Special Issue: Infrastructures and Services for Multimedia

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Welcome to the special issue of *Multimedia Tools and Applications* on “Infrastructures and Services for Multimedia.” This special issue contains a collection of papers that explore the following topics:

- Innovative Design Methodology for Multimedia Services
- Optimization, Automation, and Control for Multimedia Infrastructure
- System and Network Engineering Technology
- Architectural Design and Infrastructures Theory
- Artificial Intelligent Methodologies for Convergence Information
- Information Fusion Methods and Architectures for Sensor Networks
- Detection/Classification Methods
- Distributed Sensor Networks—Networking/Caching Issues
- Managing Resource Constraints for Infrastructures
- Cooperative Signal Algorithms for Sensor Networks
- Convergence Multimedia Service Systems
- Information Technology for Infrastructures Multimedia
- Sensor, Wireless Technology and Embedded System on Multimedia

A brief description of each paper follows.

The paper by Choi et al. [1] details how to strengthen security awareness programs based on an RFID access control system for inside information leakage prevention. For this purpose,

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this study proposes a security awareness program that improves security levels by establishing security policies for users who have access to important information as well as by implementing continuous training to prevent sensitive information leakage in specific organizations or enterprises. The proposed security awareness program can detect violations in physical/logical security policies, leading to positive effects on user security awareness as well as improvements in job processing procedures through additional training related to warning message displays and violated security policies.

The paper by Chung et al. [6] proposes a medical information service system that monitors the human body for u-healthcare. One of the key features of this system is the selection technique. If the user selects a specific part of the human body in the 3D viewer, the system provides detailed medical information about all diseases associated with the selected body part. The 3D viewer has the advantage of being able to view the structure of the human body realistically and intuitively. The proposed system can also prevent diseases in advance and provide answers to many questions concerning disease-related symptoms. The 3D anatomical model is modeled to resemble the actual human body by separating the skeleton, muscles, internal organs, and skin. In addition, the proposed system provides necessary medical knowledge and information related to diseases affecting specific parts of the 3D anatomical model selected by the user. Therefore, the proposed medical information service system is a realistic and effective system for u-healthcare for the general public.

The paper by Whangbo et al. [2] introduces an efficient method for dividing adjacent circular-shaped objects into a single object. The authors propose a more accurate way of determining the boundaries of adjacent objects based on the premise that the objects are circular in shape. The proposed method starts by detecting the boundaries of the final single-object area based on the adjacent information of the initially detected areas. For segmentation into distinctive objects, the final segmentation object is determined in the following three steps: detection of the ROI, determination of the candidate segmentation points, and the creation of a segmentation boundary. The paper by Baik et al. [11] presents a digital image super-resolution using adaptive interpolation based on a Gaussian function. The authors develop an efficient SR scheme that constructs an HR image of high visual quality from a given LR source image. Proposed technique revolves around the idea of the computation of unknown pixels from known pixels in the neighborhood by weighted approximation. Their proposed method is very simple computationally and resembles classic interpolation techniques, except they are of higher quality. Applications that require a real-time response can easily incorporate it.

The paper by Lee et al. [4] proposes a decision-supporting method for chronic disease patients based on a mining frequent pattern tree. The proposed method is beneficial for pain-related decision making by chronic disease-suffering patients based on a frequent pattern tree for the preprocessing, extraction, and mining of conventional medical data. By utilizing basic information from patients, who are the foundation of pain-related decision making, normalization can be applied to the frequent pattern tree of data mining. The pain forecast supports pain-related decision making by extracting similar patient information in a frequent pattern tree based on electronic medical records. The paper by Kim et al. [8] shows the design and implementation of a start-stop system algorithm for an aftermarket smart key system that uses the OBD-II interface. Comparison of the RTT of the data signal with the SAE benchmark after installing the start-stop system in the vehicle (and measuring RTT time) shows that the proposed start-stop system satisfies every time restriction. Moreover, the proposed start-stop system adopts the OBD-II interface to reduce the time needed to install the system as well as increase reusability by standardizing the interface with the vehicle.

The paper by Song et al. [13] proposes a method for speeding up data collection on a digital crime using mobile devices. Pattern search based on a table related to criminal charges has the advantage of immediately and more rapidly providing investigators with necessary information. The proposed method rapidly collects data at a crime scene based on the type of criminal charge by accounting for each feature of the software, thereby providing rapid results through a pattern search. There is also a range of options available to parallel routines. Single or multiple options can be utilized depending on the investigator's requirements. The paper by Kim et al. [5] presents an analytic approach to estimate the shear resistance force of a retaining wall consisting of fill materials and steel frames. Compared with the experimental results, the proposed approach, which uses DEM, contains the process of the natural sedimentary state can predict the shear behavior of a retaining wall with a cellular form. They also demonstrate that the internal friction of the fill materials as well as the overburdening load are the major factors affecting the shear behavior of the retaining wall.

The paper by Lim et al. [10] proposes a composite gene selection method using both unsupervised and supervised gene selection processes. For unsupervised gene selection, the method uses the threshold number of misclassification score to select the appropriate number of top-ranked genes for microarray data analysis. This method also uses two gene selection steps for microarray data analysis; the score is used in the first gene selection step while the NADM method is used in the second gene selection step. According to the results, the top-ranked 93 colon cancer and 143 leukemia genes having ≤ 14 (colon cancer) and ≤ 13 (leukemia) scores were selected in the first gene selection step. When the lowest-ranked four colon cancer and 13 leukemia genes were used as inputs the performance accuracies were 98.39 and 100 % respectively when the authors used inputs as lowest-ranked four colon cancer and 13 leukemia genes.

The paper by Park et al. [12] presents a performance analysis of an LTE antenna for use in an advanced bus information system. In the proposed BIS system, the BIS center controls bus operation information by monitoring situations in real time and manages the overall operations of public transportation. In particular, wireless communication technology is essential for collecting bus location and operation information, and its real-time performance should be consistently accurate and stable without any faults regardless of bus operation region, traffic conditions, or bus speed. For this purpose, a circularly polarized LTE antenna for advanced BIS, which has been dramatically developed in recent years, is designed. In the designed antenna, the author adopted LTE for Antenna and applied a particle swarm optimization method based on HFSS for achieving it. The aim of this paper is to design and fabricate a CPW-fed rectangular LTE antenna as well as study the effects of antenna length, width, substrate parameters, relative dielectric constant, and substrate thickness on radiation parameters of bandwidth.

The paper by Kim et al. [7] shows the design of a configurable I/O pin control block for improving reusability of multimedia SoC platforms. The authors propose an automated design scheme for the generic pin control block based on a formalized text process using our proposed auto-generator. Using this formalized text process, designers can specify an arbitrary generic pin control block with a minimal amount of description effort. In addition, designers can rapidly obtain RTL blocks using the automated procedure. Further, this procedure is beneficial for the efficiency and reliability of the design of the generic pin control block. Proper management of a formalized text allows for a completely configurable design in multimedia SoC platforms. These platforms demonstrate validity and reusability with respect to the design methodology of the generic pin control block. Experimental results have shown that it is possible to describe various generic pin control architectures using the proposed description format.

The paper by Lee et al. [9] proposes a multi-objective hybrid genetic algorithm combined with fuzzy logic controller for the efficient elimination of multi-objective reverse logistics network problems. The proposed method clears each objective function (i.e., total costs and total delivery tardiness), computational time and number of Pareto solutions with LINGO, priority-based GA with adaptive weight approach, and mo-hGA proposed with numerical examples. The paper compares the percentage gap of LINGO, a priority-based encoding method, with those of the adaptive weight approach and multi-objective hybrid genetic algorithm. The authors also use the percentage gaps between the optimum and heuristic solutions. We compared LINGO fl, GAs fl, and Pareto solutions at the same time. Besides, the authors show the efficiency of computational time. The paper by Han et al. [3] presents a SaaS application that integrates and manages the contents of public organizations or libraries. Specifically, the paper outlines a SaaS method and content framework for a literature content service that utilizes the metadata encoding and transmission standard schema and the metadata object description schema as standard formats. Further, the study explains SaaS-based technology for literature content integration and presents a standard metadata framework technology.

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