

Blockchain Based Secured Data Shearing in Healthcare

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Abstract: *Healthcare organizations generate a large amount of sensitive patient information such as medical records, test reports, prescriptions, and personal details. Sharing this information between hospitals, doctors, laboratories, and patients is important, but the existing centralized systems can face problems such as unauthorized access, data modification, privacy loss, and lack of proper tracking. This research focuses on using blockchain technology to provide a more secure way of sharing healthcare data. The proposed approach uses blockchain to maintain a secure record of data-sharing activities and to provide better control over who can access patient information. The actual medical data is stored outside the blockchain in encrypted form, while important information related to the data and access transactions is recorded on the blockchain. Access to the data is provided only to authorized users through suitable authentication and access-control methods. Smart contracts can be used to check access requests and record the activities performed by different users. The system also supports removing access when a user's permission is no longer valid. This helps to reduce unauthorized use of healthcare information and provides a clear record of data access. The proposed approach is discussed in terms of data security, privacy, access control, integrity, and transparency. The main aim of this research is to develop a secure and practical healthcare data-sharing model that gives patients and healthcare organizations better control over sensitive medical information while maintaining reliable and traceable data-sharing activities..*

Keywords: Patient Data Governance, Access Revocation, Consent Management, Audit Traceability

I. INTRODUCTION

Nowadays, healthcare services use digital information for many activities such as storing patient records, sharing medical reports, and providing treatment. Patient information can be used by doctors, hospitals, laboratories, insurance companies, and other healthcare organizations. Sharing this information can help healthcare professionals provide better and faster services. However, patient records contain sensitive information, so it is important to make sure that the data is shared only with the right people and for the right purpose.

One of the common problems in healthcare data sharing is managing user access. Different users may need different types of information at different times. For example, a doctor may need patient information during treatment, while a laboratory may need only selected information for a particular test. When the required work is completed, the access should also be removed. If this is not managed properly, patient information may remain available to users who no longer need it.

Blockchain technology can be useful for keeping a secure record of data-sharing activities. The transactions stored on a blockchain can be checked and traced, which can help in maintaining transparency. However, storing complete medical records directly on the blockchain may not be practical because healthcare data can be large and sensitive. Therefore, this research considers storing the actual medical information in secure external storage and using the blockchain to maintain information related to access and sharing activities.



The main purpose of this research is to develop a simple and secure approach for sharing healthcare data. The proposed approach focuses on managing user consent, controlling access, and removing access when it is no longer required. It also keeps a record of sharing activities so that data access can be checked when necessary. The proposed framework aims to provide better control over patient information and support secure data sharing between authorized healthcare users.

II. PROBLEM STATEMENT

Healthcare data is shared between doctors, hospitals, laboratories, and other authorized users. However, managing who can access patient data and for how long is still a challenge. Sometimes, users may continue to have access even after their required work is completed, which can increase the risk of misuse of sensitive information.

Patients also have limited control over how their data is accessed and shared. Therefore, there is a need for a system that can provide controlled access, allow permissions to be removed when they are no longer required, and maintain a clear record of data-sharing activities. This research focuses on developing a blockchain-based approach that provides secure data sharing, better permission management, access revocation, and proper tracking of healthcare data access.

III. RESEARCH GAP

Existing Approach	Limitation	Proposed Improvement
Centralized healthcare data sharing	Patient data depends on one main system	Distributed data handling
Blockchain-based data sharing	Managing different data permissions can be difficult	Simple permission management
Role-based access	Users may need different access for different tasks	Task-based access
Fixed access permissions	Access may continue after the work is completed	Access revocation
Traditional data-sharing systems	It may be difficult to check the complete history of data use	Clear access tracking
Different healthcare users	Each user may require different information for a specific purpose	Purpose-based data sharing
Long-term patient records	Old permissions may not match the patient's current needs	Updated consent management
Multiple healthcare services	Data sharing can involve many steps between different users	Simple sharing workflow

IV. OBJECTIVES

- To develop a blockchain-based system that records the complete process of healthcare data sharing, from the initial request to the final use of the data.
- To reduce unnecessary data sharing by checking whether the requested information is really needed for the required healthcare task.
- To provide only the required parts of a patient's healthcare record instead of sharing the complete record unnecessarily.



- To keep track of the status of shared data, such as requested, in use, completed, and closed, for better monitoring.
- To close the data-sharing session after the required healthcare work is completed.
- To maintain a clear blockchain record of data-sharing activities so that unusual or unnecessary access can be identified when required.

V. PROPOSED SYSTEM

The proposed system uses blockchain to make healthcare data sharing more secure and controlled. When a healthcare user needs patient information, the system first checks what data is needed for the specific task. Only the necessary information is shared instead of giving access to the complete patient record. The actual medical data is kept in secure external storage, while the blockchain stores important details related to the data-sharing activity. The system keeps track of the sharing process through different stages such as Requested, Shared, In Use, Completed, and Closed. The system also checks previous sharing records to avoid sharing the same patient information unnecessarily. Once the required healthcare work is finished, the data-sharing session is closed and the activity is recorded on the blockchain. This helps maintain a simple and clear record of how healthcare data was shared and used.

VI. PROPOSED SYSTEM ARCHITECTURE

The proposed architecture provides a simple flow for secure healthcare data sharing. The system first receives a data request and checks the reason and required information. Only the necessary data is selected and shared. The blockchain records the sharing activity, while the actual patient data is kept in secure storage. The system also checks repeated requests and monitors how effectively the shared data is used.

Proposed System Architecture



VII. EXISTING SYSTEM

In the existing healthcare systems, patient information is usually stored and shared using centralized databases or blockchain-based platforms. These systems mainly try to keep medical information safe and allow only authorized users to access it. Blockchain can help maintain a record of data-sharing activities and make it easier to check when and by whom the data was accessed. In some systems, the actual patient information is stored separately, while the blockchain keeps the related transaction details. However, existing systems mainly focus on protecting the data and controlling user access. They do not always check whether the user really needs all the requested information for a particular healthcare task. Because of this, the same information may sometimes be requested or shared more than once. Therefore, there is a need for a system that can not only protect healthcare data but also check whether the shared data is actually useful for the required task. The proposed system focuses on this aspect by monitoring data usage and measuring the efficiency of data sharing.



VIII. ADDITIONAL FEATURES OF THE SYSTEM

The system includes some additional features to make healthcare data sharing easier and more controlled. These features mainly focus on avoiding unnecessary data requests and checking how the shared information is used.

1. Data Request Priority: The system gives priority to important healthcare requests. For example, a request needed for urgent patient treatment can be handled before a normal request. This helps the system manage requests in a better way.

2. Data Sharing Reason Verification: Before sharing the data, the system checks why the user needs the patient information. It checks whether the requested information is actually related to the given healthcare task. If it is not related, the request can be stopped or sent for further checking.

3. Duplicate Data Request Alert: The system checks the previous requests made for the same patient information. If the same or similar data is requested again, the system gives an alert. This helps to avoid unnecessary repeated sharing of the same information.

4. Data Sharing Efficiency Score: The system checks how much of the shared information was actually useful for the required task. An efficiency score is calculated by comparing the useful data with the total data requested.

Efficiency Score = Useful Data Used / Total Data Requested × 100

For example, if 10 data units are requested and only 7 are useful, the efficiency score will be 70%. This helps to understand whether the data-sharing process was useful or whether unnecessary information was requested.

IX. NEW FEATURES FOR BETTER DATA SHARING

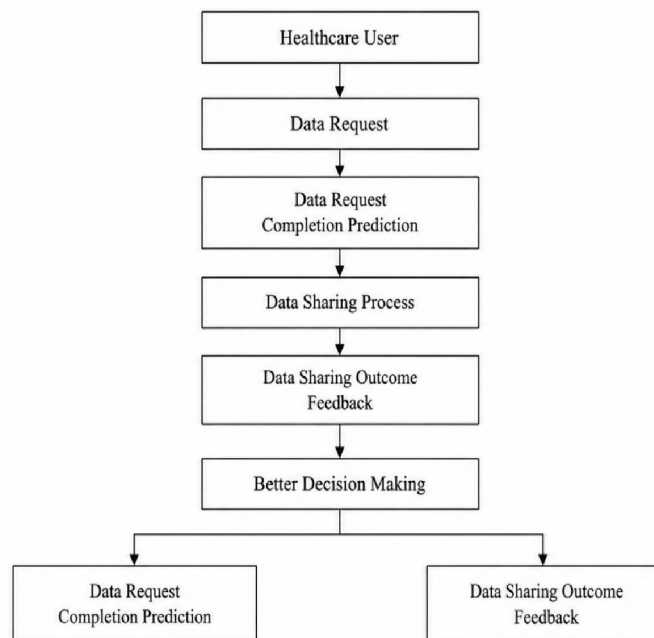


Fig. 1. Proposed Data Sharing Improvement Process

The proposed system includes some additional features that can make healthcare data sharing more useful and easier to manage. These features help the system check a data request before sharing the information and understand what happened after the data was shared. The main features are given below.



1. Healthcare User:

The process starts when an authorized healthcare user needs some patient information for a particular task. The user can be a doctor, hospital staff member, laboratory user, or any other authorized person. The user sends a request for the required information, and the system records the basic details of the request.

2. Data Request:

When a user needs patient information, a data request is created. The request contains details about the information required and the reason for requesting it. This helps the system understand what the user actually needs before sharing the data. The request can also be used later to check what happened during the sharing process.

3. Data Request Completion Prediction:

Before processing the request, the system checks the available request details and previous records. It tries to estimate whether the request can be completed successfully. If the system finds that the request may be incomplete or may have some problem, it can give an alert to the user. This can help reduce repeated requests and unnecessary processing.

4. Data Sharing Process:

After checking the request, the required healthcare information is shared with the authorized user. The system shares the information needed for the particular healthcare task. The actual patient data can be stored securely, while important details about the sharing activity can be recorded on the blockchain. This helps maintain a clear record of the data-sharing activity.

5. Data Sharing Outcome Feedback:

After the data has been shared, the system records the result of the request. The result can be marked as **Successfully Used, Partially Used, Not Used, or Sharing Failed**. This helps the system understand whether the shared information was actually useful. For example, if some requested information was not used, this can be considered when handling similar requests in the future.

6. Better Decision Making:

The information collected from previous requests and their results can help improve future data-sharing decisions. The system can identify problems such as repeated requests, incomplete requests, unused information, or unsuccessful sharing. This can help users make better requests and reduce unnecessary sharing of patient information.

IX. REVIEW METHODOLOGY

This study follows a simple review process to understand the current development of blockchain-based healthcare data sharing. The main focus of the review is not only on data security, but also on how healthcare information is requested, shared, and used. First, research papers related to blockchain, healthcare data sharing, patient information, privacy, and secure data management were identified from reliable research databases. Recent studies were given more attention so that the review represents the current direction of the field. After collecting the papers, their titles and abstracts were checked to remove studies that were not closely related to healthcare data sharing. Papers that mainly discussed other blockchain applications without a healthcare data-sharing connection were not considered further.

The selected studies were then reviewed based on a few important points, such as the type of healthcare data involved, the method used for protecting the data, the way users obtain access, how data-sharing activities are recorded, and whether the system provides any method for monitoring actual data use.

The reviewed information was then compared to identify common practices and areas that receive less attention. From this comparison, it was observed that many systems concentrate on securing and controlling access to healthcare information, while the usefulness of the requested data and repeated data requests receive comparatively less attention. Based on these observations, this research considers an additional direction: measuring the efficiency of healthcare data sharing. The review therefore provides the basis for studying features such as data request priority, reason verification, duplicate request alerts, and a data-sharing efficiency score.



X. PRIVACY AND SECURITY

Healthcare data contains sensitive patient information, so it needs proper protection during sharing. The proposed system shares only the required information with authorized users and keeps the actual data in secure storage. Blockchain is used to record important sharing activities, which helps to keep the process traceable. This approach helps reduce unnecessary data exposure and improves the privacy and security of patient information.

XI. DATA SHARING IMPROVEMENT ALGORITHM

Input: Healthcare Data Reque stand Previous Request Records

Output: Request Result and Data Sharing Outcome

The system first receives a data request from an authorized healthcare user.

It checks what information the user needs and why the information is required.

The current request is compared with previous request records.

The system checks whether the request is likely to be completed successfully.

If a possible problem is found, the user is informed before the request is processed.

If the request is suitable, the system continues with the data-sharing process.

The required healthcare information is then shared with the authorized user.

The system keeps a record of the important details related to the sharing activity.

After the data is shared, the system checks what happened to the request.

The result is recorded as Successfully Used, Partially Used, Not Used, or Sharing Failed.

This result is saved as feedback and can be used to make better decisions for future data requests.

XI. EXPECTED RESULTS

The system is expected to make healthcare data sharing more organized and easier to manage. The Data Request Completion Prediction feature may help identify possible problems in a request before the data-sharing process is completed. This can reduce incomplete requests and avoid unnecessary repeated attempts.

The Data Sharing Outcome Feedback feature is expected to show what happened after the information was shared. The result can be recorded as Successfully Used, Partially Used, Not Used, or Sharing Failed. This can help in understanding whether the requested information was actually useful.

The results collected from earlier requests can also help users make better decisions when handling similar requests in the future. This may reduce unnecessary data requests and improve the overall data-sharing process. Over all, the expected outcome is a more organized healthcare data-sharing process that can learn from previous request results and improve future data-sharing decisions.

XII. COMPARISON WITH EXISTING SYSTEM

Point	Existing System	Our Approach
Data Request	The request is mainly handled after it is received.	The request is checked before it is processed.
Request Completion	It does not usually check whether the request may be completed successfully	It checks the request and predicts whether it can be completed successfully.
Repeated Requests	Earlier request results may not be considered when a similar request is made again	Earlier request information can be used to handle future requests better.
After Data Sharing	The main focus is on completing the data-sharing process.	The system also checks what happened after the data was shared.
Data Usage	It may not clearly record whether the shared information was actually useful	It records whether the data was successfully used, partly used, not used, or failed.



Use of Previous Results	Previous results are not mainly used for future requests.	Previous results are used as feedback for future requests.
Future Decisions	Each data request is mainly handled as a separate activity	Previous request results can help in making better future decisions.
Main Focus	Mainly focuses on secure and controlled data sharing.	Focuses on improving data sharing using request prediction and outcome feedback.

XII. ADVANTAGES

Early Problem Detection:

The system can identify a possible problem in a data request before the sharing process is completed. This gives the user a chance to correct the request early.

Less Repeated Processing:

By checking previous request information, the system can reduce repeated attempts for requests that may not be completed properly.

Clear Understanding of Data Use:

After sharing the information, the system records whether it was successfully used, partly used, not used, or the sharing failed. This gives a better idea of what happened to the shared data.

Learning from Previous Results:

The result of an earlier request can be used as feedback when handling a similar request later. This can help improve future data-sharing decisions.

Better Request Planning:

Users can understand their previous request results and make more suitable data requests in the future. This may reduce unnecessary information requests.

XIII. LIMITATIONS

The proposed system has some limitations that need to be considered. The prediction of a data request may not always be accurate because healthcare requirements can change from one case to another. The system also depends on previous request records, so its prediction may be less useful when there is not enough past data available. The final result of data sharing also needs to be recorded correctly because wrong or incomplete feedback can affect future decisions. In addition, the same type of data may be useful for one healthcare task but may not be required for another task. During the initial stage, the system may take some time to collect enough request and outcome information before giving better results. The additional checking and prediction steps may also require some extra processing time. The system needs proper recording of each data-sharing outcome to work effectively. If users do not provide correct information about how the shared data was used, the feedback process may not give reliable results. Also, healthcare organizations may follow different data-handling practices, which can make the system difficult to apply in every environment. Therefore, further testing with real healthcare data and different types of users is required to improve the accuracy and practical use of the proposed system.

XIV. FUTURE SCOPE

In the future, this system can be improved by using more healthcare data-sharing records. More previous requests and their results can help the system make better predictions about whether a new data request can be completed successfully. It can also help in finding common reasons for incomplete or failed requests.

The system can further be improved by using machine learning to study previous data requests and their results. Based on this information, the system can provide better suggestions before a new request is processed. It can also show simple reports about frequently requested data, successful requests, unused information, and failed requests. In the



future, the Data Sharing Outcome Feedback feature can be connected with hospital or healthcare management systems. This can make the process of recording the final result easier and reduce manual work.

The system can also be tested with different types of healthcare users such as doctors, hospitals, laboratories, and researchers. Another possible improvement is to calculate a Data Sharing Efficiency Score by comparing the information requested with the information actually used. These improvements can make the system more practical and useful for real healthcare environments. Future work can mainly focus on improving prediction accuracy, reducing unnecessary data requests, and making the data-sharing process more efficient.

XV. CONCLUSION

Healthcare data contains important and sensitive patient information, so it is necessary to manage its sharing properly. Blockchain can help maintain a reliable record of data-sharing activities, but simply securing the data is not enough. It is also important to understand whether the requested information is really needed and what happens after the data is shared. In this research, two additional features are considered: Data Request Completion Prediction and Data Sharing Outcome Feedback. The first feature checks a request before processing and tries to identify whether there may be a problem in completing it. The second feature records what happened after the data was shared.

The outcome can be recorded as Successfully Used, Partially Used, Not Used, or Sharing Failed. This information can help the system understand the actual result of previous data-sharing activities. The results of earlier requests can also be considered when handling future requests. This can help reduce repeated or unnecessary requests and improve the way healthcare information is shared. Over all, this approach focuses not only on sharing healthcare data securely but also on understanding the result of the sharing process. With further testing and real healthcare data, the system can be improved and made more suitable for practical use.

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