Editorial SI: Mobile Applications and Services

Guest Editors Mobile Applications and Services •
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Researchers and engineers face new challenges stemming from consumer habits that continue to shift to encompass a mobility-centric work environment and lifestyle, enabled by a variety of laptops, smartphones, tablet computers and other portable computing devices. Investigators in this space are compelled by positive trends in consumer mobile computing driven by high-end mobile handsets, high-bandwidth wireless networks, and novel applications on-the-go. As a result, a key area of mobile computing research focuses on applications, application management, and application services, all of which take place above the OSI transport layer.

This special issue of the ACM/Springer Mobile Networks and Applications Journal presents selected papers that represent the wide range of recent advances in application-layer mobile computing research. Three papers are extended versions of the best papers presented at the MobiCASE conference on mobile computing, applications, and services held in San Diego, California, in 2009, while three more were accepted from a world-wide open call that received over 45 submissions, resulting in an acceptance rate of under 7%. Papers

describing novel mobile applications and mobile infrastructure systems and services are included to provide a wide breadth and far view of current research in this area.

In the first paper, entitled "Machine Learning-Based Adaptive Wireless Interval Training Guidance System," M.-S. Suh, A. Nahapetian, J. Woodbridge, M. Rofouei, and M. Sarrafzadeh present the use of smartphone and sensor technology to improve personal health rehabilitation. Their work focuses on interval training, a style of physical therapy where participants follow a protocol to increase and decrease their workout intensity during particular periods to maximize calories burned while limiting fatigue. To assist interval training participants in their study, the researchers implemented two features, namely a system that uses an Apple iPhone's accelerometer, a Bluetooth pulse oximeter, and data mining software to formulate an optimized training schedule for each individual, as well as a music and performance feedback system to provide motivation during interval training sessions.

In the second paper, J. Matthews, R. Kulkarni, M. Gerla, and T. Massey present the work entitled "Rapid Dengue and Outbreak Detection with Mobile Systems and Social Networks". This research looks at ways to quickly identify outbreaks of dengue, a mosquito-borne virus prevalent in underdeveloped countries where medical resources and technological infrastructure are lacking. The authors present a low-cost dengue detection system that uses vision sensors in a mobile smartphone, an object identification algorithm, and online servers to run a bio-assay test to analyze a sample of patient blood collected in a paper patch. By performing the analysis through the smartphone while in the field, doctors can potentially reduce the time needed for determining dengue infection from the status quo of several days down to several minutes, which helps reduce the degree of viral spread in the patient.

In the third paper, social networking in the mobile space is explored by J. Li, H. Wang, and S. U. Khan in the paper

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"A Semantics-Based Approach to Large-Scale Mobile Social Networking." The research presented here revolves around the idea of semantics-based social networking, where the semantics of the user's social data is used for constructing the network, matching user profiles together, routing application-layer messages, and managing privacy. Applications of this type of network in mobile computing include its potential use in disaster recovery or homeland security.

In the fourth paper, "Dynamic Migration of Computing Through Virtualization of the Mobile Platform," S. Sud, R. Want, T. Pering, K. Lyons, B. Rosario, and M. Gong present their work on system software that allows for the dynamic migration of computing from small-scale mobile Internet devices, such as netbooks, to a desktop computer. This feature leverages the availability of an extended instruction set now found in current-generation low-power Intel Atom processors that can be used for hardware-accelerated virtualization. While virtualization has commonly been used in servers and IT infrastructure, the authors show its use in mobile devices by demonstrating practical examples of opportunistic computation offloading.

In the fifth paper, U. Rathnayake, H. Petander, M. Ott, and A. Seneviratne investigate a new transfer service for mobile devices in "EMUNE: Architecture for Mobile Data Transfer Scheduling with Network Availability Predictions." The authors consider the problem where a mobile user roams from

one wireless coverage area to another that has a different radio interface, such as from Wi-Fi to 3 G. They suggest a method that uses available context information to accurately predict the availability and bandwidth of each network type and present an algorithm for dynamically scheduling data transfers which takes into consideration application requirements, user preferences for QoS and cost, and the network availability predictions.

In the final paper, titled "Moving Query Monitoring in Spatial Network Environments," F. Liu and K. Hua look at an important problem for mobile applications: how to efficiently perform real-time querying for objects that constantly move within some space, such as looking for all available taxis within a city. The authors suggest a distributed framework for answering range queries and nearest-neighbor queries in a spatial network by having the object monitor relevant queries as it moves in or out of the query range. A key calculation used in the work is a locally-stored edge distance that allows the moving object to compute network distance efficiently without having knowledge of the global network map.

This special issue would not have been possible without the authors' contributions as well as the numerous reviewers who offered their valuable time and effort. We would like to particularly thank the Editor-in-Chief, Imrich Chlamtac, for the guidance and opportunity to manage this special issue.