

Chapter 17

Blockchain Solutions, Challenges, and Opportunities for DNA Classification and Secure Storage for the E–Healthcare Sector: A Useful Review

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ABSTRACT

Everyone today wants to detect disease early on, but because there aren't many patterns for the many diseases available, it's hard to do so. Because DNA sequences contain all the genetic data about organisms, which can be utilised by researchers to discover or treat diseases early on by developing new medications, using DNA sequences to extract patterns of disease can be very advantageous. The largest global collection of genomic sequences is made available by NCBI, but today the biggest worry is how to protect this enormous amount of data. One of the options is to encrypt these genetic sequences using blockchain technology. As a result, a study of the number of studies in this area as well as the demand for blockchain in healthcare has been conducted in this chapter. Additionally, surveys about research done in the field of DNA sequence classification are suggested along with recommendations for using classification of DNA sequences to detect disease earlier.

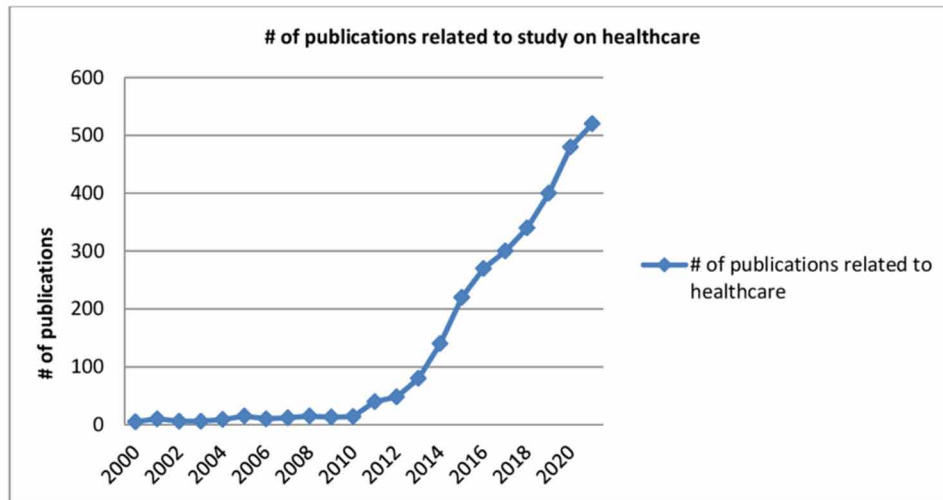
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INTRODUCTION

The analysis of DNA sequences is regarded as a crucial component in biological science since it contains genomic information that may be used by scientists and medical professionals to predict diseases before they manifest. The largest global collection of genomic sequences is made available by NCBI, but today the biggest worry is how to protect this enormous amount of data. One of the options is to encrypt these genetic sequences using blockchain technology. Here, a survey has been conducted on the frequency of healthcare data breaches, the demand for blockchain in the industry, and the number of studies conducted in this area.

The graph below displays the total number of publications relating to research on healthcare from 2000 to 2020, and it makes obvious how crucial it is to understand the healthcare system and its security.

Figure 1. A graph on the total number of publications related to studies on healthcare from 2000-to 2020



NCBI which is well known as “Genbank” is the biggest database of genome sequences in the world with billions of nucleoid bases and millions of distinct DNA sequences D. A. Benson et al. (2010). On the other hand, the cost of genome sequencing has fundamentally decreased after a greater advancement in techniques used for reading DNA sequences Ngoc Giang Nguyen et al. (2016), year-wise distribution of sequences storage in Genbank (NCBI) from 2013- to 2022 can be seen in figure 2.

Security is more important when the user holds their health records and also when this data has to be transmitted between doctors or researchers. Security problems can get resolved using blockchain technology, which has already proven itself in the field of transactions and now gaining importance in healthcare systems. In simple terms, we can say that a blockchain is a chain of encrypted records (known as blocks) that is secured using the traditional SHA 256. DNA data collected from labs and hospitals are securely stored using blockchain so that they can't get changed or attacked by an intruder. The researchers who have authorized access can use this data for classification purposes.

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