A systematic review of benefits and threats of blockchain technology in Healthcare

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Abstract— a **decentralized and open society is possible with blockchain technologies, which eliminates the need for a central authority. Owing to the usage of cryptographic rules, transactions are both encrypted and trustworthy. Blockchain technology has grown in prominence recently because of the proliferation of cryptocurrencies. Because of the need for a more patient-centric solution to healthcare services, and to integrate diverse systems, blockchain technology has enormous potential throughout the healthcare industry. A state of the art blockchain healthcare research study is presented in this article. The aim is to unveil the many ways in which this technology may be used and to bring to light the obstacles and probable future avenues in blockchain healthcare study.**

Keywords— Blockchain, Healthcare, EHR

I. INTRODUCTION

T In the world of Information and Communications Technology (ICT), usage of blockchain technology has been increasingly increasing in recent years. The rise in demand and the funding of blockchain start-ups has mostly fuelled the interest and advancement of this technology. The demand for blockchain technologies is predicted to reach a peak in 2021. Within only a few years after the launch of Bitcoin, there are already more than 1500 cryptocurrencies. In this context, Bitcoin is the trailblazer of digital currency. A trustworthy central authority is not needed to ensure that transfers are conducted in a decentralized manner. There is no requirement to identify anyone in order to use a shared key. Without miners who contribute their processing power to the Bitcoin network, there will be no Bitcoin blockchain and no Bitcoin currency. Although cryptocurrencies are only one of the many ways in which blockchain technology is currently being used, a money, algorithm, and blockchain are three essential principles of a cryptocurrency. A cryptocurrency can use the blockchain of another coin like Bitcoin or Ethereum, but can also enforce its own currency and protocol. Blockchain is a public database used by cryptocurrencies to record all transactions. Such a blockchain expands when new blocks are introduced over time because of that. Cryptocurrency blockchains are typically public, and one may query their transactions via a website like blockchain.com[1].

Without the requirement for a reputable third party, companies may conduct transactions directly. It uses validators (such as miners) that verify transactions in a decentralized manner instead of third parties. A distributed consensus mechanism (also known as a distributed system) is one in which a number of stakeholders consent to anything without having to trust each other. Cryptocurrencies and the double-spending dilemma are connected because they are all about confirmations: confirming that a certain quantity of a digital currency has not already been expended without authentication from a reliable third party (usually a bank).

Several research papers have already examined how blockchain can be used in various sectors. In a research study by Zheng et al, the authors examine the underlying design and various techniques in blockchain technology. The overviews provided by Karafiloski, Mishev, and Ahram et al., as well as their colleagues, served to cover the basics of blockchain technology in an effort to better acquaint readers with its potential implementations in the field of big data and industrial applications[2][3][4]. The peer-reviewed publications Conoscenti et al. and Yli-Huumo et al. have also recently released comprehensive articles that study the areas in which blockchain has been applied and the academic issues that surround it. Unfortunately, blockchain technology in the healthcare domain is yet to be empirically evaluated with a thorough and rigorous research method [5][6][7].

The healthcare industry has benefited from blockchain in the following respects[8].

II. BLOCKCHAIN AND HEALTHCARE

There are now systems in place that enable medical history to be automatically updated and shared across an institution or network of organisations, but there are no electronic health records in use yet. If the information was structured in such a way that a collection of information located on the topmost layer of the blockchain only included non-

protected health information (or non-personally identified information), so the information could be expanded (PII). With cohorts of hundreds of thousands of patients, academics and other organisations will be able to use this expansive dataset. Such a vast supply of relevant data will aid clinical care, the detection of rare events, and the collection of public health data[9][10].

1. Seamless switching of patients between providers

In the same way, blockchain-based knowledge may enable specific patients to securely and anonymously grant permission to access their medical records, by providing each patient with a shareable private key. This could serve to facilitate the interoperability and collaboration of diverse health information technology (HIT) users [11][12].

2. Faster, cheaper, better patient care

A blockchain-based technology that stores safe and fast retrieval health information could go a long way in the healthcare industry. Any healthcare provider interested with caring for the same patient is able to minimize miscommunication, which prevents many complications, and detection and interventions are easier because of it [13].

3. Interoperable electronic health records

When it comes to transaction layers, the blockchain is poised to provide a single mechanism where organisations can send and exchange details, thanks to the use of structured data on the chain and secured access to privately held information such as photographs or images of a patient's radiograph. Connectivity can be vastly improved when using smart contracts and uniform permission protocols [14].

4. Data security

Between 2009 and 2017, 176 million healthcare documents were compromised in data breaches. By using blockchains safe features, individuals can properly safeguard their health records. Per person has a public key and a private key, which is only available for the amount of time required.

And if it would be necessary to exploit each user personally to access private details, hacking would be hampered by the fact that the system would prevent automated attacks. Because blockchains can provide an immutable audit trail of health records, they can also be used to maintain an electronic health record[15][16][17].

5. Mobile health apps and remote monitoring

In this age of advancing technologies, mobile health apps are growing in importance. Electronic medical records (EMRs) have been discovered to be maintained through a blockchain network, and data transfer can occur quickly, as well as becoming accessible for self-monitoring and home treatment. Since root exploits enable hackers to gain access to the patient's private key, this area is vulnerable to malware[18].

6. Tracing and securing medical supplies

With blockchain technology, pharmaceutical supply chains will be more stable and identified for us to see. Labor costs and greenhouse pollution are also part of the supply manufacturing process[19]

7. Health insurance claims

The blockchain is particularly suited to claim processing, as it enables medical incidents to be presented as they happened, with no room for deception after the fact[20].

8. Tracking diseases and outbreaks

Real-time outbreak reporting and the exploration of disease trends may be supported by blockchains capabilities[21].

9. Safeguarding genomics

Genomic data leakage has been a big concern as a result with several businesses now carrying out human DNA sequencing. Blockchain could discourage this, and an online marketplace for genomic knowledge would provide scientists with ready-made test materials. This will reduce the prevalence of unsafe sales and the expense of intermediary businesses[22][23].

The first use of blockchain in healthcare is only in the early stages. There are a number of applications in use that employ blockchain technologies on a limited scale, including Ethereum and Hyperledger Fabric[24][25].Blockchain services can help with the management of healthcare data by providing increased protection and a better synchronization between various processes[26][27][28].

C. CONCLUSION

The paper examined recent blockchain healthcare analysis patterns. Blockchain technology provides a transparent network, and because of the delicate value of data being stored and handled, it has become widely accepted in the healthcare industry. The thesis was conducted to discover where the emerging state of blockchain healthcare testing and application now stands. According to our report, interest in blockchain technology is on the rise, and healthcare is starting to make use of it. Data exchange, patient history, and access regulation are common usage cases of blockchain technology in healthcare, but few other scenarios are being investigated, such as supply chain management and prescribing management. The good news is that plenty of the blockchains untapped capacity remains. Most re-search use blockchain technologies in healthcare to offer a novel system, architecture, or model. In addition, the specifics of the blockchain components used are seldom shared, such as the blockchain platform, consensus algorithm, and blockchain sort. First and foremost, smart contracts will greatly benefit the network, allowing for the integration of processes on the blockchain. The majority of studies, however, may produce only a preliminary implementation of their ideas or any implementation specifics of their concepts.

When it comes to additional science, blockchain technology is a relatively recent phenomenon in the healthcare industry, and new avenues for implementing it remain to be discovered. At a high level, blockchain can be used where it makes sense and is essential.

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