

Chapter 5

A Systematic Literature Review on the Application of Blockchain Technology in Biometric Analysis Focusing on DNA

Dilshan Hasitha Fernando

Sabaragamuwa University of Sri Lanka, Sri Lanka

Banujan Kuhaneswaran

 <https://orcid.org/0000-0002-0265-2198>

Sabaragamuwa University of Sri Lanka, Sri Lanka

B. T. G. S. Kumara

 <https://orcid.org/0000-0003-3941-2275>

Sabaragamuwa University of Sri Lanka, Sri Lanka

ABSTRACT

In the present world, we need a secured human identification system to identify humans. These kinds of systems will help forensics and the healthcare sector. But with the rapid development of technology there might have a huge security problem with these kinds of security systems. So, we also need more highly secured technology to implement this secured system. Because of this concern the authors move with the blockchain as the main technology area for this application. Also, the authors chose to use DNA or genome to identify humans as the unique key. Applying DNA binary sequence to the blockchain will provide multiple problems, which are finding and suitable algorithms. So, in this review, the authors are providing a systematic literature review (SLR) by focusing on multiple factors which are blockchain and the DNA using standard eight databases. From these reviews, the authors found the 73 total research publications, and after reading the title and the abstraction the authors selected the most relevant 10 research papers for this research domain. This paper is discusses the most suitable technology combinations and future works.

DOI: 10.4018/978-1-6684-4755-0.ch005

INTRODUCTION

In 2008, a Bitcoin whitepaper was published by an unknown person called Satoshi Nakamoto (Lemieux, 2013). According to Satoshi Nakamoto's whitepaper, bitcoin is a cryptocurrency powered by blockchain technology (Nakamoto, 2008). At the beginning of the blockchain, this technology was used for financial works and trading transactions. In 2014, Vitalik Buterin published Ethereum blockchain technology in a whitepaper (Buterin, 2014) and introduced a Smart contract. Then blockchain is used for many systems outside of finance and trading. Because of the Smart contract technology, blockchain security, and immutability quality, blockchain is used for the healthcare sector (Mettler, 2016), human identification (Wang et al., 2017), forensic (Brotsis et al., 2019), and product or property tracking (Niya, Dordevic, Nabi, Mann, & Stiller, 2019) just to name a few. Currently, the blockchain used as a cloud-based database, IPFS, or Interplanetary File System (Ristea, Langford, & Leitner, 2017) is an example. A Smart contract enables the development of business logic (Bragagnolo, Rocha, Denker, & Ducasse, 2018). Before inventing blockchain technology, there was a huge issue with financial transactions because of the finance-based cyber-attack such as denial of server or DOS attacks and ransomware. But after inventing the world's first decentralized cryptocurrency, it surpassed its original intention (Taylor, Dargahi, Dehghantanha, Parizi, & Choo, 2020).

DNA or Deoxyribonucleic-Acid is one of the important biometrics in the human body. According to (Hashiyada, June 20th 2011), the grown human body contains approximately 60 trillion bio cells. Each bio cells have an exact copy of DNA. DNA is like a blueprint of the human body, and DNA contains the complete detail of body structure. Each cell contains a full copy of the DNA. Depending on the location of the cell, only a relevant part of the DNA is activated (Christopher P. Austin, 2022). Even biometric technology like a fingerprint, face recognition, and iris scanning have been rapidly developed, DNA is the most reliable way to biometric for identification. Because DNA is intrinsically unique and digital, it will not change even a person's afterlife (Hashiyada, June 20th 2011). According to (Wald, Khoshgoftaar, Napolitano, & Sumner, 2012), Human Genome contains approximately 3 billion base pairs. The base pair includes four characters: A, C, G, and T. Those letters stand for adenine, cytosine, guanine, and thymine. This means the human approximately DNA sequence contains more than 12 billion characters.

In this paper, researchers provide the SLR, a systematic way to analyze and discuss the publications and find the gaps in published manuscripts in domain knowledge. Researchers found there are some research papers available in the standard databases which are focused on several domain areas like human identification (Chernomoretz et al., 2020), healthcare (Dambrot, 2018; Mathur, Pandey, & Goyal, 2020; Neto et al., 2020), etc. even though there is some research, researchers found gaps in those areas.

This chapter is organised as follows. Section 2 briefly overviews the blockchain, DNA, and related research. Section 3 will describe the method of mapping studies. Section 4 will describe the results, and Section 5 will discuss the results. Finally, Section 6 explains the conclusions and future works.

BACKGROUND

This section briefly discusses the main domain areas in which the researchers plan to conduct the research; Blockchain and DNA.

More succinctly, blockchain is the technology that keeps transaction lists with the help of cryptography. A list like this comprises numerous data blocks structured in chronological order, linked, and

21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/a-systematic-literature-review-on-the-application-of-blockchain-technology-in-biometric-analysis-focusing-on-dna/316576

Related Content

Precious Metal Prediction by Using XAI in the Perspective of Digital Transformation

Samet Oztoprak and Zeynep Orman (2021). *Emerging Challenges, Solutions, and Best Practices for Digital Enterprise Transformation* (pp. 284-298).

www.irma-international.org/chapter/precious-metal-prediction-by-using-xai-in-the-perspective-of-digital-transformation/275712

Impact of Digital Transformation via Unified Communication and Collaboration Technologies: Productivity and Innovation at a Global Enterprise

Anthony D. Bolton, Leila Goosen and Elmarie Kritzinger (2022). *Impact of Digital Transformation on the Development of New Business Models and Consumer Experience* (pp. 271-298).

www.irma-international.org/chapter/impact-of-digital-transformation-via-unified-communication-and-collaboration-technologies/299781

Mobile Technology: Simplifying Tourism Business Operations and Facilitating Tourists

Pramendra Singh (2022). *Disruptive Innovation and Emerging Technologies for Business Excellence in the Service Sector* (pp. 219-229).

www.irma-international.org/chapter/mobile-technology/300545

Role of Virtual Leadership and Digital Fatigue on Employee Engagement

Abhilasha Dixit, Deepali Soni and Sandeep Raghuwanshi (2024). *Digital Business and Optimizing Operating Strategies* (pp. 1-26).

www.irma-international.org/chapter/role-of-virtual-leadership-and-digital-fatigue-on-employee-engagement/336374

Manufacturing Education for Society 5.0: Reframing Engineering and Design

Jennifer Loy (2020). *Promoting Inclusive Growth in the Fourth Industrial Revolution* (pp. 74-97).

www.irma-international.org/chapter/manufacturing-education-for-society-50/258034