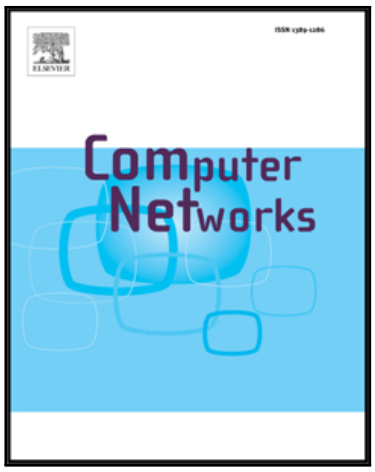

The role of big data analytics in Internet of Things

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PII: S1389-1286(17)30259-1
DOI: 10.1016/j.comnet.2017.06.013
Reference: COMPNW 6240

To appear in: *Computer Networks*

Received date: 19 December 2016
Revised date: 3 June 2017
Accepted date: 15 June 2017

Please cite this article as: Ejaz Ahmed, Ibrar Yaqoob, Ibrahim Abaker Targio Hashem, Imran Khan, Abdelmuttlib Ibrahim Abdalla Ahmed, Muhammad Imran, Athanasios V. Vasilakos, The role of big data analytics in Internet of Things, *Computer Networks* (2017), doi: 10.1016/j.comnet.2017.06.013

The role of big data analytics in Internet of Things

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Abstract—The explosive growth in the number of devices connected to the Internet of Things (IoT) and the exponential increase in data consumption only reflect how the growth of big data perfectly overlaps with that of IoT. The management of big data in a continuously expanding network gives rise to non-trivial concerns regarding data collection efficiency, data processing, analytics, and security. To address these concerns, researchers have examined the challenges associated with the successful deployment of IoT. Despite the large number of studies on big data, analytics, and IoT, the convergence of these areas creates several opportunities for flourishing big data and analytics for IoT systems. In this paper, we explore the recent advances in big data analytics for IoT systems as well as the key requirements for managing big data and for enabling analytics in an IoT environment. We taxonomized the literature based on important parameters. We identify the opportunities resulting from the convergence of big data, analytics, and IoT as well as discuss the role of big data analytics in IoT applications. Finally, several open challenges are presented as future research directions.

Index Terms—Internet of things, big data, analytics, distributed computing, smart city.

1 Introduction

The technological advancements and rapid convergence of wireless communication, digital electronics, and micro-electro-mechanical systems (MEMS) technologies have resulted in the emergence of Internet of Things (IoT). According to the Cisco report[1], the number of objects connected to the Internet has exceeded the number of human beings in the world. These Internet-connected objects, which include PCs, smartphones, tablets, WiFi-enabled sensors, wearable devices, and household appliances, form the IoT as shown in Figure 1. Reports show that the number of Internet-connected devices is expected to increase twofold from 22.9 billion in 2016 to 50 billion by 2020 as shown in Figure 2.

Most IoT applications do not only focus on monitoring discrete events but also on mining the information collected by IoT objects. Most data collection tools in the IoT environment are sensor-fitted devices that require custom protocols, such as message queue telemetry transport (MQTT) and data distribution service (DDS). Given that sensors are used in nearly all industries, the IoT is expected to produce a huge amount of data. The data generated from IoT devices can be used in finding potential research trends and investigating the impact of certain events or decisions. These data are processed using various analytic tools [1]. Fig-

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