Editorial

Mobile Intelligence Assisted by Data Analytics and Cognitive Computing

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We are entering an era of big data analysis and cognitive computing. This trendy movement is observed by the pervasive use of mobile phones, storage and cloud computing, revival of artificial intelligence in practice, extended supercomputer applications, and widespread deployment of mobile devices. Although mobile devices have emerged with a great potential to change our life especially with wireless communications and mobile computing, data analytics and cognitive computing will make it possible to understand what is happening in the world more deeply.

Therefore, data analytics and cognitive computing are significant for mobile intelligence to meet many technical challenges and problems that need to be addressed to realize this potential, such as big mobile data generation and integration of multiple data sources and types. Furthermore, the mobile ecosystems have to be upgraded with new capabilities such as machine learning, data analytics, and cognitive power for providing human intelligence.

This special issue aims to explore recent advances and disseminate state-of-the-art research related to mobile intelligence on designing, building, and deploying novel technologies, to enable intelligent mobile services and applications. The response to our call for papers on this special issue was satisfactory; we finally accept 14 excellent articles covering various aspects of mobile intelligence.

In the article “Intelligent Healthcare Systems Assisted by Data Analytics and Mobile Computing,” the authors present a comprehensive system design for intelligent healthcare systems assisted by data analytics and mobile computing, which consists of the data collection layer, the data management layer, and the service layer. It also introduces some representative applications based on the proposed scheme, which have been proved or demonstrated to be able to provide more intelligent, professional, and personalized healthcare services.

In the article “Performance Analysis of Location-Aware Grid-Based Hierarchical Routing Protocol for Mobile Ad Hoc Networks”, the performance of a hierarchical routing protocol called Location-aware Grid-based Hierarchical Routing (LGHR) for mobile ad hoc networks (MANETs) is evaluated. In LGHR, the network is divided into nonoverlapping zones and each zone is then further divided into smaller grids.

For enhancing the femtocell capacity and mitigating both cross-tier and intratier interference in a single step, the article “Cognitive-Empowered Femtocells: An Intelligent Paradigm for Femtocell Networks” proposes a novel framework of interference management by way of channel measurement and dynamic spectrum sensing for femtocell networks, called cognitive-empowered femtocells (CEF). With the proposed framework, each CEF base station (BS) and the femtocell users can utilize spatiotemporally available radio resources for the access traffic.

The article titled “Group Recommendation Systems Based on External Social-Trust Networks” uses the trust network relationship in social networks to introduce group members’ external real information, through a true evaluation of an item, to amend the group of a forecast of an item, when the group disagreement is small, that is, within the group to achieve the same case, to reduce the social network recommended to the group impact.
The article “A Multivariant Stream Analysis Approach to Detect and Mitigate DDoS Attacks in Vehicular Ad Hoc Networks” presents a novel Multivariant Stream Analysis (MVSA) approach. The proposed MVSA approach maintains the multiple stages for detection of DDoS attack in network. The approach observes the traffic in different situations and time frames and maintains different rules for various traffic classes in various time windows.

The article “A Sentiment-Enhanced Hybrid Recommender System for Movie Recommendation: A Big Data Analytics Framework” proposes a movie recommendation framework based on hybrid recommendation and sentiment analysis to improve the accuracy of recommender systems. The hybrid recommendation model with sentiment analysis outperforms the traditional models in terms of various evaluation criteria.

For advanced material handling, the authors of the article “Sampling Adaptive Learning Algorithm for Mobile Blind Source Separation” propose a sampling adaptive learning algorithm to calculate the adaptive learning rate in a sampling way. The algorithm has similar MSEs with adaptive step-size algorithm, but less computational time. By a smooth connection between two optimal points, the sampling method also has smooth curve and does not bring more recursion.

In the article “A Mobile Computing Method Using CNN and SR for Signature Authentication with Contour Damage and Light Distortion”, the authors propose a mobile computing method of signature image authentication (SIA) with improved recognition accuracy and reduced computation time. It demonstrates theoretically and experimentally that the proposed golden global-local (G-L) algorithm has the best filtering result compared with the methods of mean filtering, medium filtering, and Gaussian filtering. The developed minimum probability threshold (MPT) algorithm produces the best segmentation result with minimum error compared with methods of maximum entropy and iterative segmentation.

The article “Framework for E-Health Systems in IoT-Based Environments” presents a specialized framework to provide smart health services in underdeveloped countries, especially in rural areas. The framework studies various aspects of IoT technology for smart health services, such as the interoperability and standardization issues, constrained and Internet environments, specialized communication protocols, and web technology requirements.

In the article “On the Tradeoff between Performance and Programmability for Software Defined WiFi Networks”, the authors study software defined WiFi networks (SDWN) against traditional WiFi networks to understand the potential benefits, such as the ability of SDWN to effectively hide the handover delay between access points (AP) of the adoption of the SDWN architecture on WiFi networks and identify representative application scenarios where such SDWN approach could bring additional benefits.

Considering the on-demand MDC in cyber-physical systems, the authors of the article “On-Demand Mobile Data Collection in Cyber-Physical Systems” construct two queuing models to capture the MDC with a single MA and multiple MAs, respectively. System measures of the queues, for example, the expected values and distributions of queue length, queuing time, and response time have been explored.

The article “A Systematic Review of Security Mechanisms for Big Data in Health and New Alternatives for Hospitals” provides a view of different mechanisms and algorithms used to ensure big data security and to theoretically put forward an improvement in the health-based environment using a proposed model as reference. After analyzing the different solutions, two security alternatives are proposed combining different techniques analyzed in the state-of-the-art, with a view to providing existing information on the big data over cloud with maximum security in different hospitals located in the province of Valladolid, Spain.

The authors of the article “RADB: Random Access with Differentiated Barring for Latency-Constrained Applications in NB-IoT Network” introduce the background of NB-IoT, investigate the research on random access optimization algorithm, summarize relevant features of NB-IoT uplink and narrowband physical random access channel, and design random access with differentiated barring (RADB), which can improve the insufficiency of traditional dynamic access class barring method.

To achieve the corresponding high-level context information using the specific low-level multidomain context directly obtained by different sensors in the Internet of Things, the authors of the article “The Fusion Model of Multidomain Context Information for the Internet of Things” propose a wrapper feature selection method based on the genetic algorithm to obtain a simpler and more important subset of the context features from the low-level multidomain context, and use the decision tree algorithm which is a multiclassification algorithm to determine which high-level context the record set of the low-level context information belongs to.

We hope that this SI will serve as good reference for researchers, scientists, engineers, and academicians in the field of mobile intelligence.

Conflicts of Interest
The authors declare that there are no conflicts of interest regarding the publication of this article.

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