ICT-Based Wireless Personal Computing

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Information and communications technologies (ICT)-based wireless personal computing has created increasing interest in convergence technology-based personal services, in which personal equipment is combined with wireless network-based services. Smart services, in which convergence technology services and hybrid peer-to-peer, personal environment network technology plus wireless network information technology are combined, are future-oriented. With the emergence of the smart mobile age, personal users can enjoy a lifestyle that uses content, such as information recommendation and personal services, based on various applications in smart IoT devices. This special issue introduces selected research papers by the authors who submitted them. This issue includes trends in ICT-based wireless personal computing, including digital convergence, hybrid networking systems, big data mining, interactive mobile applications, cloud services, secure data transmission, P2P network architectures, hybrid wireless protocols, index structures, multi-channel protocols, crowdsourcing, future communications systems, network architectures, personal computing, short URL generation, and multicasting communications.

The paper by Jeong and Shin [1] proposes an efficient access reduction scheme for big data based on total probability theory. Big data collected from a wide variety of areas shows a little variation in information search processing time, depending on the type and size of data. This study is on the reduction approach of divide-and-conquer; that is, it distinguishes all the attributes of data so as to minimize the data to improve the efficiency of data access based on the probability values within the big data group. The paper by Jung et al. [2] presents efficient malicious packet capture through an advanced

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DNS sinkhole. This study analyzes the limitations of a current DNS sinkhole packet collection program on a server. The system makes it possible to collect more information on malicious packets by collecting an average of 5.3 malicious packets per source IP. The study results are expected to be used in stopping malicious bots, using analysis of the behavior of malicious packets.

The paper by Kang and Hyong [3] presents changes in electromyographic activity of lumbar paraspinal muscles according to the type of inverted spinal traction. The proposed method obtains basic data for the establishment of inverted spinal traction (IST) protocols and the development of programmed devices by using electromyographic signals from the lumbar paraspinal muscles. The paper by Lee et al. [4] proposes density- and frequency-aware cluster identification for spatio-temporal sequence data. This study identifies three types of cluster: high-density and high-frequency clusters, high-density and low-frequency clusters, and low-density and high-frequency clusters. The proposed method is expected to be useful in identifying important regions that are crowded with moving entities having mobile wireless devices, or through which entities are frequently passing.

The paper by Chae and Cho [5] suggests a user authentication algorithm guaranteeing reusability of the biometric data in a BioPKI system. This study is an algorithm that is reusable, even though a user's biometric data are leaked by an attacker after generating and storing reusable biometric data in secret-sharing schemes, according to the user's input sequence, applying it to the BioPKI system. User authentication is performed with biometric data input derivation numbers, strengthening the conventional distributed algorithm. The paper by Jin et al. [6] looks at the effects of consumer characteristics on information-search behavior in a wireless mobile social networking services using structural equation model (SEM) analysis. The enterprises should distinguish the effects of consumers' characteristics on customer participation and information-search behavior in the marketing activities on a mobile social network. This study aims to figure out the laws of consumers' information-search behavior on the wireless mobile social internet, and applies some suggestions for enterprises to explore mobile social internet marketing.

The paper by Kim and Kim [7] proposes an analytical hierarchy process (AHP)-based multi-channel media access control (MAC) protocol in the Internet of Things (IoT) ecosystem. The IoT ecosystem is a basic concept of IoT services and technologies, and this leads to the creation of new types of applications. This study is an AHP-based network interface and channel-selection algorithm for multi-channel MAC protocols in the IoT ecosystem that takes into account a multitude of decision factors, such as expected channel condition, latency, and frame reception ratio. The paper by Kim and Jung [8] presents a data transmission and network architecture in long-range low-power sensor networks for the IoT. This study is on a network and data transmission architecture for long-range sensor networks. The proposed network architecture is based on one machine-to-machine IoT standard. The gateway computes the waiting time in the system and reports the status information of the system to the network server. The network server balances traffic load in a bottleneck by creating a clone of the gateway.

The paper by Choi et al. [9] suggests puzzle-based algorithm learning (PBAL) to cultivate computational thinking. This study develops PBAL, including well-designed puzzles for informatics-gifted students to verify improvements in learners' computational thinking (CT). The research results show that puzzle-based algorithm learning has better effects on improving CT competency, compared to the traditional algorithm learning method. The paper by Lee [10] proposes fast k-nearest neighbor searching static objects. This study provides an efficient algorithm to search k-nearest neighbors for static objects.

Since locations of static objects are known in advance and are not changed, most of the existing solutions build a kd-tree in preprocessing and search the k-nearest neighbors by using it. The proposed method is to build in advance the k-nearest neighbors of each static object during preprocessing.

The paper by Yoo and Chung [11] introduces a PHR-based diabetes index service model using life behavior analysis. The suggested model analyzes the correlation of factors related to diabetes through a multivariate analysis algorithm according to medical data. Significant related factors, classified as dietary life, exercise, and others, were extracted. The PHR-based diabetes index service model using life behavior analysis enables provision of a customized diabetes index service beyond the mere delivery of information. The paper by Kim and Baek [12] proposes a study on ubiquitous environments based on the animal and plant management system in a greenhouse. The developing ubiquitous sensor network system sends an alarm message to users who have portable devices, such as a mobile smart phone, to detect the growth of plants in a state farm's greenhouse.

The paper by Lee et al. [13] introduces an analysis of factors affecting achievements in maker programming education in the age of wireless communications. This study examines the factors affecting software education achievement before implementation of the curriculum, so that the revised curriculum can be efficiently established in schools. The paper by Kim and Lee [14] presents flocking in interpretation with visual art design principles. The proposed method interprets flocking, which is usually applied to engineering, in terms of the design elements in visual art, including unity, diversity, and rhythm. This study provides a way to actualize flocking through variable control and user interactions that consist of entity behavior rules of separation, cohesion, and arrangement, and shows that elements such as diversity, unity, and rhythm are included in flocking.

The paper by Prabha and Kumar [15] introduces an efficient image contrast enhancement algorithm using a genetic algorithm and a fuzzy intensification operator. The proposed method improves the visibility information of an image by manipulating its intensity information. Results revealed that the proposed contrast enhancement technique performs better than previous techniques at very low to very high levels of distortion. The paper by Han et al. [16] introduces a secure and efficient vehicle-to-vehicle authentication method in heavy traffic environments. This study is a protocol that accelerates message processing by sending a low data volume for communications in areas of heavy traffic, and it blocks replay attacks by checking timestamps. The present findings will be conducive to more secure vehicular communications, especially in urban areas of heavy traffic, as well as better privacy protection and a safer vehicular environment.

The paper by Kim and Chung [17] proposes a depression index service using knowledge-based crowdsourcing in smart health. This study provides an index suitable to the context of each user by using knowledge-based crowdsourcing within a smart health platform to compare actual users with similar users and to predict depression levels. The knowledge-based CES-D matrix is constructed based on highly reliable data determined from context information within the smart health system. The paper by Mun and Li [18] introduces a secure short URL-generation method that recognizes the risk posed by the target URL. The service provider of a short URL monitors the risk of the target URL page for the generated short URL and decides whether to provide the service. Application of verification-based technology to utilize the short URL is essential in the existing system that generates the short link only with input information in a short message service using the short URL frequently.

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