A review on impact of Blockchain and Big data on healthcare sector

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Abstract: Hospitals, medical clinics, and diagnostic centres have to deal with critical situations and emergencies daily, and managing documentation is a cumbersome process. Using blockchain, healthcare providers can create an elaborate and highly efficient database management system. The network can house a wide range of data about different medicines, diagnostics and test results, patient medical and insurance information, and emergency contact information. Building such a massive database requires a systematic approach. Even administrative tasks such as scheduling a doctor’s appointment and managing medicine inventories can be performed easily with blockchain. The technology provides not only functional efficiency but also a cost-effective model for data management. The major goal of this study is to find out how the impact of this technology is affecting the healthcare industry. We can also identify the new features that can be provided to user for better treatment of the health issues by using the technology. In this paper, we review and propose a solution that can be used to manage individual health data as well as cross-institutional sharing of this information.

Keywords: data analysis, queries, processing, embedded devices, healthcare

1. Introduction

Healthcare industry is growing rapidly. In the last 40 years there is a numerous increase of data in this sector. Record keeping is becoming the major concern for the today’s industry. In the early years hard copy of the data was kept. Maintenance of record was easy as files can be store under a big room. Now we are living in a digital world, as the world is moving toward the digitization the maintains of the data is becoming a difficult task. Hospitals and treatment centres still rely a lot on traditional and offline record-retention procedures for routine activities. There’s little to no potential for data interoperability among service providers.

Blockchain functionalities can help immensely when it comes to maintaining databases about drugs and medicines. Transactions between pharmaceutical companies, wholesalers, doctors, and patients can form a private blockchain network, and cryptographic encryption can keep the data secure. Additionally, all related parties can keep track of their inventory levels.
The implications of Big Data Blockchain for the global healthcare industry are enormous. Instead of being relegated to the periphery, Big Data Blockchain allows people to operate at the centre of the value stream – controlling how their own data is used and monetised. Big Data Blockchain enables interoperability and data liquidity to be achieved on a global scale. It allows regulatory compliance to be automated and adaptable at both a corporate and governmental level. Business intelligence departments, decision support tools, AI engines and other intelligence systems can gain access to new data sets, forming a comprehensive and longitudinal view of clinical, operational, environmental, social and other data. It eliminates the slow and manual processes that have become standard practice for provider credentialing, prior authorisations and claim adjudication. It enables and enhances real-time analytics and intelligence algorithms. It allows data to be managed with far greater specificity, control and accountability. It opens the door to new research collaborations and medical discoveries, greater individual empowerment and engagement, and global health access and equity.

Blockchain's ability to keep an incorruptible, decentralized and transparent log of all patient data makes it a technology rife for security applications. Additionally, while blockchain is transparent it is also private, concealing the identity of any individual with complex and secure codes that can protect the sensitivity of medical data. The decentralized nature of the technology also allows patients, doctors and healthcare providers to share the same information quickly and safely.
2. Literature Review

The authors explore a blockchain structure applied to EHRs. Authors build on this distributed ledger protocol originally associated with Bitcoin. The blockchain uses public key cryptography to create an append-only, immutable, timestamped chain of content. Copies of the blockchain are distributed on each participating node in the network. The Proof of Work algorithm used to secure the content from tampering depends on a “trust less” model, where individual nodes must compete to solve computationally-intensive “puzzles” (hashing exercises) before the next block of content can be appended to the chain. These worker nodes are known as “miners,” and the work required of miners to append blocks ensures that it is difficult to rewrite history on the blockchain [1].

The author examined that health bank has thereby become a symbol of end user respectively patient empowerment in healthcare which rides alongside digitalization, new digital business models and digital health initiatives. Blockchain technology will further boost this end user and patient empowerment in healthcare [2].

The authors have illustrated as blockchain is demonstrated in the financial field that trusted, auditable computing is possible using a decentralized network of peers accompanied by a public ledger. In this paper, the author proposed an App (called Healthcare Data Gateway (HGD)) architecture based on blockchain to enable patient to own, control and share their own data easily and securely without violating privacy, which provides a new potential way to improve the intelligence of healthcare systems while keeping patient data private [3].

The author explained that the use of blockchain technology in health care is at a promising stage in development but blockchain-based applications are yet to be demonstrated as a viable platform for exchanging and reviewing information. Healthcare systems should be cautiously optimistic regarding the potential of blockchain and do a thorough business and technical diligence that is driven by targeted use cases to be successful [4].

Immutability is an important aspect of blockchain for building trust and protecting the integrity of data stored on the blockchain. Once data are stored on the blockchain, it cannot be changed. Modifications and deletions can be accomplished through appending new records to the blockchain that supersede the originals. However, the older records on the blockchain remain intact. Distributed ledgers are used for building a broad class of applications and services like secure, robust cryptocurrencies (e.g., Bitcoin); for providing verifiable ownership of assets; and for managing access rights to personal data. These services can be provided without the requirement that a single organization be trusted with the data [5].

Healthcare is a multi-dimensional system established with the sole aim for the prevention, diagnosis, and treatment of health-related issues or impairments in human beings. The major components of a healthcare system are the health professionals (physicians or nurses), health facilities (clinics, hospitals for delivering medicines and other diagnosis or treatment technologies), and a financing institution supporting the former two. The health professionals belong to various health sectors like dentistry, medicine, midwifery, nursing, psychology, physiotherapy, and many others. Healthcare is required at several levels depending on the urgency of situation [6].
3. Conclusion

The increase in reported incidents of security breaches that compromise privacy of individuals requires us to question the current model used to collect patient information. What we have learned from bitcoin and the underlying blockchain technology is that there are ways for us to protect this information by using a distributed ledger. In this paper, we review and propose a solution that can be used to manage individual health data as well as cross-institutional sharing of this information. The solution will increase clinical effectiveness and an increase in research when the data is shared with researchers. The proposed system solution based on blockchain technology that includes providers, hospitals and clinic, insurance companies, and patients. All along the ownership of the data would belong to the individual or the patient.

4. References


