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Transaction Method of Warehouse Sharing Platform Based on Blockchain Technology

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Abstract

As big data and blockchain technology advanced very quickly, warehousing transaction methods became a hot area of research, and it is a trend to encourage the use of warehousing sharing platforms. The commonly used methods for barter transaction warehousing precision tend to fall short of ideal precision in transaction computations. On the topic of transaction forms and accuracy, this study proposes from the perspective of blockchain technology a warehouse transaction model. The model is implemented using a warehousing trading platform based on transaction data and methods to utilize the proposed approach. It filters unnecessary transaction information, based on the warehouse characteristics, and evaluates transaction forms and outcomes. The model computes results by looking at the rate of change in transaction data and methods, working them based on actual transaction scenarios and adjusting transaction parameters and indicators. MATLAB virtual simulations clearly show that assigning the warehousing transactions calculation to the blockchain improves the accuracy of the transactions to a rate of 95.3%. It evaluated transaction contents on the platform and transaction forms, then counted what types of transactions happened and how often. The study proves that blockchain technology is a good solution to ensure fast, reliable and sound warehousing transactions.

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Introduction

To meet the data analysis requirements when data is stored continuously,[1] encrypted,[2] and chained together, these transactions present challenges. As transaction of goods moves increasingly towards analyzing index of transactions and designing better trading frameworks through warehouses trading platforms,[4] such platforms suffer from insufficiency of high precision calculations[5] as a consequence of complexity of data structure and limitation of server computing power.[6] This is why researchers worldwide are using block-chain based computing on top of warehousing sharing platforms to improve transaction efficiency. Preliminary surveys from the years 2020 to 2022.[7] also show a blockchain technology potential to increase warehousing transaction efficiency by 20.36% and transaction levels by 35.2% if the sharing platform for warehousing transactions is adopted. Although such advancements have been made, the warehousing transactions on the sharing platforms as such are poorly satisfactory and not secure. More effective trading methods and higher accuracy warehouse transactions are still needed [9]. While warehousing transactions take advantage of the well-defined database and systematic goods statistics, there are still several problems to be resolved such as the problem of existing transaction safety, the problem of how to do comprehensive data analysis, and the problem of the sharing platform of warehousing. From transaction information "(block encryption, structural processing, data analysis [10], correlation analysis, and other such processes)" that is complicated, the platforms cannot accurately analyze transaction methods. For warehousing you have HUGE datasets to deal with so the server API pumping processes needs to be robust to process these data. An integrated

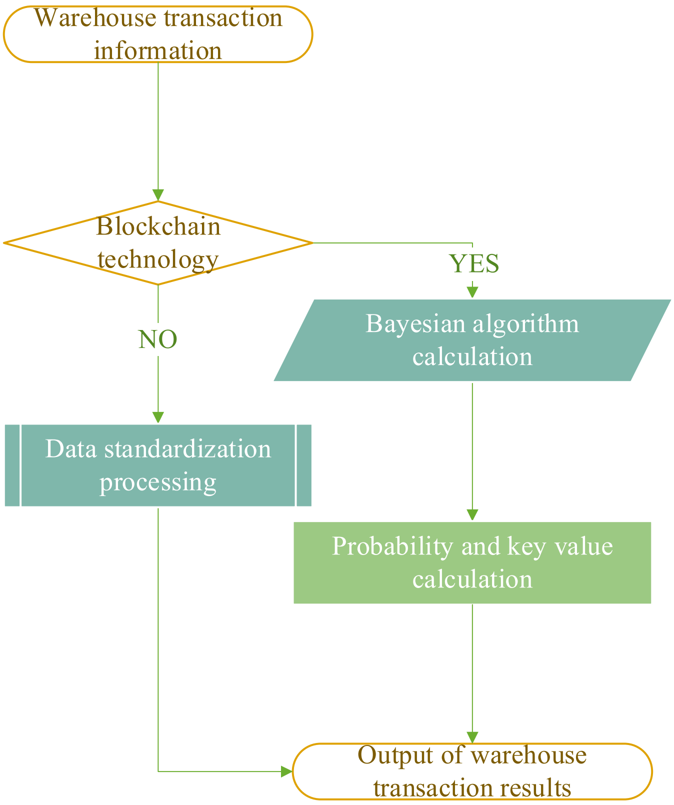

Fig. 1: A Workflow of Comprehensive Transaction Information Analysis using Blockchain Computing Methods.

and efficient warehousing transaction process based on transaction information analysis and data collected from home warehousing sharing platforms can streamline and efficient warehousing transaction process. The combination of these integrations results in operational improvements reflected in outcomes shown in Figure 1.

Some researchers have merged blockchain computation technologies with logical computation methods, aiming to accomplish the comprehensive analysis of transaction information and optimized parameters design. The results confirm that utilization of idealized blockchain computing combined with "intelligent algorithms" enables detailed analysis of the "warehousing data, unearthing hidden keys, transaction details, and other important knowledge to satisfy the needs of warehousing transactions". Blockchain computing is an aggregation of cutting edge technologies in "cloud computing, cloud platforms, and big data". They are also used in "auditing, economics,[13] management and other fields". But they have problems, such as "susceptibility to hacker attacks, channel blockages when computing, and difficulty in quantitatively calculating warehousing data". While blockchain methods can handle a variety of transaction data, they are limited in data correlation, simplification, and coupled computation capability, and hence can only process the warehousing data initially. Furthermore, the blockchain computing method takes data retrieved from "standard cargo databases" and "apply intelligent algorithms" to "predict transaction information" in full coverage. In this case, paying extra attention to transaction information on warehousing sharing including warehousing time and cargo information.[14] Then they are cross referenced with cargo and warehousing databases. Transaction details such as the content, methods and warehousing characteristics are monitored by the system and results are compared across methods, examining storage attributes and transaction points. It quantifies transaction data applying these constraints to enhance comprehensive design calculations.[15] However, warehousing transactions are still largely affected by external factors and subjective interference, thus, it is still impossible to make a complete and accurate prediction about the transaction information. Warehousing platforms have a highly complex design with many feature points, and most of these cannot be easily simplified by blockchain methods to handle cargo and transaction data. The resulting complexity then leads to an extremely tedious design process0[16] By integrating blockchain methods and more advanced intelligent algorithms, "such as hill climbing algorithms or improved particle swarm optimization, transaction data can be quantified, large datasets made easier to work with and warehousing transaction more accurate and reliable, using the full computing power of blockchain".[17] Overall, warehousing platforms are inefficient in terms of cargo data filtering and transaction performance.[18] Massive and frequent data simply fail to get validated efficiently, and intelligent algorithms can fill that gap. To conduct a comprehensive prediction of transaction information, this paper suggests utilizing blockchain computing along with intelligent algorithms to identify the characteristic quantities, i.e., cargo data[19] as well as numbers and hidden keys, and finally produce a result set. It is an approach to improve the "mining and computation of the transaction information effectively".

Review of Literature

Method of Calculation

Blockchain based computation method collects content associated with transaction, warehousing and cargo information. It uses Bayesian algorithms to calculate data probabilities to evaluate likelihood of deviations from zero; link datasets together establishing correlations and logical relationships; and identify optimal indicators. It integrates blockchain computing with Bayesian algorithms in order to filter key data values from large cargo datasets and aggregate primary warehousing transaction data. Moreover, the blockchain computation methodology facilitates the simplification of transaction information, cargo specific data as well as warehouse platform datasets with categorization key transaction types within the warehousing framework. To ensure "precise calculations, implementation conditions, trading environments, and constraints for the warehouse sharing platform are defined" leading to the following results:

Parameters for the data collection for warehouse platforms include "transaction content x_{ij}, server nodes y_i, server response rate, transaction correlation function k, transaction frequency $JC(x_i \otimes x_{i-1})$" and others. Equation (1) H_i is the equation of data collection process of warehouse sharing platform.

$$ral(k) = \sum x_{ij} \otimes y_i \times k \cdot 100 \cdot H_i \tag{1}$$

" $rand(\sum x_i)$ is a random server number;

$\overline{x_{ij}} \geq \max \sum x_{ij} \cdot H_i$, value of which is constraint.

Transaction Information Processing: It includes warehouse sharing $f_1(x \cdot k) \cdot f_2 \cdots f_n \cdot H_i$, identity verification function $f(x_{ij}) \in \sum x_{ij} \approx 1$", the process of which is shown in Equation (2):

$$\sum_{y_{ij}} f(x) = \overline{y'} \cdot \sum x_i \cdot k \tag{2}$$

Bayesian probability calculation: The probability is $\sum x_{it}$, the function of child parent node is $ZF(x)$, the equation of which is shown below:

$$ZF(x_{ij}, y_{ij}) = \frac{\zeta_{ii} + (x_i \otimes x_{i+1})'}{y_{ij}} \cdot H_i \tag{3}$$

Methodology

Correlation of Warehousing Data

However, warehouse data appears to exhibit some degree of correlations, while transaction forms are varied and transaction content frequently changes. That implies that warehousing data needs to be simplified so relationships can be made and key data points identified. However, transaction outcomes suffer from challenges like hacker attacks and user losses. These issues must be mitigated by calculating the correlation between transaction data to be able to analyze warehousing data in its entirety. The detailed flow is depicted in Figure 2.

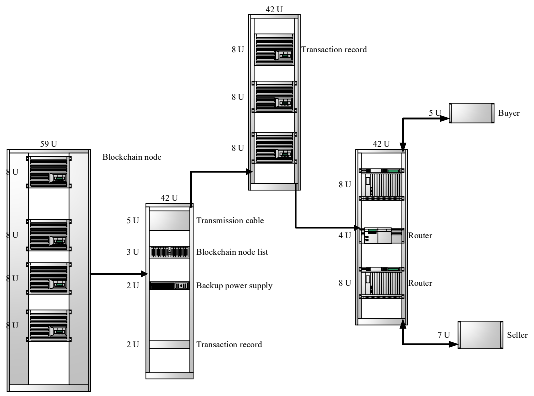

Fig. 2: Warehouse sharing platform data obtaining process

The results show that although transactions get standardized, the distribution points are evidently very dispersed and data fluctuations remain. This highlights the frequent and the large transaction volumes witnessed on the warehousing platform. The transaction modes, hidden keys, and cargo numbers are evidence for a trend towards larger scale quantification within the platform's observations. With the rise of this trend, our data processing should be standardized further.

Table 1: Warehousing Data via Bayesian Probability Analysis

"Index Probability Level (%)	Transaction Content	Transaction Information	Hide the Key	Volume of Goods	Total Probability
5	90.03	86.52	88.4	73.75	79.67
10	85.44	83.1	87.4	77.42	90.53
15	82.77	82.05	88.5	85.9	74.63
20	71.35	81.95	71.9	84.9	80.28
25	75.06	83.82	79.1	75.91	83.64
30	73.62	79.45	82.4	81.57	84.86
35	91.82	85.23	85.2	84.68	87.6
40	77.68	77.7	84.7	80.44	92.17
45	80.8	91.6	76.8	81.13	85.65
50	90.07	78.25	77.5	83.48	77.42
55	82.61	83.38	72.3	91.41	90.9
60	70.69	82	84.9	88.66	92.29
65	82.03	73.76	77.13	90.77	77.59
70	82.34	82.62	71.8	80.4	80.4
75	83.32	81.06	73.6	72.98	77.84
80	77.29	79.68	83.8	74.98	85.69
85	82.33	90.49	78.9	90.83	72.15
90	75.32	91.92	76.6	92.16	90.14
95	82.09	90.75	86.7	75.27	86.9
100	83.27	91.26	85	74.85	78.25"

Table 2: Warehousing Data Statistical Analysis

"Random Sample	Percentage of Data Collected by Block-chain Computing Method (%)		Data Conversion Rate (%)		Bayesian Probability Calculation
	Structured Data	Unstructured Data	Standard Rate	Probabilistic Bias	
74	85.05	14.95	65.81	5.18	0.94
83	51.46	48.54	63.26	4.49	0.93
26	40.76	59.24	45.92	4.20	0.84
67	32.11	67.89	61.71	3.64	0.9
75	52.8	47.2	93.49	6.00	0.87
45	42.69	57.31	1.14	5.37	0.85
30	19.32	80.68	46.23	5.74	0.88
67	62.84	37.16	68.10	5.93	0.8
20	67.13	32.87	55.93	5.17	0.96
66	42.33	57.67	45.18	5.58	0.99
41	73.96	26.04	46.23	5.68	0.92
37	44.71	55.29	46.32	2.23	0.99
74	68.02	31.98	44.50	7.06	0.87"

Using the Bayesian probability calculations in Table 1, the integrated probability distributions in the warehouse sharing platform data are very likely. This means the data warehouse structure is practically and can bear large amounts of information. The statistical results in Table 2 summarize the results after a thorough analysis on Table 1.

It can be seen From Table 2 that all data have high standardization rate, probability ddeviation is less than 8 percent and Bayesian probablity is higher than 80 percent. Moreover, data warehousing data processing is effective because the proportion of unstructured data is significant.

Selection of Warehousing Trading Methods

Blockchain-based warehousing transactions primarily involve three methods: unilateral transaction, third party guarantee and two party transactions. The statistical representation of these three transaction methods is as follows:

Equation (4) details computation of unilateral transactions.

$$sof(x_{ij}) = \int_{i=1}^{n} \sum \overline{x_{ij} \otimes y_{ij}} \quad (4)$$

Equation 5 shows the calculaion of transaction between parties.

$$douf(x_{ij}) = \frac{k \cdot \sum \overrightarrow{x_{ij}} \cap \overleftarrow{y_{ij}}}{H_i} \quad (5)$$

Equation 6 represents the third-party guarantee calculation.

$$thirf(x_{ij}) = \begin{cases} sof(x_{ij}), \sum x_{ij} > \sum y_{ij} \\ douf(x_{ij}), \sum x_{ij} < \sum y_{ij} \end{cases} \quad (6)$$

"From the above analysis, the comaprison were made between the three methods of warehousing transaction and the results are shown in the Table 3. "

Table 3: Comparison of Results of Different Warehousing Trading Methods"

"Different Methods	Random Sample	Degree of Relevance	Verify
One-Party Transactions	10	78.25	Qualified
	84	72.52	Qualified
	68	75.89	Qualified
	87	76.36	Qualified
Transactions between the Parties	10	76.94	Qualified
	84	73.14	Qualified
	68	70.98	Qualified
	87	78.02	Qualified
Third Party Warranties	10	78.07	Qualified
	84	76.07	Qualified
	68	65.36	Qualified"

The results of Table 3 show that "the number of transactions of warehousing across unilateral, two party, and third party method varies randomly, and their change directions conforms to the requirements on that". Further, the frequency of data changing is still less than 20%, evidencing that standardized processing has tremendously contributed to the stability of warehousing transaction data. It sets the stability which allows the subsequent verification of methods in warehousing transaction.

Comprehensive Judgment of Warehousing Transactions

Based on blockchain technology, warehousing transaction method can integrate various approaches by the integrated method of transaction content, transaction form, and the factors such as hacker attack. Joint calculations using multiple methods are conducted, with the specific results detailed as follows.

Equation (7) presents the calculation for the unilateral joint transaction method.

$$sil(x_i) = \sum_{y_{ij}} sof(x_{ij}) \cup douf(x_{ij}) \cdot k \quad (7)$$

Equation (8) shows the calculation of the unilateral and the third party joint transaction method.

$$dof = sof(x_{ij}) \cup thirf(x_{ij}) \cdot \frac{k}{H_i} \quad (8)$$

“The calculation of Transaction method of two parties and third party is represented in Equation (9).

$$y_3(x_t) = sof(x_{ij}) \cup thirf(x_{ij}) \cup douf(x_{ij}) \cdot H_i \quad (9)$$

Using the hamster trading method powered by blockchain technology optimizes the warehouse sharing platform in many ways. The platform’s data is processed, data association processes among datasets are analyzed, and the data structure is optimized. Second, Bayesian probability helps reduce complexity of data, reduce data volume, and perform comprehensive process of cargo information. Finally, warehousing transaction methods are developed by repeatedly monitoring transaction content, transaction forms and calculation outcomes, creating a comprehensive dataset of warehousing transaction methods. The results of this dataset are then verified.

Blockchain-Based Transaction Method Selection Process for Warehouse Sharing Platforms

Once the Bayesian algorithm is applied, the blockchain powered warehousing would have to verify transaction information, inspect cargo details, investigate deeply into the data, such as cargo numbers and content. Figure 3 illustrates the detailed selection process of transaction methods.

Step 1: “First, figure out the nature of the platform of the warehouse sharing, then collect the detailed warehousing data. Correlation calculations are performed on the content of warehousing data, which

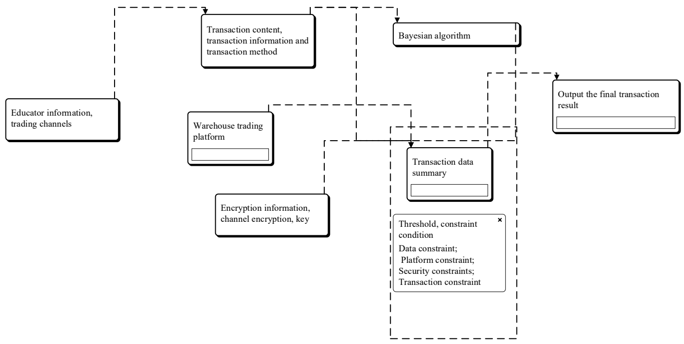

Fig. 3. Transaction Process of Warehouse Sharing Platform Based on Blockchain Technology

is approximately a standardized information set for warehousing sharing. Define in parallel the constraints on standardized warehousing data, transaction content, and blockchain technology by which the data can be preprocessed.”

Step 2: “Correlate and discrete data, record the trends and direction of warehousing transactions.”

Step 3: “Implement a warehousing transaction function. Interpret the transaction content, transaction methods, server details, cargo numbers, etc., including access server data, through the use of blockchain technology. In identifying the key values for warehousing transactions and accomplishing complete calculation of various warehousing transactions, weights and thresholds in transactions should be assigned.”

Step 4: “Determine the coefficients for transaction methods and storage and mining results. It informs on the storage transaction method having the higher likelihood according to them if the cargo data and the cargo numbers considered.”

Step 5: “Economically complete calculation of warehousing information and verification of present value and initial value constraints in transaction methods.”

Step 6: “Evaluate the accuracy, rationality, data simplification rate and complexity of warehousing transactions through a thorough prediction.”

Step 7: “Traverse all the data in the transaction datasetndata_times0teps)) and record any outlier values, redundant information. Continue with steps 2 through 6 for refinement and further analysis.”

Results and Discussions

Transaction Scenarios of Warehouse Sharing Platform Using Blockchain Technology:

Transaction on the Warehouse Platform

This paper analyzes the above data using a case study of a blockchain based warehousing trading platform; specifically, the number of goods in the platform, their content, the methods of transaction and the frequency of transaction within the platform. Time spans of storage transaction times are from 2020, 2021 and 2022. Calculated results are presented in Table 4 using MATLAB and standardized processing software.

Integrated Warehouse Trading Methods

Warehouse trading methods is a key indicator of comprehensive, which produces by warehouse transaction outcomes. Table 5 presents the result of detailed calculation.

Table 4: Transaction on the Warehousing Platforms

"Information Category	Information Detail	Transaction Nature	Data Amount (M)	Percentage of Frequent Transactions
Cargo Details	Identification Codes	Random	5460.75	0.46
Cargo Details	Timing of Arrivals and Departures	Directional	5644.69	0.96
Cargo Details	Origin of Goods	Random	3266.5	0.03
Cargo Details	Goods Category	Random	6239.06	0.91
Cargo Details	Movement Pathways of Cargo	Random	7435.69	0.94
Cargo Details	Security Measures	Random	1768.97	0.64
Transaction Details	Parties Involved	Random	5916.15	0.01
Transaction Details	Mode of Transaction	Random	1959.45	0.32
Transaction Details	Details of Transaction	Random	7896.32	0.75
Transaction Details	Transaction Intensity	Random	8251.36	0.93
Transaction Details	Regularity of Transactions	Directional	1513.53	0.44
Transaction Details	Volume of Trade	Directional	2632.72	0.32
Encryption Information	Specific Encryption Techniques	Random	6978.16	0.69
Encryption Information	Complete Encryption	Random	3908.04	0.32
Encryption Information	Phase-specific Encryption	Directional	7952.65	0.5
Encryption Information	Encryption During Transfer	Directional	8294.38	0.93
Defense Details	Security Firewall	Directional	690.02	0.93
Defense Details	Interpretation	Random	1669.01	0.33
Defense Details	Review Procedures	Random	5547.38	0.75"

Table 5. Integrated Warehousing Transaction Methods

Trading Methodologies	Information Category	Specific Detail	Index Value	Integration Score
Blockchain-based Warehousing Transaction Approach	Encryption Data	Data Encryption During Transfer	86.58	84.26
Blockchain-based Warehousing Transaction Approach	Encryption Data	Complete Data Encryption	82.44	84.29
Blockchain-based Warehousing Transaction Approach	Encryption Data	Targeted Encryption Strategy	85.43	86.78
Blockchain-based Warehousing Transaction Approach	Transaction Details	Participants	86.63	86.32
Blockchain-based Warehousing Transaction Approach	Transaction Details	Details of the Transaction	85.81	85.01
Blockchain-based Warehousing Transaction Approach	Transaction Details	Transaction Frequency	85.52	86.37

Trading Methodologies	Information Category	Specific Detail	Index Value	Integration Score
Blockchain-based Warehousing Transaction Approach	Commodity Details	Origin of Items	84.09	83.7
Blockchain-based Warehousing Transaction Approach	Commodity Details	Type of Items	83.6	84.84
Blockchain-based Warehousing Transaction Approach	Commodity Details	Goods Movement Paths	84.77	85.38
Blockchain-based Warehousing Transaction Approach	Commodity Details	Timing of Shipments	85.37	81.92
Blockchain-based Warehousing Transaction Approach	Commodity Details	Security Measures	82.25	80.7
Collaborative Warehouse Sharing Platform	Encryption Data	Data Encryption During Transfer	84.73	87.17
Collaborative Warehouse Sharing Platform	Encryption Data	Complete Data Encryption	83.97	86.91
Collaborative Warehouse Sharing Platform	Encryption Data	Targeted Encryption Strategy	84.29	85.73
Collaborative Warehouse Sharing Platform	Transaction Details	Participants	85.17	84.26
Collaborative Warehouse Sharing Platform	Transaction Details	Details of the Transaction	82.9	81.21
Collaborative Warehouse Sharing Platform	Transaction Details	Transaction Frequency	83.4	81.3
Collaborative Warehouse Sharing Platform	Commodity Details	Origin of Items	87.44	86.6
Collaborative Warehouse Sharing Platform	Commodity Details	Type of Items	84.36	87.1
Collaborative Warehouse Sharing Platform	Commodity Details	Goods Movement Paths	85.94	88.57
Collaborative Warehouse Sharing Platform	Commodity Details	Timing of Shipments	85.33	82.66
Collaborative Warehouse Sharing Platform	Commodity Details	Security Measures	84.2	85.15
Standard Warehousing Trading Techniques	Encryption Data	Data Encryption During Transfer	87.99	82.82
Standard Warehousing Trading Techniques	Encryption Data	Complete Data Encryption	86.58	84.26
Standard Warehousing Trading Techniques	Encryption Data	Targeted Encryption Strategy	82.44	84.29
Standard Warehousing Trading Techniques	Transaction Details	Participants	85.43	86.78
Standard Warehousing Trading Techniques	Transaction Details	Details of the Transaction	86.63	86.32
Standard Warehousing Trading Techniques	Transaction Details	Transaction Frequency	85.81	85.01
Standard Warehousing Trading Techniques	Commodity Details	Origin of Items	85.52	86.37
Standard Warehousing Trading Techniques	Commodity Details	Type of Items	84.09	83.7

Trading Methodologies	Information Category	Specific Detail	Index Value	Integration Score
Standard Warehousing Trading Techniques	Commodity Details	Goods Movement Paths	83.6	84.84
Standard Warehousing Trading Techniques	Commodity Details	Timing of Shipments	84.77	85.38
Standard Warehousing Trading Techniques	Commodity Details	Security Measures	85.37	81.92

"The transaction process for the data in Table 5 is shown in Figure 4."

Figure 4 shows that blockchain warehouse platform shows stable transaction performance and changes centralized and with normal pattern. This is a process whereby the strength of the platform's trading method is through its "data concentration, data volume, and data organization". This is done through the use of Bayesian algorithm whereby the probability of warehousing transactional content and trading methods is calculated. The algorithm checks data against calculated thresholds and constraints, removing data which is below the thresholds and irrelevant. It enables to compute the reduced dataset of the warehousing platform at an efficient speed.

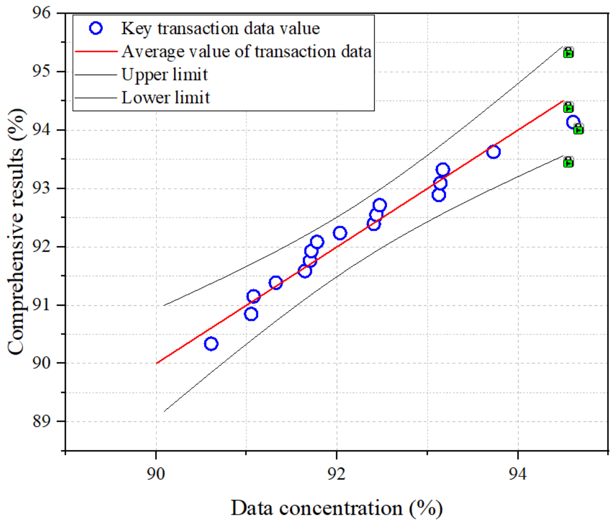

Fig. 4: The Transaction Process of the Warehousing Platform"

Reduction Rate in Warehousing Transactions with Transaction Data

Abnormal cargo data is identified in Table 6. The results are multiple verifications and iteratively removing some data to calculate transaction data.

The transaction data results from the Table 4 is represnted in Figure 5 , below.

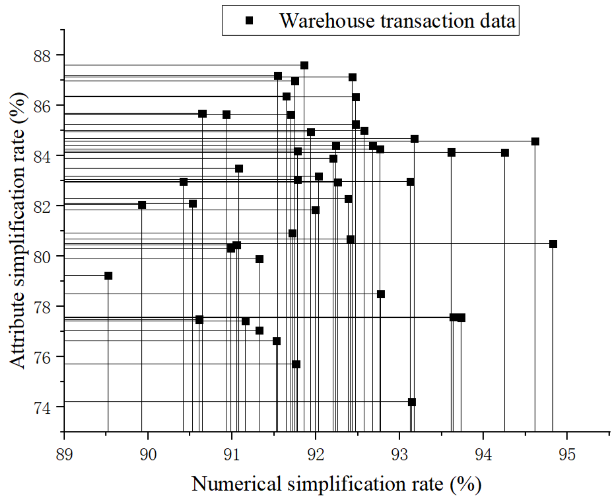

Fig. 5: Variation in Transaction data Reduction Rate

Table 6. Frequency of Anomalies in Warehousing Transactions

Iteration Range	Platform Category	Warehouse Sharing Platform	Block Server Infrastructure	Warehousing Systems	Trading Participant Interface	External Services Integration	Rate of Process Simplification (%)
0 to 50 Iterations	First Measurement	5.09	4.91	4.92	4.97	4.84	98.36
0 to 50 Iterations	Second Measurement	5.01	5.09	5.09	4.91	4.89	85.22
51 to 100 Iterations	First Measurement	5.13	5	5.16	4.98	5.17	92.75
51 to 100 Iterations	Second Measurement	5.09	5.02	4.94	5.18	5.17	90.68

Similarly, in Figure 5, there are low occurrence rate of data outliers that have no overlap or correlation with one another. This indicates that redundant data elimination is effective in rejecting outliers only once, without repeated rejections. Furthermore, outlier distribution is uniform and they are neither phased nor centrally eliminated, supporting the fact that the elimination of outliers is systematic and reasonable. The data sources listed in Table 4 are so diverse that excluding abnormal data is quite important in view of the proper calculation without redundant data.

Accuracy Rate of Transaction Data in Warehousing Transactions:

"Correction rate" is a "critical verification metric for the warehousing transaction as well as an elementary part of the warehousing platform's functionality and the goal of the blockchain deployment". Figure 6 shows the changes of the warehousing transaction correction method.

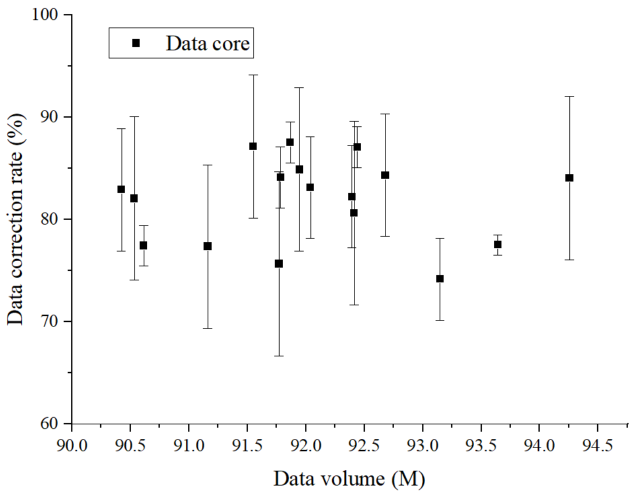

Fig. 6: Accuracy Rate of Warehousing Transaction Dat

The level of correction for warehousing transaction data is shown in figure 6 that has a concentrated correction level and with variable correction direction. The spread is dispersed among segments, and displays properties that are characteristic of a normal distribution. It is observed that the data correction accuracy of blockchain technology depends on that it ensures the clustering of calibration results and the migration from any point toward a correction direction. Results are presented and summarized from the comparison of various methods of evaluation of correction results for storage data, as shown in Figure 6.

In comparison with the traditional warehousing sharing platforms and transaction methods, the blockchain based warehousing transaction method increases the accuracy of transaction information dramatically. It corrects encrypted data, transaction details and content effectively, and the correction direction is random. The blockchain based method is found to have facilitated standardization of transaction data, defining of constraints and thresholds, and verifiable in later stages. In addition, the iterative deepmining process exhaustively checks encrypted information, transaction details, and content, to make the results as reliable as possible. Here, the encryption is adding the inherent randomness of blockchain technology, that minimizes subjective bias on the process of proofreading.

Accuracy of Storage Transactions

A major shortcoming of traditional warehousing sharing platforms has been accuracy. A central objective of blockchain technology implementation is to enhance the accuracy of transaction. The results presented in the following section captured in Figure 7show transaction accuracy verification.

Table 7. Comparison of Warehousing Transaction Data Correction by Different Methods

Methodology	Information Category	Correction Success Rate (%)	Direction Adjust-ment
Blockchain-based Warehousing Transactions	Encryption Data	85.91	Random
Blockchain-based Warehousing Transactions	Transaction Details	85.67	Random
Blockchain-based Warehousing Transactions	Transaction Specifications	89.93	Random
Collaborative Warehouse Sharing Platform	Encryption Data	83.77	Random
Collaborative Warehouse Sharing Platform	Transaction Details	84.66	Random
Collaborative Warehouse Sharing Platform	Transaction Specifications	84.41	Random
Standard Warehousing Trading Techniques	Encryption Data	83.07	Random
Standard Warehousing Trading Techniques	Transaction Details	84.76	Random
Standard Warehousing Trading Techniques	Transaction Specifications	76.2	Random

Figure 7 shows that the blockchain based warehousing transaction method can not only combine the transactional data effectively with the transcriptual data over time, but also can improve calculation accuracy. Significant decreases in data redundancy, complexity, and volume, along with increases in data correlation are the main contributors to these improvements. The final accuracy of the warehousing transaction method results are summarized in Table 8.

Table 8 illustrates that the calculation accuracy of scalability from the blockchain warehousing transaction method is very high, i.e. 93.42% for transactions excavations 0-50 and 95.12% for 51-100 excavations. In addition, the verification data volumes were 45,142M and 55,425M respectively. Rates above 90% were rejected outlying values, key values, and redundant values. Also, data coupling, fitting, correlation, and validity exceeded 80% and testing frequencies were very high for non structured data. The overall performance of the proposed method in the presence of calculation constraints and data structure requirements matches to practical needs. The success is due to the blockchain based approach which is able to standardize and process unstructured data, simplify data complexity, reduce data volume and provide a robust foundation to warehousing transactions. Table 9 presents a random sampling analysis comparing different methods.

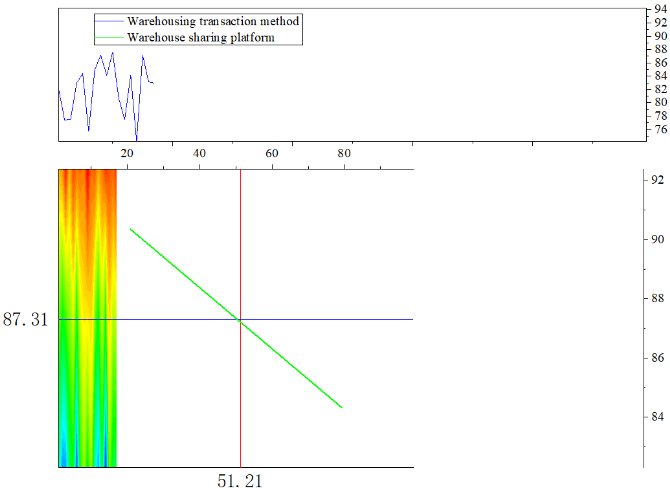

Fig. 7: Different Warehousing Transaction Accuracy

Table 8: Precision of Warehousing Transaction Calculation

"Dig Beep	Number of Samples	Verify the amount of data	Calculation accuracy
0~50 times	6	45142M	%93.42
51~100 times	8	55425M	%95.12
Number of outliers/ overall data =12.96%		Overall fit = 98.36%	
Key value ratio = 95.72%		Data coupling = 85.32%	
Key value rejection rate = 96.12%		Data correlation degree = 86.42%	
Theoretical value÷ actual value= 0.11%		Proportion of unstructured data = 65.32%	
Test frequency= 152.4%		Data validity = 86.35%"	

"Table 9: Results of Random Sampling Method"

Number of Sam-ples	Warehousing Transaction Content				Warehousing Transaction Information			
	Blockchain Technology	Sharing Platform	Amplitude	Difference	Blockchain Technology	Barter Law	Amplitude	Difference
35	92.23	84.31	6	7.6	92.41	80.68	5	8.4
81	90.76	84.52	2	8.38	90.61	77.48	8	8.79
5	92.73	84.05	2	7.94	91.78	84.19	8	8.05
48	92.39	82.29	4	6.66	93.14	74.22	4	7.96
25	90.53	82.11	4	6.66	92.43	87.15	6	8.23
22	91.16	84.42	2	8.99	92.03	83.81	6	8.65
96	93.64	77.57	9	7.74	93.13	82.96	9	9.19
29	90.42	82.97	4	7.55	91.65	86.37	8	8.72
69	92.67	84.39	7	9.08	91.08	83.5	7	7.29
59	91.76	75.71	6	7.66	91.05	80.45	8	9.29
72	91.94	84.94	7	7.84	93.73	77.56	2	7.84
55	91.54	87.19	9	9.81	91.72	80.92	9	8.95

In Table 8, the overall sampling accuracy of "the warehousing transaction method" adopted on the based "blockchain technology" is lower, while the transaction content and information accuracy is much higher than that of traditional warehousing sharing platform. The integration of the blockchain based method with the Bayesian algorithm that computes transaction probabilities, prioritizes high probability transactions, and verifies low probability other transactions accounts for much of this. Thus, this approach minimizes the influence of external factors in warehouse results by limiting the frequency of warehouse transactions.

Conclusion

This study formulates a blockchain based warehousing transaction method to address the challenges of the warehousing sharing platforms by proposing a scheme that incorporates the Bayesian algorithm for calculating transaction probabilities and constraints. The method simplifies the complexity of warehousing transactions by standardizing transaction data. These findings show that the "proposed method increases the transaction accuracy, completeness, minimizes of redundant data, increases the transaction simplification rate, and results in 98.9 percent. consistency of actual transaction outcomes". Nevertheless, these limitations of the method are found in non-structural classification standards that result in a low differentiation between the data structures and an increased repetition rate in calculations.

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