

AN EFFICIENT HEALTHCARE DATA EXCHANGE BY USING BLOCKCHAIN

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Abstract: Machine learning's ability to recognize patterns in data, analyses it, and draw conclusions has demonstrated its value in a number of industries. For machine learning to produce correct results, a sufficient amount of data must be available. In order to increase the accuracy of machine learning, data exchange and reliability are essential. Data sharing is emphasized by the block chain technology's decentralized database. Block chain technology's consensus ensures that data is authentic and safe. By combining the security and dependability of Block chain Technology with the convergence of these two technologies, very precise machine learning outcomes can be produced. This project provides an overview of the potential benefits of merging these two technologies in the healthcare industry..

KEY WORDS— emphasized, block chain, decentralized database, machine-learning model.



1. Introduction:

Data is a crucial tool for machine learning. Additionally, the data can be employed in preprocessing methods to enhance study environments. Data may be generated electronically through the internet or obtained through interviews, questionnaires, surveys, and research. In machine learning, efficiency, classification accuracy, and prediction rate are all improved by both the quality and quantity of data. Machine learning models have established their value in a number of industries, including marketing, e-commerce, healthcare, and transportation. It can be used for prediction and detection of diseases like cancer, diabetes etc. in healthcare. As the growing needs, the data increased and data are stored in centralized servers. The data in these centralized servers are released at a fee. This limits the quality of research. The centralized server also faces the failure issues and hence the reliability of data suffers. Blockchain comes

with decentralized database without compromising on data reliability. The data is accessible to users easily in decentralized database. Blockchain technology consists of a decentralised network of linked nodes. Every node in the blockchain network has a copy of the distributed ledger, which contains information on each and every transaction. Machine learning models may be fed data directly. Beyond the financial industries, blockchain has demonstrated its versatility and capacity. The Bitcoin cryptocurrency, which was introduced in Satoshi Nakamoto's whitepaper in 2008, gave blockchain technology recognition. This can be illustrated by saying that a transaction will start if someone in the Blockchain network does so. The P2P network's "nodes" will publicise the transaction. The transaction will be verified by the nodes. The transaction will be joined with other legitimate transactions to form a block if it is verified. The block

will be added to the current Blockchain and is marked with the previous block's hash and timestamp. The block is unmodified and unchangeable. There is no single point of failure issue, and no centralised server to control the network. Beyond bitcoins, blockchain technology has advanced greatly. One of its applications is in healthcare. The proposed system, which was based on the bitcoin concept, aimed to satisfy customer information needs **while maintaining patient privacy**. If a consumer wants to view the patient's record under this idea, they must pay a fee in bitcoins. This has the drawback of patient records being misused, and having to continually pay fees makes it expensive. From public blockchain networks to private blockchain networks, the research changed direction. In the healthcare industry, numerous parties must access the same data. The Ethereum Blockchain Technology-based Gem Health Network was introduced. With the use of this infrastructure, information may be distributed throughout several organisations. The most recent treatment information is accessible to avoid the transparent use of out-of-date information. Additionally, it demonstrates prior communications between the patient and all doctors. Another study in this area was conducted by Estonia's digital health infrastructure, which was developed to assist insurance companies in monitoring all patient medical care. The Counterfeit Medicines Project based on hyper ledger Technology, was based on drug counterfeiting. The drug produced was timestamp and added to the blockchain which cannot be altered. This also helps in detecting the ownership transfer thereby protecting fraud. Health bank, on the other hand came up with an idea of Data is new Gold. In this the patient's health data like heartbeat, blood pressure, sleep patterns etc. can be taken from various health apps available or from wearable or physician visit. This data was stored in Blockchain. The patient's in

return will get financial benefit and data can be utilized by researchers. The blockchain design pattern was made famous by Bitcoin but Bitcoin is an application of blockchain technology. The blockchain technology has advanced substantially. Any node can join the bitcoin network without restriction when conducting a transaction. Businesses needed a certain level of anonymity to leverage blockchain technology's decentralised advantages. Many organisations can come together on a common platform where they can securely share and exchange business information. The append-only shared ledger used by the decentralised database, where transactions are logged, provides significant benefits for the healthcare sector. The full medical history of a patient is crucial for therapy, and it adds value when diverse stakeholders have access to the same data. The components of the permission block chain network will be as follows: Combined Ledger The only distributed system that maintains a record of all the transaction. that occur in a network of blockchains. Each peer in the blockchain network keeps it up to date. Network of peers Any transaction started by any network node will be verified by peers. The block will also include the verified transaction. Authority for Membership/Certificates To join the network, the user needs authorization. The Certificate Authority verifies the users' identities and makes sure they have the proper access to the ledger for the transaction they are carrying out. The software or business logic that runs on the ledger is known as a smart contract.

EXISTING SYSTEM:

In the current systems, there are barely any medical services offered in rural areas. People who require medical care frequently have to travel great distances. Even in urban areas, the service is occasionally delayed. Doctors and patients hardly ever interact with one another. Additionally, patients had to wait a long time to speak with the doctor. The secrecy of the data is the major issue here. Non-confidential data transfers are likewise a source of worry, but systems that handle them are sometimes referred to as "health information exchanges.

PROPOSED SYSTEM:

Machine Learning can be used in identification of Treatment, give personalized suggestion to Patient, Outbreak Prediction etc. User can get disease summary on the basis of symptoms entered. Tokenization, removal of stop words and stemming are used as preprocessing. Many techniques have been done in this area which includes SVM classifier, Naive Bayes and Decision Trees. The best result obtained has the accuracy percentage of 98.51%. The machine learning algorithm can also give lifestyle suggestion to Patient on the basis of current medical situation and medical history. To anticipate future results, machine learning models can be trained. Block chain technology's consensus ensures that data is authentic and safe. Combining the security and dependability of Block chain Technology with the convergence of these two technologies can produce machine learning results that are extremely accurate. This essay provides an outline of the potential benefits of fusing these two technologies in the healthcare industry.

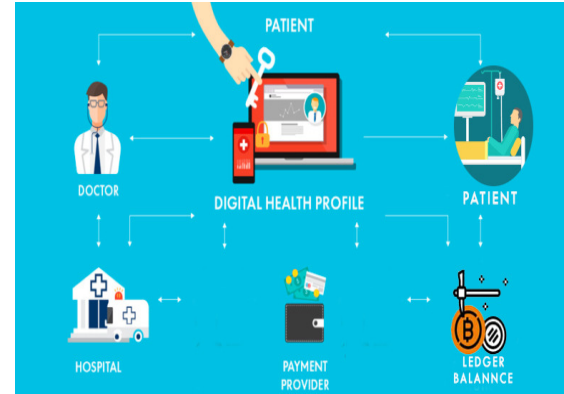
ADVANTAGES:

1. Machine learning algorithms can identify treatments and provide personalized suggestions to patients based on their symptoms and medical history, which can improve the accuracy of diagnosis and treatment.
2. By using blockchain technology, the system can ensure the security and legitimacy of data, which is an important concern in healthcare.
3. The convergence of machine learning and

blockchain technology can result in highly accurate and secure healthcare services.

4. The proposed system can potentially improve access to healthcare services, especially in remote areas where medical services are scarce, by providing telemedicine services.

SYSTEM ARCHITECTURE:



INPUT DESIGN:

The information system and the user are connected through the input design. It entails creating specifications and protocols for data preparation, which are steps required to convert transaction data into a form that can be processed. either having individuals key the data directly into the system or inspecting the computer to read it from a written or printed document. The input process is designed with an eye towards minimizing the quantity of input necessary, minimizing errors, minimizing delays, minimizing extra stages, and maintaining a straightforward workflow. The input is made in such a way that it offers security, usability, and privacy preservation. These factors were taken into account by Input Design:

- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.
- What data should be given as input?

OUTPUT DESIGN:

- A quality output is one that shows the information clearly and complies with the end user's needs. Any system's outputs are how processing results are transmitted to users and other systems. It is decided during output design how information will be displaced for immediate demand as well as the hard copy output. It is the user's most crucial and direct source of information. The interaction between the system and aiding user decision-making is improved by efficient and intelligent output design. 1. It is important to design computer output in an organised, well-thought-out manner. The correct output must be created, and each output component must be created so that users may utilise the system successfully and easily. When analysing computer-generated output, one should pinpoint the precise output that is required to satisfy the specifications.
 - 2. Decide on how to convey the information.
 - 3. Produce reports, documents, or other forms containing data generated by the system.
 - One or more of the following goals should be achieved by an information system's output format.
 - Communicate details regarding previous actions, the state of things right now, or future predictions.

- Indicate significant occasions, chances, issues, or warnings.
 - Start an action;
 - Verify an action.

OVERVIEW OF IMPLEMENTATION:

PYTHON:

- Python is an open-source, high-level programming language that may be used for a wide range of programming activities. The Python programming language is an interpreted one that is automatically translated into byte code before use.
- It is also a dynamically typed language that includes (but does not require one to use) object-oriented features.
- Python is also extensively used by Google to implement many components of its Web Crawler and Search Engine & Yahoo !For managing its discussion groups.

FEATURES OF PYTHON PROGRAMMING:

1. A simple language which is easier to learn Python has a very simple and elegant syntax.
 - It is much easier to read and write Python programs compared to other languages like: C++, Java, C#.
 - Python makes programming fun and allows you to focus on the solution rather than syntax. If you are a newbie, it is a great choice to start your journey with Python
2. Free and open-source
 - You can freely use and distribute Python, even for commercial use. Not only you can use and distribute software's written in it, you can even

make changes to the Python source code.

- Python has a large community constantly improving it in each iteration.

3. Portability

- You can move Python programs from one platform to another and run it without any changes.

4. Extensible and Embeddable

- Suppose an application requires high performance. You can easily combine pieces of C/C++ or other languages with Python code.
- This will give your application high performance as well as scripting capabilities which other languages may not provide out of the box.

5. A high-level, interpreted language

- Unlike C/C++, you don't have to worry about daunting tasks like memory management, garbage collection and so on. Likewise, when you run Python code, it automatically converts your code to the language your computer understands. You don't need to worry about any lower-level operations.

6. Large standard libraries to solve common tasks

- Python has several standard libraries which makes life of a programmer much easier since you don't have to write all the code yourself.
- For example: Need to connect MySQL database on a Web server?
 - You can use MySQL dB library using import MySQL db.
 - Standard libraries in Python are well tested and used by hundreds of people.

7. Object-oriented

- Everything in Python is an object. Object oriented programming (OOP) helps you solve a complex problem intuitively. With OOP, you can divide these complex problems into smaller sets by creating objects.

4 Reasons to Choose Python as First Language.

1. Simple Elegant Syntax

- Programming in Python is fun. It's easier to understand and write Python code. Why? The syntax feels natural. Take this source code.

for an example :

```
a = 12
b = 03
sum = a + b
print(sum)
```

Even if you have never programmed before, you can easily guess that this program adds two numbers and prints it.

2. Not overly strict

- You don't need to define the type of a variable in Python.
- Also, it's not necessary to add semicolon at the end of the statement.
- Python enforces you to follow good practices (like proper indentation). These small things can make learning much easier for beginners.

3. Expressiveness of the language

- Python allows you to write programs having greater functionality

- with fewer lines of code. Here’s a link to the source code of Tic-tac-toe game with a graphical interface and a smart computer
- opponent in less than 500 lines of code. This is just an example. You will be amazed how much you can do with Python once you learn

OVERVIEW OF SYSTEM TESTING:

Testing is done to look for mistakes. Testing is the process of looking for any flaws or weaknesses in a piece of work. It offers a means of examining the operation of parts, subassemblies, assemblies, and/or a finished product. It is the process of testing software to make sure that it satisfies user expectations and meets requirements without failing in an unacceptable way. Different test types exist. Every test type responds to a certain testing requirement.

RESULT:



CONCLUSION:

If correctly used, blockchain technology offers a wide range of advantages that go far beyond bitcoin. With blockchain, the commission and centralised authority's hegemony might both be eliminated. Data can be immediately fed into machine learning models, but central authority will regulate the rights. This will improve machine learning models' precision and effectiveness, as well as their usability. The healthcare sector is directly related to people's lives. Both doctors and patients may benefit from this. The practical application of this paradigm will be there in terms of future scope. To stop fraud, this model can be expanded for inventory.

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