approach.

Kim et al. [8] proposed a structure of the cluster cell counting algorithm for cell analysis in order to solve the problem of reliable cell counting within a cluster during cell counting by applying the transformation distance and the watershed method. The proposed algorithm can confirm the cluster count's accuracy of 93%, which is higher than that of existing algorithms.

Xu et al. [9] proposed a basic Rodrigues rotation method to solve the problem of converting the coordinates of point clouds of non-directional scanners. To determine the scan coordinates of the feature points, they used the manual selection method.

Hanine and Benlahmar [10] focused on balancing the workload between virtual machines in cloud

computing to ensure better quality of service and maximize the usage resources provided. They proposed an improved version of the simulated annealing meta-heuristic in order to provide the appropriate task distribution to virtual machines.

Zhao and Jiang [11] proposed an adaptive algorithm for the problem of blind signal processing based on the gradient optimization criterion. The authors deduced a family of parametric generalized distribution functions adapting to various marginal densities.

Wu et al. [12] presented a depth extraction model and a passive telemetry method based on a monocular vision system to measure the distance of an object placed on a horizontal plane using a smartphone. They combined the corner detection method proposed by Andreas Geiger and the cornerSubPix function provided by OpenCV to extract the sub-pixel corners. The experimental results have shown that the scope by the proposed method has higher accuracy than others based on the binocular vision system.

Park and Lee [13] proposed a class labeling method that can be used in the output layer of a deep neural network model by building a knowledge model from information on the major lesions defined in related standards for capsule endoscopy. The proposed method allows the design of a systematic learning model by labeling detailed classes through the differentiation of similar characteristics.

Wang and Yang [14] presented a scheme for obtaining an entropy-weighted conceptual network with degree of inclusion and similarity distance for the large size of formal contexts and their complicated derivation operators. The proposed method aims to calculate the combined weights by merging the degree of inclusion and the degree of entropy between two concepts.

Ahn and Im [15] proposed a more efficient approach to reducing the size of 2-hop labels to overcome the limitations of the existing 2-hop labeling schemes, generating huge label sizes at 2 jumps because they only take into account the local characteristics such as degrees. They suggested a linear combination to use local and global characteristics. The experimental results have shown that the proposed approach generates smaller labels than the existing approaches.

Wang et al. [16] proposed an improved algorithm for searching for symbiotic organisms with a mixed strategy based on the adaptive constraint method. The proposed method has improved the use of the optimal individual to accelerate the speed of convergence and search capabilities.

Jang et al. [17] presented a character extraction method based on the aspect ratio of banknotes and a character recognition method based on CNN. They designed and compared four types of CNN models and determined the best model for serial number recognition. The experimental results showed that the recognition accuracy of each character was 99.85%.

3. Conclusion

This issue features 17 high-quality articles after a rigorous review process. It publishes articles on the following: contributions to theoretical research that present new techniques, concepts, or analyses; experience reports; experiments involving the implementation and application of new theories; and tutorials on state-of-the-art technologies related to cloud computing and big data for future smart cities.

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