Editorial
Mobile Sensing and Data Management for Sensor Networks 2014

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Recent years have witnessed the rapid development of the Internet of Things, sensor cloud, mobile Internet, more and more mobile devices, such as smart phones, Google glasses, and RFID, plus deployed various sensor networks, which can sense and collect sensory data anytime and anywhere. We are moving toward the era of worldwide sensor networks, in which a huge amount of heterogeneous sensory data will be created every day and require modern data management techniques. In this background, efficiently gathering, sharing, and integrating these spatial temporal data and then mining valuable knowledge in time are a big challenge in this context. This special issue is intended to provide a forum for presenting, exchanging, and discussing the most recent advances in sensing and data management techniques.

In hybrid wired-wireless networks, network congestions and wireless link errors are two main causes for data transmitting errors. In this paper "ECN-Based Congestion Probability Prediction over Hybrid Wired-Wireless Networks," the authors proposed a method to determine the reasons of packet losses in hybrid wired-wireless networks and calculate the probability of network congestion. The authors also discuss how to improve existing TCP variants with their proposed method.

The paper "Energy-Efficient Scheduling for Mobile Sensors Using Connection Graphs in a Hybrid Wireless Sensor Network with Obstacles" investigates the scheduling problem of mobile sensors in a hybrid wireless sensor network with obstacles. A big challenge to this issue is how to efficiently schedule the mobile sensor to find an obstacle-avoiding

shortest path. To address this issue, the authors propose an efficient scheduling method based on connection graphs. They divide the region of network into grid cells with the same size. The search space of the shortest path is restricted to the connection graphs composed of some grid cells.

It is very important to timely differentiate critical/noncritical nodes in mobile ad hoc and sensor networks (MAHSNs). In this paper "Formal Specification and Validation of a Localized Algorithm for Segregation of Critical/Noncritical Nodes in MAHSNs," the authors present a localized algorithm to distinguish critical/noncritical nodes. Each node builds a k-hop connection list. Based on the list, the proposed algorithm marks a node as critical if its k-hop neighbors become disconnected without the node.

Data security and privacy protection will have significant impact on the development of the cloud technology. In this paper "Data Security and Privacy in Cloud Computing," the authors investigate different security techniques and challenges for protecting data in the cloud. They make a comparative analysis of the existing research work regarding the data security and privacy protection techniques used in the cloud computing.

In wireless sensor networks, localization is a very important issue. In nonline of sight (NLOS) environment, the localization accuracy decreases significantly using traditional methods based on received signal strength (RSS). In this paper "RSS Localization Algorithm Based on Nonline of Sight Identification for Wireless Sensor Network," the authors

propose an RSS based localization algorithm which does not need the parameters of the NLOS in prior.

The energy state of an energy-harvesting sensor changes dramatically in energy-harvesting wireless sensor networks (EH-WSNs). In this paper "Adaptive Quantization for Distributed Estimation in Energy-Harvesting Wireless Sensor Networks: A Game-Theoretic Approach," the authors investigate the crucial issue of energy harvesting and the problem of parameter estimation in EH-WSNs is formulated as a game of complete and perfect information.

How to organize and query the big sensing data generated continuously in the Internet of Things is a big challenge. The paper "Organizing and Querying the Big Sensing Data with Event-Linked Network in the Internet of Things" studies the organization of big sensing data and several different types of queries on the event-linked network are explored.

The fingerprint positioning based on received signal strength is widely used in many applications. The localization precision and the survey workload are affected by sampling cell size directly. In the paper "Optimization of Sampling Cell Size for Fingerprint Positioning," the authors propose a sampling cell size optimization method which can decrease the survey overhead while maintaining the precision.

The GPS sensors in mobile phones make location based service (LBS) applicable. However, LBS brings the issue of location privacy to mobile users. In the paper "A Voronoi-Based Location Privacy-Preserving Method for Continuous Query in LBS," the authors put forward a location privacy-preserving method which is based on Voronoi graph partition on road networks. This algorithm can work out precise results and also solve the uneven distribution problem in SpaceTwist.

Reliable and efficient localization is needed for robots to carry out given tasks. In the paper "A Location Estimation Algorithm Based on RSSI Vector Similarity Degree," the authors present a localization algorithm based on the quadrilateral location unit by using more accurate RSSI and range. Moreover, they introduce the generalized inverse to solve the coordinates of nodes.

Different senor networks are likely to cause interference to neighbor networks since different senor network topologies are likely to exist in the same area. How to detect, determine, and locate the unknown wireless topologies in a given geographical region is a big challenge. In the paper "RSSI and LQI Data Clustering Techniques to Determine the Number of Nodes in Wireless Sensor Networks," the authors apply three different clustering methods to determine the number of active sensor nodes in the unknown wireless topology.

A lot of indoor location based services (LBSs) are developing rapidly and efficient queries based on semantic-constraint in indoor spaces are a big challenge for supporting and boosting LBSs. In the paper "A Semantic-Based Indexing for Indoor Moving Objects," the authors present an indoor semantic-based model and a new semantic-based index. Besides, they develop efficient algorithms for two new queries.

Energy consumption is a key factor for designing the underwater acoustic sensor networks (UWASNs). In the paper "Balance Transmission Mechanism in Underwater Acoustic Sensor Networks," a balance transmission mechanism is proposed. Besides, the authors give detailed theoretical analysis to evaluate the optimum energy levels in the UWASNs.

Possibilistic c-means clustering algorithm (PCM) is difficult to cluster incomplete big sensor data in real time because of the existence of many missing values and huge amount of data. In the paper "A Distributed Weighted Possibilistic c-Means Algorithm for Clustering Incomplete Big Sensor Data," the authors propose a distributed weighted possibilistic c-means clustering algorithm (DWPCM). The experimental results show that the algorithm produces an appropriate partition efficiently for incomplete big sensor data.

In battery-powered wireless sensor networks, data transmission consumes more energy than any other behaviors. In this paper "A Distributed Energy Optimized Routing Using Virtual Potential Field in Wireless Sensor Networks," the authors design a distributed energy optimized routing algorithm to extend the network lifespan. Their method forces all packets to move toward the sink meanwhile to achieve energy efficiency and energy balance simultaneously.

In wireless sensor networks, database applications require sensor nodes to collect data in specific target regions. In this paper "Design and Implementation of Spatial Operators and Energy-Efficient Query Processing Strategy in Wireless Sensor Network Database System," the authors describe spatial operations and energy-efficient query processing methods implemented in their sensor network database system. Their system can specify the target space of interest easily and greatly reduce the cost of calculating the target spaces.

In order to improve the efficiency of the broadcast service in vehicular ad hoc networks, in this paper "TDMA-Based Control Channel Access for IEEE 802.11p in VANETs," the authors propose an TDMA-based channel access scheme to reduce the rate of transmission collisions and to improve the availability of time slots for the control channel. Their method adjusts mainly disjoint sets of time slots to vehicles moving oppositely and to the left and right slot frames. In addition, the location information of a node is used for allocating the time slot.

For the resource constrained WSNs, the security issue is very critical due to wireless communication, energy limitation, and computation constraint. The path-based denial of service attacks impact the network maintenance. In this paper "A Novel Method Defends against the Path-Based DoS for Wireless Sensor Network," the authors detect the malicious behavior at the base station through a combination of triple exponential smoothing and Markov chain.

In vehicular networks, it is a big challenge to efficiently provide multimedia services with the constraints of limited resources, high mobility, opportunistic contact, and service time requirements. In this paper "Evolutionary Game Theoretic Modeling and Repetition of Media Distributed Shared in P2P-Based VANET," the authors design a set of methods to avoid the disadvantage of P2P system appearing in VANET. An evolutionary game-based veracity (EGV) game model is proposed to guarantee the multimedia service share veracity of all vehicles.

In the researches and the applications of WSNs, an important problem is the wireless sensor deployment. In this paper "3D Self-Deployment Algorithm in Mobile Wireless Sensor Networks," the authors propose a 3D autonomous deployment method which can guarantee network connectivity and balance the node distribution.

On the modern smartphones, automatic handoff is important for making full exploitation of these accessible technologies due to complementary characteristics of wireless networks. In this paper "Adaptive Heterogeneous Network Handoff of Smartphone Based on the Closed Control Loop," the authors analyze the closed loop handoff model and propose a model on smartphone switching heterogeneous wireless networks.

On the Internet of Things, it is important to use information effectively and to drive entities automatically. In this paper "Ontologies for the Transactions on IoT," the authors describe an information processing framework which represents the entities of semantic web services and automatically creates service sequences. On the basis of some ontologies proposed, the framework can ensure the effective management and control of information during the transaction.
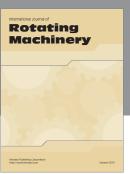
It is important that there is effective allocation strategy to balance energy consumption for wireless sensor networks. In this paper "A Distributed Task Allocation Strategy for Collaborative Applications in Cluster-Based Wireless Sensor Networks," the authors propose a distributed task allocation strategy in which sensor nodes are classified depending on the estimated service abilities. The allocation of complex tasks composes two steps: the first is allocation to several clusters and the second step is scheduling on collaborative cluster members.

Sensing RFID data faces some challenges with the requirement of integration of multiple sensors into active radio frequency identification system. In this paper "Management of Sensor-Related Data Based on Virtual TEDS in Sensing RFID System," the authors propose a virtual description method based on Transducer Electronic Data Sheet to improve interoperability and compatibility of the sensing RFID data. In addition, the authors propose a data table storage mode and analyze the operational mechanism and procedure of the sensor sampling system.
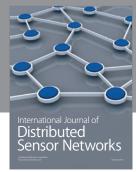
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