Guest Editorial:

Machine Learning for Smart Electronic Systems

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We have been seeing use of word "smart" before almost anything that we can think of in our day-to-day life: smart phone, smart TV, and smart appliance. At a bigger scale smart cities, smart villages, smart healthcare, and smart agriculture, are used to describe new generation of these physical entities. So, an obvious question: What is smart? From dictionary, smart means: "(of a person) clean, tidy, and well dressed" and "(of a device) programmed so as to be capable of some independent action". Thus, smart and intelligence is the "ability to take decisions based on the data, circumstances, situations".

What is smart in the context of smart phone, smart appliance smart TV? Does Smart Mean Small? Does Smart Mean Portable? Does Smart Mean More-Features? Does Smart Mean Safe? Does Smart Mean Battery-Operated? Does Smart Mean Connected? Does Smart Mean Cyber-Enabled? Does Smart Mean Autonomous? In the current literature smart term is used to broadly suggest any of the above features like portable, energy efficiency, and connected. What is smart in the context of devices, systems and Cyber-Physical Systems (CPS) and Internet-of-Things (IoT)?

In one perspective, the autonomous features integrated with devices and systems make them smart/intelligent. It is analytics of lots of data from various sensors from the devices, systems, and system-of-systems (like smart healthcare, smart cities, and smart villages) and their corresponding responses from the machine learning models derived from these data. IoT-enables CPS such as smart cities, smart villages, and smart healthcare rely heavily on ML/AI for their operations. This Special Issue brings together a set of papers that papers that discuss various works focusing on the use of ML in various CPS including smart healthcare, smart agriculture, and smart transportation.

Use of ML in Smart healthcare is highly essential for various levels of automation including analysis of Electrocardiogram (ECG) and electroencephalogram (EEG) as well automatic diet management and stress management. The paper titled "iBuffet: An AIoT-Based Intelligent Calorie Management System for Eating Buffet Meals with Calorie Intake Control" focuses on the use of ML for diet management. This work relies on computer vision based method that processes food images for automatic calorie quantification. The work titled "iKardo: An Intelligent ECG Device for Automatic Critical Beat Identification for Smart Healthcare" is another example of the use of ML in smart healthcare. It proposes DNN mechanism by making balance dataset from imbalance dataset to improve to improve accuracy of arrythmia detection. In the paper titled "CovidDeep: SARS-CoV-2/COVID-19 Test Based on Wearable Medical Sensors and Efficient Neural Networks", ML is explored for COVID-19 detection. This work proposes a methodology to detect COVID-19 using different sensors integrated in wearable devices.

The use of ML in smart agriculture is ongoing research just like in the smart healthcare. Smart agriculture domain may be more challenging in terms of handling plant as well animal health and various other agriculture domain activities including irrigation control, air/water quality, plant growth prediction, and greenhouse control. The paper titled "LiveCare: An IoT based Healthcare Framework for Livestocks in Smart Agriculture" is one example of smart agriculture work presented in this Special Issue. This paper presents a ML framework that can detect 9 different diseases of cows based on various sensor data: temperature sensor (neck), Saliva sensor (hangs from mouth), Lameness Accelerometer (feet and neck), and Load sensors (under feet).

The use of ML in smart transportation is also done. This special issue presents 2 papers which can be helpful in improving safety in smart transportation. The paper "Deep Learning-Based Raindrop Quantity Detection for Real-Time Vehicle-Safety Application" presents a CNN mechanism for no-rain, light-rain, and heavy-rain detection from vehicle images. The work "Driver Gaze Zone Estimation via Head Pose Fusion Assisted Supervision and Eye Region Weighted Encoding" uses head pose and face modalities to help Advanced Driver Assistance Systems (ADAS).

The paper titled "A Hybrid of Interactive Learning and Predictive Modeling for Occupancy Estimation in Smart Buildings" considers use of ML for smart cities domain. This work presents an efficient statistical learning approach for estimating occupancy in smart buildings that uses a small set of nonintrusive sensors while ensuring a minimal involvement of the users.

Use of ML in Smart Education domain is the focus of the paper titled "A Video Analytic In-Class Student Concentration Monitoring System". In this work a non-intrusive deep-learning based computer vision system has been presented that monitors student concentration in classrooms and sends feedbacks to instructor.

The guest editors sincerely believe that this Special Issue will be a good reading for researchers around the globe. The guest editors would like to thank all the contributing authors for their excellent contributions for this Special Issue. The guest editors also sincerely thank all the reviewers for their help in reviewing the manuscripts throughout the multiple revisions to have a rigorous selection of the works.

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