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Twenty Years Survey of Big Data: Definition, Concepts, and Applications in Engineering

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Abstract

In the last decade, there was an exponential growth in data generation from different sources especially due to advances in information and communication technology. Thus, organizations have seen the potential to gain competitive edges from the analyses of this data, changing it in the information that, without Big Data tools, could not be obtained. In this context, this work brings a survey about Big Data and explains this concept has changed during the years. Moreover, this paper aims to elucidate the last twenty years of Big Data and its applications in different areas of engineering: civil, electrical, manufacturing, mechanical, materials, chemical, and software engineering.

Keywords

Big Data **Engineering** **Areas** **Data generation**

Twenty years survey of Big Data: Definition, concepts and applications in engineering.

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Abstract. In last decade there was an exponential growth in data generation from different sources especially due to advances in information and communication technology. Thus, organizations have seen potential to gain competitive edges from the analyses of this data, changing it in information that, without Big Data tools, could not be obtained. In this context, this work brings a survey about Big Data and explains this concept have changed during the years. Moreover, this paper aims to elucidate about of the last twenty years of Big Data and its applications in different areas of engineering: civil, electrical, manufacturing, mechanical, materials, chemical and software engineering.

Keywords: Big Data, Engineering Areas, Data Generation.

1 Introduction

The last two decades the internet has shown a significant growth, that was especially responsible for the amount and the speed of data generation [1]. Currently, most of actions performed on the Internet generating data, have been identified in order to analyze customer preferences, behavior patterns, evaluate trends and even detect potential crises and fraud [2]. The importance of data generation and its applications increases considering the estimative of data volume growth for 2020 around 40 zettabytes [2][3]. Among the possibilities to extract value from this large amount of data (structured or not); one of the outstanding ways it is to identify existing patterns in databases through the most frequently used information. Another way is that companies can create and store data and get detailed information across a range of areas, such as inventory forecasts, demand prospects over the coming months, and then use that information to make better decisions and improve organizational performance [4].

The term Big Data is used to define a large and complex data set whose traditional database techniques, tools and software are no longer efficient. Therefore, scaling this data, the diversity and complexity requires new techniques, architectures and algorithms for its management and analysis, allowing, an easier extraction of value and knowledge.

Big Data tools and techniques help to extract value and useful information for better decision making in the most diverse areas and possibilities (Table 1).