

Chapter 1: Introduction

1.1 Introductory Discussion

The introductory discussion sets the stage for the research by providing context and background information on the topic at hand. It is designed to orient the reader to the purpose and scope of the study, as well as to highlight the significance of the research question. By providing this foundation, the introductory discussion helps the reader to understand the research that follows and to appreciate its relevance and contribution.

To effectively handle patient information, the electronic health record (EHR) system is an important healthcare industry resolution. The EHR system enables data exchange with healthcare professionals and aids in the predicting of health issues. It holds extremely sensitive data and stores health-related information [1]. A few inappropriate changes or revisions of certain EHR information might have serious outcomes. Hence, confidentiality becomes a key component of EHR systems. The EHR system needs a tamper-resistant element to function properly. When a person's lifetime health-related data can be gathered and kept in a way that makes it impossible for it to be tampered with, it significantly improves the quality of their personal protection healthcare. Blockchain's immutability, backup, and cryptographic verifiability features might make it a useful tamper-resistant storage option for the EHR system.

The crucial step in obtaining the greatest advantages from an innovative study is data sharing. It is crucial to understand the 3 Ws, or where, what, and when. Before beginning the process of data exchange, these inquiries should be precise. There aren't many operating scopes, and the owner of the data set must offer incentives and rewards. This study demonstrates safe data exchange while utilising blockchain's advantages. Blockchain, a distributed ledger, is a new development in the IT industry.

According to a Silicon Valley specialist, the consensus technique is regarded as an important and vital invention. The removal of unauthorised parties achieves trust, which is a key feature of blockchain technology. Blockchain is currently used in many industries, including health care, IoT, cloud computing, information security, data trade, etc [2]. The misunderstanding and abuse of information are the key difficulties in this data sharing.

Obtaining accurate and timely data is crucial for medical personnel to diagnose and address emergencies quickly. Artificial intelligence (AI) can assist doctors, nurses, and other medical staff in using real-time, precise information to expedite and improve essential treatment decisions. The use of AI can lead to better preventive measures, cost savings, and reduced wait times for patients by producing faster and more realistic results.

In our study, we demonstrate that machine learning and deep learning techniques can be utilized to classify the severity of an illness. Our aspiration is that other researchers will take notice of our findings and be motivated to tackle this problem with even more effective solutions. We

have already observed a significant level of interest and activity among other researchers, and their work has served as a source of inspiration for us.

1.2 Literature Review

A literature review is a critical component of any research study, and the same applies to a thesis. It provides an overview of existing research in the field, identifying gaps and opportunities for further investigation. The literature review aims to synthesize relevant and credible information from various sources, such as academic journals, books, and conference proceedings. The literature review of a thesis typically begins with a comprehensive search for literature related to the research problem, including keywords and phrases relevant to the study. The review is then organized and analysed to identify key themes, debates, and inconsistencies in the literature. The literature review is not merely a summary of the works consulted but is intended to demonstrate the author's ability to engage with the literature critically. A literature review is an essential part of a thesis because it allows the researcher to contextualize their research and identify its place in the existing body of knowledge. Through a literature review, the researcher can identify research gaps and formulate research questions that can be addressed through the research. We have reviewed some paper that is related to our field of work. The literature Survey is clearly described in the Table 1.1.

Table 1.1: Literature Survey

RESEARCH PAPER	OBJECTIVES	CONTRIBUTIONS	LIMITATION
K.N.G.L. Reshwanth et al. [3]	Making a Blockchain technology approach for drug delivery in health care	Blockchain tech in healthcare can enhance data sharing and interoperability, and help healthcare systems tackle public health threats such as COVID-19.	Didn't use optimization techniques for securing the data.
Sharda Tiwari et al. [4]	Create a real time secured medical management system based on blockchain and internet of things	Proposed an IoT-based prototype that uses Blockchain technology for secure and private patient data access.	Didn't applied the encryption process before applying blockchain technology.
Haddad, A. [5]	Establish Generic Patient-Centred Blockchain-Based EHR Management System.	Developed a PCEHRM system for patient-centred blockchain-based EHR management, enabling patients to manage their healthcare records across multiple stakeholders while maintaining privacy and control without requiring a centralized infrastructure via access and viewing rights management.	Not disclosed the key generation process for encryption.

Abdelgalil, L. [6]	Create a framework for a Collaborative Sharing of Electronic Health Records Based on Blockchain	Presents "Health Block", a framework that utilizes various technologies to facilitate secure and collaborative sharing of electronic health records (EHRs) while preserving patient privacy.	Encryption not done with the key generation process.
Ghassan Al-Sumaidae et al. [7]	Give the performance analysis of a private blockchain network built on Hyperledger Fabric for healthcare	Presenting the use of Hyperledger Fabric in healthcare to improve information flow and solve the fragmentation problem between two medical institutions. In addition, two rate controllers on Hyperledger Calliper are used to evaluate the performance of our network: fixed and linear.	Not disclosed the key generation process.
Stawicki et al. [8]	Use the Blockchain in Fighting Medical Misinformation	Blockchain tech can aid medical adaptation to change, curb medical misinformation in pandemics, and promote scientific consensus and transparency for public access, ultimately leading to better health outcomes and informed citizens.	Didn't optimize the Model using meta-heuristic optimization algorithm.
Pilares et al. [9]	Addressing the Challenges of Electronic Health Records Using Blockchain & IPFS.	To aid the acceleration of EHR adoption. Another objective is to ensure the robustness of the system to resist malicious attacks.	Didn't encrypt the EHR using the Optimal Key.
Said, O. LBSS [10]	Use a Lightweight Blockchain-Based Security Scheme for IoT-Enabled Healthcare Environment.	Suggests a security scheme, LBSS, for healthcare-enabled IoT. The proposed scheme gives importance to data and outperforms traditional models based on performance metrics, as seen through simulations using the NS3 package.	Not done optimal key generation process and model optimization.
Mohsan et al. [11]	Making a Decentralized Patient-Centric Report and Medical Image Management System Based on Blockchain Technology and the Inter-Planetary File System	This study suggests an Ethereum blockchain and Inter-Planetary File System based system for managing patient test reports and images. A patient-centric access control protocol is employed to ensure secure access control, and the system provides distributed and secure data access for hospitals, patients, and image requestors. The framework was tested using an Ethereum TESTNET blockchain and demonstrated to be efficient and practical.	Not used the model optimization.

Sammata, Parthiban [12]	Making a model that allows the user to control access to data, permit the hospital authorities to read/write data, and alert emergency contacts.	Develops a new Hyperledger blockchain enabled secure medical data management with deep learning (DL)-based diagnosis (HBESDM-DLD) model.	Didn't applied the the use of metaheuristic optimization based hyperparameter optimization.
S. Melhem et al. [13]	Utilize machine learning to classify patient care into inpatient or outpatient, in order to reduce the efforts and time expanded by the doctors.	Use 4 different machine learning model to improve the performance.	The model was not optimized using a meta-heuristic optimization algorithm.
Hiwale, M. et al. [14]	Create a Blockchain-Based Proposal for Tuberculosis Data Management in India	The work identifies challenges of the NPY scheme from patients' and healthcare stakeholders' perspectives and proposes a blockchain-based architecture called Nikshay Chain to share medical reports and bank details among stakeholders. The proposed architecture improves productivity and reduces workload and costs while ensuring effective data management.	Encryption process was not utilized prior to the implementation of blockchain technology.

1.3 Objective

The objective of a thesis paper is to present a unique and well-researched argument on a particular topic or question. The paper should demonstrate a clear understanding of the subject matter and provide a comprehensive analysis of relevant data and literature. The primary objective of a thesis paper is to contribute new knowledge or insights to a particular field of study and provide a platform for future research. Additionally, the paper should showcase the author's critical thinking, analytical, and writing skills. The purpose of a thesis paper is to provide a scholarly and rigorous exploration of a particular topic that advances the understanding of the subject matter.

After completing the literature survey, the objective of this thesis paper becomes clearer and more refined. The literature survey helps us to identify the existing gaps in the field, which can guide the direction of the thesis. The objective of the thesis paper is to contribute new knowledge or insights to the field, to address a particular research question, or to provide a critical analysis of existing research. Additionally, the literature survey helps us to find the appropriate research methods and data analysis techniques to achieve the objective of the thesis. The main objective of this thesis paper is to –

- Develops a new Hyperledger blockchain enabled secure medical record management system with machine learning or deep learning-based diagnosis model by optimization algorithm.
- Allows the user to control access to data, permit the hospital authorities to read/write data, and alert emergency contracts.
- Encrypt the health records using an optimization algorithm to generate the most optimal key for encryption. This process aims to find the best possible key that can provide

maximum security and confidentiality for the health records. The optimization algorithm will utilize various techniques to generate the optimal key for encryption, which will ensure that the health records remain secure and protected from unauthorized access.

- Enhance the performance in encryption or diagnosis procedures by utilize the Normal Model, which can reduce the time required for these tasks. By employing the Normal Model with optimization algorithm, the efficiency and effectiveness of these processes can be improved.

1.4 Organization of the Thesis

The organization of the thesis typically refers to how the thesis is structured and presented to the reader. It outlines the different sections or chapters of the thesis and the order in which they appear. This particular thesis is composed of five chapters. In the first chapter, the thesis introduces the reader to the research topic using the introductory discussion, provides a literature survey, outlines the objectives of the study, and discusses the organization of the thesis. The second chapter presents the methodology and techniques used, including a flowchart or block diagram of the proposed work and a general algorithm for dataset analysis, among other required techniques. Chapters three and four analyse and validate the methodology using various classification problem, each consists with an introduction, implementation, and results analysis. The final chapter or chapter five, provides a conclusion that summarizes the previous analysis, discusses the future scope of the work, and highlights the limitations of the study.