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EDITORIAL

Applications of machine learning in pervasive systems

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This special issue is based on the best papers from the 14th International Conference on Future Networks and Communications (FNC'19) and the 16th International Conference on Mobile Systems and Pervasive Computing (MobiSPC'19) that were held on August 19–21, 2019, Halifax, Canada. Both conferences attracted a good number of scientific papers that contributed to the state-of-the-art in the areas of these conferences' themes. All the papers selected for this special issue have been extended from their original versions and underwent two rounds of rigorous peer-review process. Based on the reviewers' feedback, as well as the evaluations of the Guest Editors, 8 papers were selected for this special issue from 11 invited submissions. The accepted papers cover forthcoming development and emerging research along with mobile applications, smart homes, prediction systems, transportation, intrusion detection approaches, IoT and edge computing.

The first paper by Schickler et al. is entitled "Flexible Development of Location-based Mobile Augmented Reality Applications with AREA". The authors of this paper discussed the importance of augmented reality applications that require high development efforts. The main aim of this paper is to show the flexibility of the Augmented Reality Engine Application (AREA) based on a developed ARGame, serious game, which is used for commercial purposes. In the AREA project, a kernel was implemented that enables location-based mobile augmented reality applications and provides a flexible architecture that fosters the development of individual location-based mobile augmented reality applications.

The second paper by Modarresi and Symons is entitled "Resilience and Technological Diversity in Smart Homes. A Graph-Theoretic Approach to Modeling IoT Systems with Integrated Heterogeneous Networks". This paper introduced and demonstrated the role of an abstract model for understanding the network properties of a complex IoT system, with a special focus on focus on relatively simple context of smart homes. The authors showed how their proposed approach permits the exploration of the resilience properties of various instances of smart systems involving complex technological interdependency. The proposed approach may serve as the basis for tackling the challenge of designing resilient IoT-based smart-cities from the point of view of network topologies.

The third paper by Nose et al. is entitled "Data-driven Child Behavior Prediction System Based on Posture Database for Fall Accident Prevention in a Daily Living Space". The authors of this paper developed a system for predicting places that children can climb in a data-driven manner by integrating cameras, a behavior recognition system (OpenPose), and a climbing motion planning algorithm based on a rapidly exploring random tree. The main aim of this system is to preventing child fall accidents in a daily space. The authors performed computer simulations to demonstrate the feasibility of the prediction function.

The fourth paper by Farrag et al. is entitled "A Microsimulation-based Analysis for Driving Behaviour Modelling on a Congested Expressway". In transportation, one of the keys factors for ensuring the reliability of the models in reflecting local conditions is the calibration and validation of microsimulation models. This paper presented the necessary procedure for calibration and validation of a microscopic model, using the VISSIM software, during peak hours in Muscat Expressway in Oman. The authors claim that the proposed procedure can be utilized as a base for future traffic strategy analysis and intelligent transportation systems

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evaluation for helping decision makers with long-term and sustainable development decisions.

The fifth paper by Sebbar et al. is entitled "MitM Detection and Defense mechanism CBNA-RF based on Machine Learning for large-scale SDN context". This paper proposes an intrusion detection and prevention framework using machine learning techniques to detect and stop Man in the Middle (MitM) attempted attacks. The authors showed that the evaluation of the proposed framework demonstrates that the model can classify and detect malicious connections and nodes while keeping high accuracy and precision scores.

The sixth paper by Bali et al. is entitled "Rule based Auto-scalability of IoT Services for Efficient Edge Device Resource Utilization". This paper proposed an approach to facilitate a scalable and lightweight solution for service deployment for efficient resource utilization on IoT edge nodes. Their solution is based on the container concept and cluster concept for defining a group of IoT edge devices. The authors claim that the evaluation of their approach efficiently adapting the system performance to meet service performance requirements and to meet the availability of system resources.

The seventh paper by Park et al. is entitled "SFSH: A Novel Smart Factory SDN-Layer Handoff Scheme in 5G-enabled Mobile Networks". The authors of this paper proposed a Smart Factory SDN-layer Hando (SFSH) framework to guarantee Quality of Service by supporting efficient handoff devices in a smart factory. The proposed SDN framework is for a smart factory and a handover algorithm considering the Received Signal Strength (RSS) and the speed for SFSH. Through simulations, the authors showed that the SDN framework can flexibly cope with the conditions required by the smart factory. They also showed that the performance of SFSH considering RSS is improved over the existing handover process.

The eighth paper by Adda and Aliane entitled "HoBAC: fundamentals, principles, and policies". Within an IT infrastructure, the authors of this paper raised the importance and the challenging security aspect of Access Control (AC). They proposed different AC models to define AC policies that dictate the conditions under which a resource may be accessed by a subject. Attribute-Based Access Control (ABAC) is one of the most promising of those models that has received attention in recent years. The authors have proposed a Higher-order Attribute-Based Access Control (HoBAC) as a generalization of ABAC that offers more flexibility when designing AC policies. In this paper, the theoretical foundations of HoBAC are developed and an Access Control System (ACS) and an AC policy framework are presented. To demonstrate the feasibility of their proposed approach, an application example related to the Internet of Things (IoT) is used to illustrate the different concepts of HoBAC.

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