Chapter 8

Big Data Applications and Architectures for Emerging Countries

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ABSTRACT

Exponential increases in generation of data, especially through social media, has found an increased influence in society over the last decade. This chapter provides an overview of big data technologies and architectures and how this data could be applied to meet the special needs of the emerging societies. Healthcare applications are most important, especially for the rural and the marginal sections of society. This chapter lays out architecture designs of 10 big data applications with half of them relating to the healthcare sector. These designs can be seeds for the implementation of other imaginative beneficial big data applications.

INTRODUCTION

Anything that has been recorded can be considered data. The process of 'datafication' of the world is driven by increased speed of communication over the internet, along with the decrease in the costs of storage of data. This new data is free flowing and representing a variety of contributors including people and machines. Big Data is an all-inclusive term that refers to such large, fast, diverse, and complex data that cannot be managed with traditional data management tools (Mayer-Schönberger & Cukier, 2013; Maheshwari, 2019). Much potential knowledge embedded within

this unbounded data can be discovered when it can be structured and put to work using the right tools, in the service of addressing the right challenges. Emerging economies represent large populations which may not yet have access to the same levels of services that are available to people in mature economies. Health, education, transportation, farming and others are some of the key areas of Big Data applications for emerging economies. Ideally, Big Data can help deliver the right information, to the right person, in the right quantity, at the right time, to make the right decisions. Big Data can be harnessed by developing scalable and evolutionarily flexible data architectures, coupled with the use of highly cost-effective computing devices organized as a cloud computing platform. This chapter will present ten applications for emerging economies using Big Data, with their potential technological architectures.

TWO LEVELS OF BIG DATA

Big Data can be examined on two levels (Figure 1). At a basic level, it is just another collection of data that can be analyzed and utilized for the benefit of the business. At this level, it follows the data analytics cycle is as follow (Maheshwari, 2017). Business activities are recorded and then these records become data. There is more data from customers' responses through social media, and data from industry organizations. All this data can be organized and mined using special tools and techniques to generate insights and intelligence, which reflect how the business is functioning. This business intelligence can then be fed back into the business executives so that the business can grow and evolve to become more effective and efficient in serving customer needs. This in turn makes the business grow and produce more data. And the cycle continues on.

On a deeper level, Big Data is a complex collection of diverse kinds of data that offers unique opportunities, and also poses many technical challenges (Maheshwari, 2019). The quantity of data generated in the world doubles every 12-18 months. The primary reason for the growth of data is the dramatic reduction in the cost of storing data by 30-40% every year. Big Data is being generated by billions of devices, and is communicated at the speed of the light, through the internet. The primary reason for the increased velocity of data is the increase in internet speed from 10MB/sec to 1 GB/sec (100 times faster), as well as mobile devices. Big Data is totally inclusive of all forms of data, for all kinds of functions, from all sources and devices. When all three Vs (Volume, Velocity, Variety) arrive together in an interactive manner, it creates a perfect storm (Mayer-Schönberger & Cukier, 2013). While the Volume and Velocity of data create the major technological concerns in managing Big Data, these two Vs are themselves driven by the 3rd V, the Variety of forms and functions and sources of data. The uneven accuracy (Veracity) of data complicates the management of Big Data further.

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