

Chapter 10

Review on the Application of Big Data Algorithms to Understand a Pandemic Virus

Angélica Guzmán-Ponce

Universitat Jaume I, Spain

J. Leonardo González-Ruíz

Universidad Autónoma del Estado de México, Mexico

Iván Francisco-Valencia

Universidad Autónoma del Estado de México, Mexico

ABSTRACT

The COVID-19 pandemic is an ever-evolving and accumulating public health crisis affecting global populations. Scientist worldwide have generated proposal through big data technics due to the massive amount of data that provide valuable and relevant knowledge; these include clinical and treatment information. This chapter first defines the related concepts of big data and analyzes the technical advantages of the state of the art. At the same time, it discusses challenges and issues associated with the review works. Big data applications focused on the COVID-19 disease can fight the pandemic.

INTRODUCTION

Data is the new gold for allowing advances in nowadays society. There are plenty of fields of application for which the knowledge extraction from information eases the decision process (Becker et al., 2015; Luengo et al., 2020), such as fraud detection (Makki et al., 2019), fault/failure diagnosis (Taskazan et al. 2019), text classification (Luo et al., 2019), sentiment analysis (Lee et al., 2019), among others.

Worldwide industrial growth produces massive amounts of data, such as the Internet of Things (IoT), cloud computing, social network, mobile devices, inclusive clinical records, health records of patients, and results of medical examinations. The ability to collect and process the massive amount of data ap-

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propriately continuously generated by different sources of information is known as Big Data (Naimi et al., 2014; García et al., 2016).

Medicine and healthcare have been supported by Big Data to IoT detect and deal with viruses. Moreover, it allows clinical researchers to reconstruct the underlying mechanisms of diseases caused by these (Cremin et al., 2022). Since late 2019, the COVID-19 pandemic has been a public health crisis that severely affects people's health worldwide. As of the writing of this proposal, the disease COVID-19 has led to around 453.68 million infections worldwide, and it has wreaked havoc like 6 million deaths (<https://coronavirus.jhu.edu/map.html>). The epidemic implies approximately 447.7 million survivors.

The recent years have greatly affected the Covid-19 pandemic caused by SARS-CoV-2, which is still impacting and profoundly changing people's lives. In this context, the need for timely and accurate information has become vital in decision-making in healthcare (Rabhi et al., 2019; Maillo et al., 2020).

As a result of the high accumulation of information, studies have been derived using areas of Artificial Intelligence such as machine learning, pattern recognition to develop alternative solutions and analyses in the different aspects of the study of the pandemic offered in Big Data context (Heydari et al., 2020; Mansour et al., 2021; Muhammad et al., 2020).

Primarily Artificial Intelligence techniques are based on medical image processing (Litjens et al., 2017), which aims to look for patterns during the infection or treatment strategies. The most common data sets are chest radiographic applying Deep Convolutional Neural Network model (Abbas et al., 2020; Ozturk et al., 2020). These data sets can predict and analyse sentimental behaviour around the virus (Zhua et al., 2020). Moreover, electronic media became a data source like Facebook, Twitter, and YouTube. The impact of the solutions can improve the management in governments, medical sectors, or educational situations.

In this regard, this chapter aims to provide an overview of the application of Artificial Intelligence on Big Data for Covid-19, describing the main characteristics of the algorithms and the data sets, the methodologies, and the results.

Along the chapter we answer the following research questions.

- RQ1: Do Big Data techniques have a high impact to deal with a pandemic virus?
- RQ2: What are the challenges and issues associated with existing Artificial Intelligence and Big Data techniques in a pandemic virus?
- RQ3: Can Big Data analysis have patterns in the social-demographic context?
- RQ4: Is there an evolution in the existing Artificial Intelligence and Big Data techniques used in Covid-19?

The structure of the chapter will be as follows. The first section will describe some preliminaries in Big Data and Artificial Intelligence techniques. The aim here is to introduce some remarkable definitions, frameworks, and general methodologies. The second section will show the state of the art on Artificial Intelligence and Big Data techniques used. The third section will present the analysis results to answer the research questions. The final section will present the discussion of the results and finally the conclusion.

Preliminaries

Medical experts have categorized clinical databases. Nonetheless, the massive records complicate the process. This fact lets Artificial intelligence (AI) analyse the quantitative and qualitative medical records

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