Role Of Big Data Analytics In Smart City: An Overview

Abstract

The concept of smart city has emerged with an aim of alleviating exceptional challenges occurred as a result of continuous urbanization. Many governments nowadays are inclined towards the adoption of big data applications to implement smart cities so that living standards of people could be improved. The concept of smart city is realized by using multiple ICTs (Information and Communication Technology) to offer higher levels of safety and comfort to the citizens. The concept of smart city allows governments to reduce the consumption resulting in reduced costs along with relatively active and effective engagement with the citizens. Usage of Big Data allows daily collection of enormous data generated by various ICT technologies installed in the city and analyse this huge amount of data to be used in beneficial and efficient manner. Proper usage and analyzation of big data collected from various devices is a key to success and this concept has been adopted by many business and service domains. This report provides literature review on three existing studies related to the Big Data analytics in smart cities while comparing and discussing various definitions, benefits, challenges along with evaluation of the concept “big data analytics in smart city infrastructure” in general.

Keywords: Smart cities, big data, Big Data Analytics, Smart Education, Internet of Things (IoT), Smart environments, Cloud computing.

1. Introduction

The growth of technologies such as big data and advancement of Internet of Things (IoT) have played crucial role in realization of smart city advantages. Introduction of Big data provided cities with potential to attain valuable insights into enormous data being collected from various sources. Whereas, the IoT allowed integration of radiofrequency identification, sensors, and Bluetooth devices in real-world environment by utilizing vastly networked services. The unique combination of IoT and big data has brought various interesting and new challenges for realizing the goal of “Smart Cities”. Main aim of this report is to find various challenges by focusing primarily on issues related to technology and business that empower cities to realize the principles, visions, and requirements of smart cities by understanding the key smart environment features. Thorough discussion and comparison of visions of three authors is presented in this report by focusing on how big data can help in development of safe Smart Cities along with its benefits, challenges, opportunities, applications, and requirements.

2. Literature Review 1

This journal article explains that introduction of big data and IoT technologies enabled governments to transform old city infrastructure to smart city initiatives. The author states that IoT acted as an enabler for these smart cities where everyday devices and objects are connected by using various network technologies. Furthermore, the concept of big data enabled government to gather and analyze huge amounts of data flowing from these devices and other sources. IoT offered the integration of various sensors, radio-frequency identifiers, and

Bluetooth devices in real-world environment by using networking and big data is at the core of these services rendered by IoT (Hashem et al., 2016).

In this research literature, the author aims to provide a comprehensive view of Big Data's role in Smart cities and discussed about various enabling technologies that can help in its realization. Moreover, the author has also proposed a future business model of smart city and its architecture along with associated important roles of Big Data Analytics for its accomplishments. The author has also provided strong referencing by examining various case studies of the smart cities discussed by other authors along with identification of various technological and business research challenges. Furthermore, this study can act as a point of reference for all the industries and researchers for future development and progress of realizing smart cities with help of big data (Hashem et al., 2016).

2.1 Literature Review 2

Governments across the globe are considering adopting the concept of smart city and big data analytics implementation in their cities which support the components of smart city. This is out to help governments to reach the desired level of improvement and sustainability in living standards. The author explains that usage of multiple technologies by smart cities to enhance performance of energy, transportation, education, health, and water services would lead to provide exceptional levels of comfort to the residents. Moreover, it would also help to reduce resource and costs consumption and will help government to more efficiently and actively engage with the citizens to understand their requirements and issues being faced by them so better services could be provided (Al Nuaimi, Al Neyadi, Mohamed & Al-Jaroodi, 2015).

The author believes that Big Data Analytics is one of the recent technologies that can enhance the services and benefits provided by smart cities. This paper also reviews various applications of Big Data that support smart city infrastructure. In this literature, the author has also discussed and compared several definitions of big data and its uses in smart city concept while exploring its challenges, benefits and opportunities of integrating big data analytics for smart cities infrastructure. In addition, the author also attempts to recognize the requirements of a smart city to support the implementation of big data analytics (Al Nuaimi, Al Neyadi, Mohamed & Al-Jaroodi, 2015).

It is clear that though multiple opportunities are present for usage of Big Data in Smart Cities, there exist many challenges and issues that are required to be considered so that full potential use of this technology could be realized. However, no actual model of big data analytics in smart city is proposed by author in this report and sufficed it with clear and clear theory.

2.1.1. Literature Review 3

In this journal article, the author elaborates that smart cities are evolving so fast and has a strong structure of universal sensing devices, heterogeneous network infrastructure, intelligent control systems and big-data processing. He further adds that the main aim is to enhance the quality of life of residents by offering intelligent services such as transportation, energy, environment, and healthcare. Moreover, the author also investigated the state-of-art research efforts focussed towards "big-data analytics" in the context of smart-city (Pal, Triyason & Padungweang, 2018). Firstly the author has provided a taxonomy of big-data for smart-cities to

bring forward a basic overview of big data paradigm in smart city environment. Secondly, a top level snapshot of analytical platforms used in big data is presented in this report.

Additionally, the study presents a basic four-tier big data framework combined of storage hubs; application hubs, sensing hubs and processing hub are presented. The author complemented this data by providing information on basic big-data applications and overview of ten selected case studies of several smart-cities present across the world. Finally, some open challenges are also discussed by the author such as data integration, data analytics, and security/privacy which demands attention from research community and helps in providing research directions to future researchers (Pal, Triyason & Padungweang, 2018).

2.1.1.1. Conclusion

Overall, it can be stated that substantial increase in various connected devices in metropolitan cities has given birth to enormous amount of data, which has attracted the attention of several researchers in diverse research domains. This report aims to provide an overview of the big data analytics in smart city infrastructure. This report have also discussed about various enabling technologies that are used in smart city along with its various characteristics, benefits, and requirements. Also, many future business model and architectures are proposed by authors in the literatures with the objective of managing big data analytics in smart city which could turn out to be very beneficial for the future researchers to realize their goals and implement big data analytics successful to develop smart cities. Moreover, different case studies are also examined by authors in their research. However, research focused on implementation of big data in smart city is in its initial stages and there are several challenges which are required to be addressed so the desired outcomes could be realized.

3. References

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