Introduction to Web of Things and Big Data Analytics

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Preamble: The special issue of the International Journal of Computing and Digital Systems (IJCDS), focuses on the Web of Things and Big Data Analytics. This SI publishes selected papers from the Second International Symposium on Web of Things and Big Data (WoTBD 2016), September 19-22, 2016, London, United Kingdom, which was held in conjunction with the 7th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN). [http://cs-conferences.acadiau.ca/euspn-16/]. The selected papers covered a range of topics related to the theme of Web of Things and Big Data.

Keywords: Web of Things; Cloud Computing; Internet of Things Analytics; Big Data Models and Algorithms

INTRODUCTION

With the successful deployment of Wi-Fi and cellular wireless networks as well as the Internet over the past decades, we have anytime and everywhere connectivity for connection of people, and smart things or objects. The number of subscriptions has been increased exponentially exceeding the size of the total population; this led to the "Newark of Network of Things" also known as the Web of Things (WoT) or "Internet of Things". In the WoT, huge amount of multimedia traffic and data are being continuously generated, and communicated. It is worth noting that the WoT and big data analytics should be treated as two sides of the same coin. In the WoT storage, processing and communication of continuous stream of data are major components. When selecting the technology for big data analytics, we need to keep in mind that there would be tremendous influx of data that need to be mined and processed in almost real-time. Recently many industries have been using Hadoop and Hive to store big data and distributed cloud computing for processing data for real-time operations. Extracting meaningful and valuable data from big data generated from the WoT is one of the important tasks. A big data analytics platform should be based on three main aspects: performance, infrastructure, and scalability. Moreover, the WoT is regarded as a heterogeneous system where security vulnerabilities, privacy requirements, and trust issues are vastly diverse. In the WoT era, we also need to make fundamental changes in their security, privacy and trust landscape. Note that the WoT and the IoT are bringing not only more benefits to the world/business, but also many more unique and new challenges. Research challenges include: Managing and effectively utilizing big data techniques for WoT; Supporting convergence for WoT–related standards and technologies; Embedding security, privacy and trust as intrinsic building blocks of WoT systems; Creating intelligent and adaptive natural user interfaces and interactions for WoT devices, infrastructure and systems; and Designing, developing and implementing WoT applications. The first SI of WoTBD, volume 5, issue 4, July 2016 [1-7] publishes selected papers from the 2015 International Symposium on Web of Things and Big Data (WoTBD 2015), 18-20 October 2015, Manama, Bahrain.

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This special issue of Web of Things and Big Data (WoTBD 2016) includes six accepted papers that cover different areas related to the theme of the internet of things and big data analytics, the main contributions of the accepted papers in the SI of WoTBD are highlighted in the remaining part of this introduction.

The main idea of the paper entitled "Sentiment analysis of Social Sensors for local services improvement" by Olivera Kotevska, and Ahmed Lbath addressed processing and categorization of microblogging data and identified the sentiment level of each category in order to provide a better understanding of public needs and concerns. The objectives of this research are measuring the sentiment at certain area and topic to determine the relevant services and promote recommendations in decision-making [8].

Mirjana Maksimovic tries to summarize the role of novel technology advancements and Big data' achievements in the process of creating cities where the quality of life will be enhanced alongside reduced pollution and more efficient utilization of goods. This research assist in understanding the symbiotic relationship between G-IoT and Big data through the analysis of their roles and contributions in creating an intelligent and sustainable city by reducing pollutions, decreasing energy demands, and efficient resources utilization [9].

R.N. Navagamuwa et. al presented a new technique and good experimental study to be publicized to those who are concerned in Complex Event Processing (CEP) since it exploits technology. They proposed a technique that combines parallel coordinates and shapelets to automate the CEP query generation. This technique enables users to obtain useful insights from data; going beyond what it already known, and can be applied to both multivariate and multivariate time-series data [10].

Luca de Oliveira Turci presented an application of FreeRTOS for fire alarm system, in his paper " Real-Time Operating System FreeRTOS Application for Fire Alarm Project in Reduced Scale". In this research, the use of real-time operating systems in fire alarm achieves great results considering that fires are example of critical time systems, where the time of response is extremely important. Some tests, such as jitter, latency, and in worst-case response time are also accomplished to evaluate the performance of the proposed real-time system [11].

Ibtesam R. K. Al-Saedi et. al create a system having the ability to gather and transfer data, processing and reporting for workshop's machines. The research focused on the integration of wireless technology and CAD/CAM system for CNC workshop development. A specific case study is described a system based on embedded wireless device and Internet of Things (IoT) concept with Bezier techniques for the proposed model [12].

Shilpa H Baria, and Chintan Bhatt introduced an IoT voice recognition system, this system uses voice recognition system to control different types of devices based on personal assistant. All tasks and services working on user related all information available to online sources at present location. Sensor devices are used in this system to control devices to improve system security, and then make accurate decisions [13].

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Danda B. Rawat received his Ph.D. in Electrical and Computer Engineering from Old Dominion University, Norfolk, Virginia. He is an Assistant Professor in the Department of Electrical Engineering at Georgia Southern University, USA. Dr. Rawat's research focuses on wireless communication networks, cyber security, big data, cyber physical systems and internet of things including design, analysis and evaluation of cognitive radio networks, wireless virtualization, cyber-physical systems, software-defined networks, cloud radio access networks, network security, smart grid, wireless sensor networks, and vehicular/wireless ad-hoc networks. Dr. Rawat is the recipient of NSF Faculty Early Career Development (CAREER) Award in 2016. He has published over 120 scientific/technical articles, 8 books and over 15 peer-reviewed book chapters. He has been serving as an Editor/Guest Editor for over 10 international journals. He serves as a Web-Chair for IEEE INFOCOM 2016/2017, served as a Student Travel Grant Co-chair of IEEE INFOCOM 2015, Track Chair for wireless networking and mobility of IEEE CCNC 2016, Track Chair for Communications Network and Protocols of IEEE AINA 2015, and so on. He served as a program chair, general chair, and session chair for numerous international conferences and workshops, and served as a technical program committee (TPC) member for several international conferences including IEEE INFOCOM, IEEE GLOBECOM, IEEE CCNC, IEEE GreenCom, IEEE AINA, IEEE ICC, IEEE WCNC and IEEE VTC conferences. He has received the Best Paper Awards at the International Conferences. He is also the recipient of Outstanding Research Faculty Award (Award for Excellence in Scholarly Activity) 2015, Allen E. Paulson College of Engineering and Technology, Georgia Southern University, 2015. He is the Founder and Director of the Cyber-security, Wireless Systems and Networking Innovations (CWiNs) Research Lab at GSU. Dr. Rawat is a Senior Member of IEEE, and a member of ACM and ASEE. He is serving as a Vice Chair of the Executive Committee of the IEEE Savannah Section since 2013.

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