

Retraction

Retracted: Application of Heterogeneous Network Oriented to NoSQL Database in Optimal Postevaluation Indexes of Construction Projects

Discrete Dynamics in Nature and Society

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] A. Yang and G. Yu, "Application of Heterogeneous Network Oriented to NoSQL Database in Optimal Postevaluation Indexes of Construction Projects," *Discrete Dynamics in Nature and Society*, vol. 2022, Article ID 4817300, 10 pages, 2022.

Research Article

Application of Heterogeneous Network Oriented to NoSQL Database in Optimal Postevaluation Indexes of Construction Projects

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With the advent of the Internet Web 2.0 era, storage devices used to store website data are developing at an ever-increasing high-growth rate and a diversified trend. The focus on the structured data storage model has reduced the responsiveness of traditional relational databases to data changes. NoSQL database is scalable, has a powerful and flexible data model and a large amount of data, and has an increasing application potential in the memory field. Heterogeneous networks are composed of third-party computers, network equipment, and systems. Network types are usually used for other protocols to support other functions and applications. The research on heterogeneous networks can be traced back to the BARWAN project that started in 1995 at the University of California, Berkeley. The project leader RHKatz merged multiple types of nested networks for the first time to form heterogeneous network requirements for various future terminal services. Construction engineering refers to an engineering entity formed by installing pipelines and equipment that support the construction of various houses and ancillary facilities. “House construction” refers to projects with roofs, beams, columns, walls, and foundations that can form internal spaces to meet people’s needs in production, living, learning, and public activities. Among them, the engineering evaluation index is a statistical index used to evaluate and compare the quality and effects of social and economic activities through the use of equipment, such as capital turnover rate and employee labor efficiency. It is the exchange of corporate performance evaluation content and the expression of corporate performance evaluation content.

1. Introduction

This article first studies the theoretical knowledge of NoSQL databases, including the three theoretical databases and data models of NoSQL, and then analyzes the two representative product principles of NoSQL, Redis and MongoDB. Secondly, we summarized the internship period and introduced the evolution of the Redis survey system. According to actual business needs, Redis mainly stores praise and interest modules in a high-growth nonrelational database, while the MySQL database is used to store the data of the user module structure. The system design plays an important role in improving the practicability and concurrency of the system through in-depth research on the functional design of the Redis database, cache design, and asynchronous frame

design in the question and answer system. Finally, the business scenarios recorded in Redis are compared with the business scenarios stored in MySQL in the same test environment, and it can be known that the average transaction response time is only one-tenth of the business scenarios recorded in Redis. MySQL memory fully shows the performance advantages of Redis database. The old database technology can no longer meet the needs of rapid data growth and complex and changeable data types. In the past few years, distributed database technology has become a new hot spot for storing large amounts of data. Research how to use distributed database technology to store various data types in heterogeneous networks. The current nonrelational database model has been widely used in the construction of distributed databases at home and abroad. HBase technology

has attracted widespread attention. Its most outstanding function is the open source function, which is sought after by external manufacturers. This article uses HBase as the basic architecture of a distributed database, divides it into structured data and unstructured data according to the data attributes of heterogeneous networks, and uses various data to improve the performance of HBase. A large number of data objects are effectively stored in the network. This article also analyzes the construction project as a comprehensive construction project, and the multiperson and multitype operations have amazing characteristics, such as multiple equipment and multiple processes. This function will cause unsafe factors in the construction process, so managers need to be aware of the importance of risks to avoid problems in the work. There are currently several methods for evaluating construction safety, but due to the method of considering overall factors, it is no longer applicable today. For example, the scope of construction safety indicators and related factors need to be considered. Among them, the specific part is the unreasonable construction of the evaluation index system, the complicated operation evaluation method, and the unscientific index weight. Therefore, this article mainly conducts scientific research on the rationalization of on-site construction safety evaluation models and adopts comparative research methods from the perspectives of project management, LEED-BD + C, BREEAM-NC, and GM-NB. GS-DB and ASGB-A conducted a detailed analysis of the business management indicators of the five main evaluation criteria in 2014, took into account the inadequacy of ASGB-A's business management indicator settings, and determined the ASGB-A optimization path. In 2014, it provided project management indicators and further studied foreign standards. On this basis, the ASGB-2014 evaluation indicator optimization model was established. Finally, the behavior case interview method was used to optimize the evaluation indicators.

2. Related Work

The literature introduces the implementation of various new technologies, new equipment, and new concepts to solve long-term requirements and apply them to green building projects to continuously improve the level of green building technology. In order to regulate and encourage the development of green buildings, the state new regulations and policies are constantly being promulgated [1]. Green buildings are an important guarantee for promoting the development of green buildings, and evaluation standards are getting more and more attention. The literature introduces suggestions for optimizing project management indicators, which is the main result of this research [2]. Based on the index level, we have added qualification indicators for owners, builders, designers, and consultants and added green building performance indicators for contractors to increase the company's rating index score. The literature introduces the background and significance of the research based on the research [3]. We will refer to relevant foreign documents to analyze the safety management issues in the construction, focusing on safety issues, materials,

management, and environmental personnel. Four hidden dangers have been analyzed. The literature introduces related technologies, such as the main structure and storage mechanism of the distributed database HBase used in this topic. Heterogeneous network data is divided into structured data types and unstructured data types, and the storage mechanism is configured according to the characteristics of different data [4]. The literature introduces an analysis of the performance bottleneck that appears in the HBase storage of multimedia data. The performance bottleneck accounts for the largest proportion of unstructured data [5]. It provides a distributed database storage solution for multimedia data and provides HBase to improve the refresh, compression, splitting, and other functions. This mechanism can effectively store media data and can improve the read and write performance of HBase for storing media data.

3. Heterogeneous Network Model Design of NoSQL Database in the Optimization of Postevaluation Indexes of Construction Projects

3.1. NoSQL Database Model

3.1.1. Key Value Storage. The key value database is essentially a hash table, which is stored according to the value of the key, and the value corresponding to the value of each key can be any value. NoSQL does not set too many restrictions on the value, so each product can be freely determined [6]. Generally, when NoSQL databases are set relative to key values, they only provide simple tasks, such as importing and deleting, and cannot manipulate the value of a specific value. The key value database is mainly tailored to the business accessed through the primary key.

3.1.2. Document Storage. The document type database is designed based on the Lotus Notes Office software, which is based on key storage, but the value is no longer an arbitrary value, but a structured document. The structured document must conform to certain storage formats, such as XML and JSON [7]. The document database can be considered as an upgraded version of the key value database, which allows us to nest document key values for complex storage. Generally, because the value type is specified, the query efficiency in the document database is higher than the query efficiency in the key value database, which increases the complexity of the query.

3.1.3. Column Storage. Column storage depends on the relational database table model (Table) but does not provide multitable join operations, such as "join" in the relational model. The design idea is to use "columns" in the stored data when the user saves the data. From the perspective of physical storage, the smallest storage unit on a hard disk is a page. Therefore, a relational database stores the same data records in a table on the same page of the hard disk, and the columns are stored in the same page on a page similar to the hard disk. Store the data to which it belongs [8]. This method

is very suitable for query operations involving a small number of columns, such as applications including data warehouses. Use it when displaying a list of databases because each query handles a large amount of data but does not contain many columns each time, thereby greatly reducing the number of IOs and improving system performance. The database also supports the “Column Series” [9] function, which allows us to combine multiple columns. You can also design and develop a NoSQL database-based system on the basis of columns to store the column units together, thereby further improving the efficiency of storing and querying these columns. In short, columnar databases are very suitable for data warehousing and aggregation applications [10].

3.1.4. Picture Storage. The graph database uses algorithms related to the graph structure to implement data such as shortest path addressing algorithms and N-degree relationship search. If you are using a graph data model, you usually need to perform overall graph calculations to obtain the required information. The calculations are relatively complex, and the graph structure is suitable for distributed cluster solutions. The graph database is more suitable for social networks, recommendation systems, and so forth and focuses on the construction of relationship graphs [11].

3.2. Heterogeneous Network Model. In order to solve the problem of heterogeneous network handover, the design of handover enhancement strategy is supported by the simulation analysis of the 3GPP Release11 Hetnet Mobility Enhancement research project. The main purpose of these improvement strategies is to save users time. Therefore, the handover strategy mainly considers reducing the execution time of TTT reasonably and executing the handover as soon as possible [12].

In response to the above problems, this article discusses a new handover trigger condition to strike a balance between shortening the TTT and reducing the handover probability, thereby reducing the possibility of handover failure in small cell scenarios. This article newly defines an A7 event. The definition expression is as follows:

A7 measurement entry condition 1 (A7-1):

$$Mp + ofp + Ocp - Hys < Thresh1. \quad (1)$$

A7 measurement report trigger condition (A7-2):

$$Nd > ThreshN. \quad (2)$$

A7 measurement entry condition 2 (A7-3):

$$Mn + ofn + Ocn - Hys > Mp + Ofp + Ocp + Off. \quad (3)$$

A7 measurement leaving condition 1 (A7-4):

$$Mp + Ofp + Ocp + Hys > Thresh1. \quad (4)$$

A7 measurement leaving condition 2 (A7-5):

$$Mp + Ofp + Ocp + Hys < Mp + Ofp + Ocp + Off. \quad (5)$$

A7 counting conditions (A7-6):

$$Mp - Mn > Thresh_Drop. \quad (6)$$

A7 counting threshold setting (A7-7):

$$Thresh_Drop = Mp - Mn - Ofd. \quad (7)$$

3.3. Algorithm Model Simulation

3.3.1. Simulation Method. The test is implemented with the help of the stress testing software LoadRunner, which can simulate the operation of multiple users, and the work of each user is regarded as a collection of multiple transactions (e.g., login, normal, and so on). Select the system test index as the average transaction response time, and display the average time from sending the request to completing the transaction. The shorter the time, the better the performance of the system. LoadRunner provides the required statistical information by recording the response time of each transaction during user interaction.

Choose a business scenario based on Redis and MySQL storage, which emphasizes the performance comparison between Redis and MySQL storage. Without loss of generality, the test selected two business scenarios, such as the business scenario based on Redis storage, and two business scenarios, namely, the login and logout services based on MySQL access [13]. These services are each with 10, 50, and 100 transactions, while testing the response time of the scene.

3.3.2. Simulation Results

(1) 10 concurrent executions

Use LoadRunner to simulate 10 users who log in to the system at the same time, like, follow, and log out. Figure 1 shows the response time of various services.

As mentioned above, when performing 10 concurrent executions, the average response time for subsequent operations based on Redis storage is about 0.115 seconds, and the average response time for each login and logout based on MySQL storage is about 0.7412 seconds (electronic), and the access speed is about 45 times.

(2) 50 concurrent executions

Use LoadRunner to simulate 50 users who log in to the system at the same time, like, follow, and exit. The response time of different services is shown in Figure 2.

If there are 10 concurrent executions as described above, the average response time of subsequent operations based on Redis storage is about 0.112 seconds, and the average response time of each login and logout based on MySQL storage is about 4.352

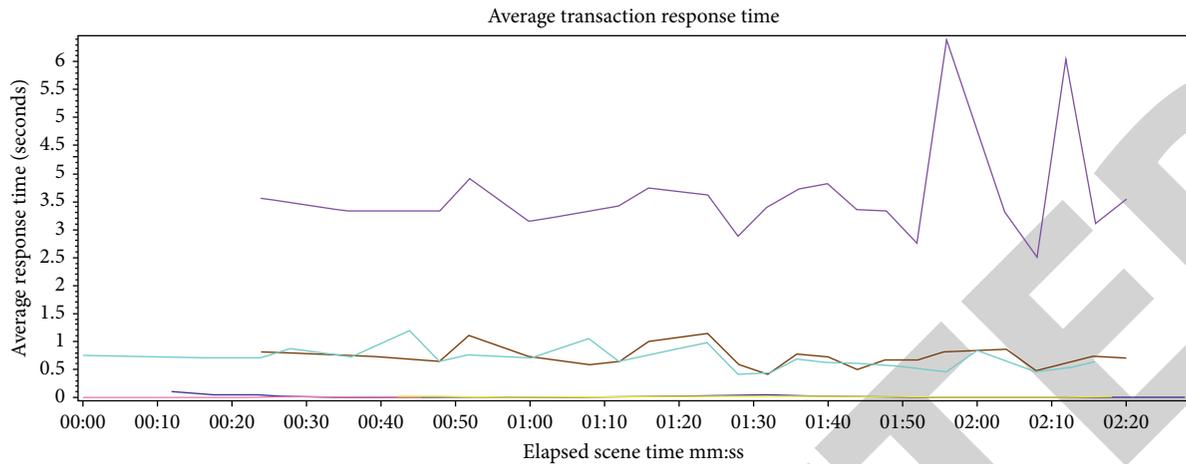


FIGURE 1: Average transaction response time for 10 concurrent transactions.

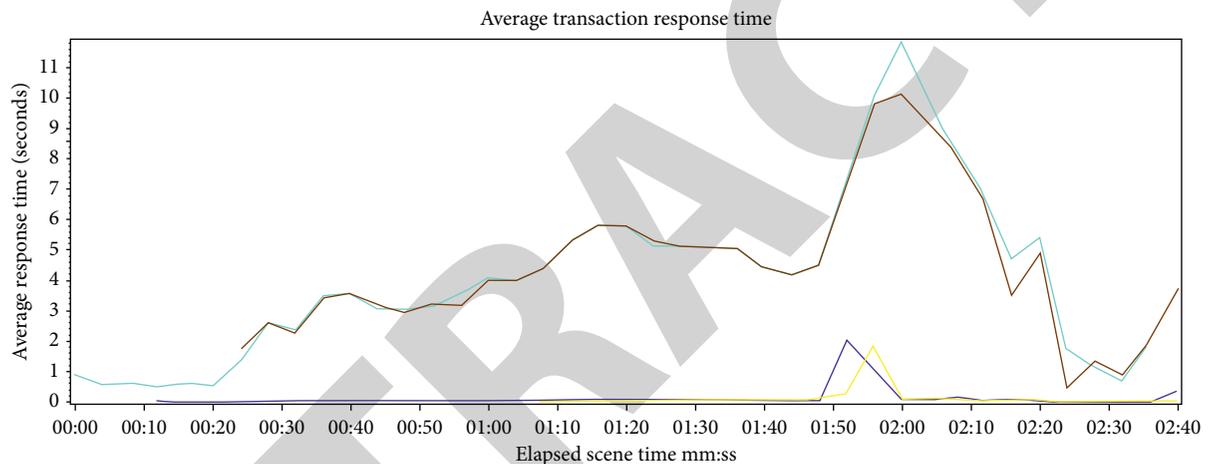


FIGURE 2: Average transaction response time for 50 concurrent transactions.

seconds. The electronic access speed is about 35 times faster than the latter.

(3) 100 concurrent executions

Use LoadRunner to simulate 100 users who log in to the system at the same time, like, follow, and exit. Figure 3 shows the response time of various services.

When there are 10 concurrent executions as described above, based on Redis storage, the average response time of each follower is about 0.1536 seconds, and the average response time of each login and logout based on MySQL storage is about 9.716 seconds, while the electronic access speed is about 55 times faster than the latter.

Table 1 summarizes the DDL data used to display the results more intuitively.

In Table 1, Redis access is much faster than MySQL access. In an independent environment, even if the number of concurrent executions reaches 100, transactions based on

Redis storage can be completed in 0.1536 seconds. On the contrary, the response time of MySQL-based storage increases significantly. Redis storage has high concurrency and is suitable for applications that process large amounts of data (Program).

4. Practical Application of NoSQL Database-Oriented Heterogeneous Network in Postevaluation Index Optimization of Construction Projects

4.1. Postevaluation System for Construction Projects

4.1.1. *Contents of Post-Bid Evaluation.* Postevaluation can evaluate and analyze the goals and effects of the project based on the actual situation of project management after the project is completed and confirm the existing problems, so as to facilitate comparison with theoretical effects.

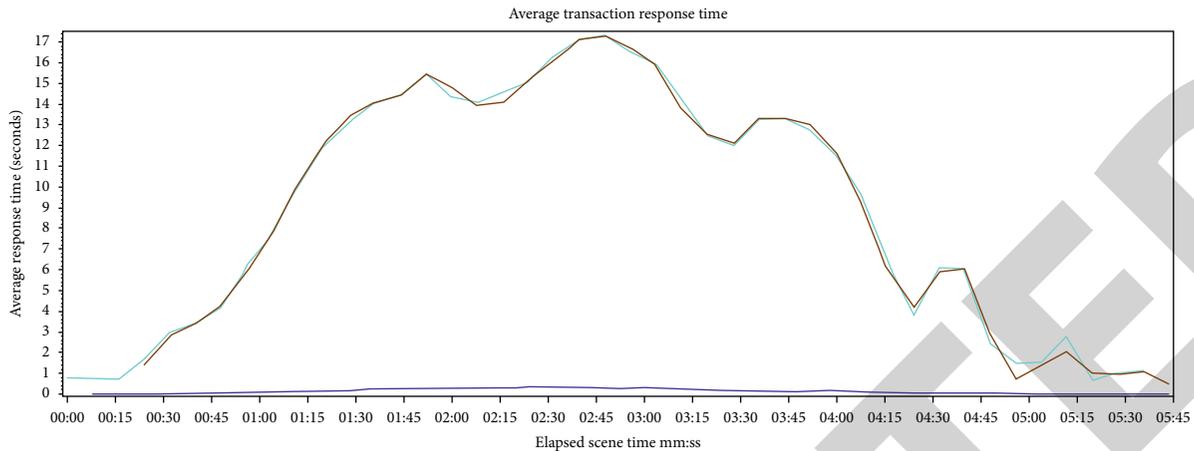


FIGURE 3: Average transaction response time of 100 concurrent transactions.

TABLE 1: Summary of test results.

	Redis access average response time (s)	MySQL access average response time (s)	Redis: MySQL
10 concurrent executions	0.115	0.7412	1:45
50 concurrent executions	0.112	4.352	1:35
100 concurrent executions	0.1536	9.716	1:55

Throughout the construction process of the project, take responsible measures and improve target measures [14]. After the completion of the traditional bid evaluation process, the entire bidding activity will be announced, and this process is not responsible for any problems in the evaluation process or unreasonable bid evaluation results. The separation of professional authority and responsibility and many control rights are under control. Even if there is a problem, the bid evaluation committee is responsible, and it is difficult to find an individual to be held accountable. It is very important to establish and improve a postevent supervision mechanism [15]. In order to promote the healthy development of the bidding industry, some local governments have emerged in recent years, such as a certain sea, a certain town, a certain Tianjin, and a certain station and formulated a policy. There are only a few local governments nationwide that have established a postevaluation system, and there is no uniform standard.

4.1.2. The Role of Post-Bid Evaluation. Bidding evaluation activities are of a one-off nature. Usually, the bid appraisal expert will select the winning bidder according to the set procedure but cannot confirm whether the bid appraisal result is reasonable [16]. Therefore, in order to supervise and check the problems in the bid evaluation process, it is necessary to establish a post-bid evaluation system. The specific functions of the post-bid evaluation are as follows.

- (1) *Conducive to Improving the Standardization of Evaluation by Bid Evaluation Experts.* Relevant regulations and documents include the following: the owner directly determines the winning bidder, or it is decided by the bid evaluation committee, so that

the bid evaluation committee can directly determine the winning bidder after preparing the bid evaluation report and declare that it can be entrusted. Experts can decide the final result of bid evaluation by themselves [17]. They must perform their rights and obligations as bid evaluation experts in a fair and honest manner. However, in actual bid evaluation activities, some individual bid evaluation experts will still receive bribes from illegal bidders, so it is inevitable to adopt measures such as accepting and intentional bidding. Unusual behaviors such as donations, high scores, and not serious evaluation attitude are just a form [18]. Such behaviors as separation of power and responsibility and failure to perform fairness obligations have seriously affected the fairness and credibility of the bid evaluation results and brought hidden dangers due to quality problems in future projects.

- (2) *Conducive to Improving the Service Quality of Bidding Agencies.* The bidding activity can be directly implemented by the owner, or a qualified bidding agency can be entrusted to replace it. This agency relationship determines that the bidding agency represents the interests of the owner [19, 20]. Since it is the responsibility of the bidding agent for the agent to carry out the bidding business, the expert will work hard to improve his professional knowledge and ability and prepare the bidding documents from the perspective of the owner. Elect the bidding company that meets the requirements and has the strongest overall strength. The post-bid evaluation system can effectively monitor the work of bidding and bidding agencies and supervise and inspect the

behavioral norms of bidding agencies through the qualitative and quantitative methods of post-bid evaluation. Privately determine whether there is a relationship between the bidder and the bid evaluation committee. The bidding agency is of an intermediary nature, and its work is related to the interests of the owners, bidders, bid evaluation committees, and other relevant agencies, and it is also a place of conflict. The bidding agency needs to be aware of its position and improve its professional capabilities and appropriately handle and coordinate the interests and conflicts of all parties, which fully reflects the principle of fairness in the bidding.

4.1.3. The Necessity of Post-Bid Evaluation Reliability Analysis. The “Tendering and Bidding Law” stipulates, “The number of bid examiners must be an odd number of 5 or more, and technical and economic experts among them must account for at least two-thirds of the total number of members.” The law requires 5 or more experts. In bid evaluation, because the scale and type do not have specific numerical requirements for other projects, the bidders will be random and irregular in other bidding. In addition, in order to summarize the actual bid evaluation cases, the bid evaluation committee of most bid evaluation projects is composed of five people. The bid evaluation committee is composed of five people. Therefore, the scientific rationality of the number of experts can be questioned. It can be a unit with several bidding units. Only five bid evaluation experts are selected to save bid evaluation costs and time. Not only will the bidding be expressed only in form, but it will also reduce the reliability of winning the bid, making the evaluation result difficult to guarantee, and it is easy to cause complaints and doubts from the winning bidder. In addition, if the number of experts is too small, there will be a single bid evaluation expert. The phenomenon that bidders collaborate privately to give a biased abnormal score will have a great impact on the bid evaluation results and then affect the fairness of the results.

$$X_{pir} = \mu + \mu_p - \mu + \mu_i - \mu + \mu_r - \mu + \mu_{pi} - \mu_p - \mu_i + \mu + \mu_{pr} - \mu_p - \mu_r + \mu + \mu_{ir} - \mu_i - \mu_r + \mu + X_{pir} - \mu_{pi} - \mu_{pr} - \mu_{ir} + \mu_p + \mu_i + \mu_r - \mu, \quad (8)$$

or

$$X_{pir} = \mu + v_p + v_i + v_r + v_{pi} + v_{pr} + v_{ir} + v_{pir,e}. \quad (9)$$

Among them, μ_p is the average bid document score of the entire observation area, and μ_i evaluation index i is the average score of the entire observation area. In other words, in the bid evaluation of the bid evaluation experts in the entire field, the experts will compare all evaluation indicators. μ_{pi} is the average of the scores of all bid documents, which is defined as follows:

Once the winning bidder obtains the bid qualification by bribing the bid appraisal experts or using other improper means, it is impossible to know whether the company has sufficient comprehensive capabilities to carry out the construction of the project. This kind of result often produces tofu dregs projects, and the cause is only investigated after the engineering accident occurs. At this time, it will be too late, and the personal safety and financial losses are irreversible. Therefore, after evaluating the bid, it is very important to reevaluate the evaluation result of the bid based on the scoring data and analyze its credibility. This can not only detect fraud in the bid evaluation process, but also avoid financial losses and also force bidding experts to improve the collection of bid documents and seriously consider them as bid evaluation experts, thereby improving the overall bidding experts (Professional Quality).

4.2. Evaluation Index Optimization Process

4.2.1. Mathematical Model. The double-sided cross design means that the entire observation area is composed of two measurement planes, and the horizontal plane on each side and the horizontal plane to be measured must “meet” one by one. In this article, we will choose the random evaluation mode because it is randomly selected from the expert evaluation and revision expert database in the evaluation committee, and the indicator set can also be selected in a variety of ways.

Mathematical Model and Related Assumptions. In this study, the object to be measured is the actual level of each bid document (P), the measurement surface represents the evaluation index (i) and bid evaluation expert (r), and X_{pir} is the bid document (P). The index (i) is determined by the following factors: as described below, the scores given by the experts in the r-level bid evaluation can be used as the G research mathematical model of the two-sided crossover design $px \text{ ix } r$.

$$\begin{aligned} \mu_p &\equiv E_i E_r X_{pir}, \\ \mu_i &\equiv E_p E_r X_{pir}, \\ \mu_{pi} &\equiv E_r X_{pir}. \end{aligned} \quad (10)$$

Similar definition is

$$\begin{aligned} \mu_r &\equiv E_p E_i X_{pir}, \\ \mu_{pr} &\equiv E_i X_{pir}, \\ \mu_{ir} &\equiv E_p X_{pir}, \\ \mu &\equiv E_p E_i E_r X_{pir}. \end{aligned} \quad (11)$$

In this study, in addition to the total mean μ , we assume that each component (8) on the right side of the model is a random variable with its own distribution, and the mean of the distribution is 0, which is

$$\begin{aligned} \sigma^2(X_{pir}) &= \sigma^2(p) + \sigma^2(i) + \sigma^2(r) \\ &+ \sigma^2(pi) + \sigma^2(pr) + \sigma^2(ir) + \sigma^2(pir). \end{aligned} \quad (12)$$

4.2.2. Feedback Optimization. When it includes a measurement surface and needs to combine the measurement target and each height of the measurement surface one by one, it is called an arbitrary cross-section design.

Random One-Sided Crossover Design G-Study. In this study, we still use the actual level bidding documents on the measurement target and use the evaluation indicators (i) and bid evaluation experts \otimes on the measurement surface. This metric is used in a fixed aspect, and the bid evaluation expert is still a random aspect. Its purpose is to find the low-scoring reliability metric and to find the cause of the score error accordingly. Create an index to provide references to similar projects that take corresponding measures to control errors when setting indicators. Assuming there are k measures, we conduct variable generalization research on each level of k fixed edge levels and obtain k univariate intersection designs ($p \times r$). The model is

$$X_{pr} = \mu + \mu_p - \mu + \mu_r - \mu + (X_{pr} - \mu_p - \mu_r + \mu). \quad (13)$$

Among them, μ is the average total, $\nu p = \mu - \mu$, $\nu r = -r - \mu$, $\nu pr = X - r - -p - ur + \mu$ are bid documents, bid evaluation experts, and the interaction between bid documents and bid evaluation experts. The basic assumption in the model is that the average of the above three effects is zero. The corresponding variance components $\sigma^2 2(p)$, $\sigma^2 2(r)$, and $\sigma^2 2(pr)$ are as follows:

$$\begin{aligned} \sigma^2(p) &= E_p(\mu_p - \mu)^2, \\ \sigma^2(r) &= E_r(\mu_r - \mu)^2, \\ \sigma^2(pr) &= E_p E_r (X_{pr} - \mu_p - \mu_r + \mu)^2. \end{aligned} \quad (14)$$

The total variance component is

$$\sigma^2(X_{pr}) = E_p E_r (X_{pr} - \mu)^2 = \sigma^2(p) + \sigma^2(r) + \sigma^2(pr). \quad (15)$$

Random One-Sided Crossover Design D-Study. In this study, we mainly changed the scope measurement capabilities of bid evaluation experts to observe the trend of generalization coefficient changes. The mathematical model of D-learning is similar to the mathematical model of G-learning, in which the evaluator's effect and error protest difference components are estimated as follows:

$$X_{PR} = \mu + (\mu_p - \mu) + (\mu_r - \mu) + (X_{PR} - \mu_p - \mu_r + \mu),$$

$$\sigma^2(R) = \frac{\sigma^2(r)}{n'_r},$$

$$\sigma^2(PR) = \frac{\sigma^2(pr)}{n'_r}. \quad (16)$$

" nr " summarizes the sample size of the evaluator in the entire domain and still uses capital letters to distinguish the study from G. The relative error fluctuation component, that is, the generalized coefficient formula, is as follows:

$$\sigma^2(\delta) = \sigma^2(PR) = \frac{\sigma^2(pr)}{n'_r}. \quad (17)$$

Generalized coefficient is

$$E\rho^2 = \frac{\sigma^2(p)}{[\sigma^2(p) + \sigma^2(\delta)]}. \quad (18)$$

4.3. Experimental Analysis

4.3.1. Simulation Data and Evaluation Indicators. This example uses simulated data. The total construction cost of the university dormitory is about 55 million yuan. The bid evaluation committee composed of 5 experts adopts the comprehensive evaluation method to evaluate the bids and sets 6 technical evaluation indicators. Upon completion, the winning bidder with the highest overall score will be selected. After the qualification review and preliminary review, a total of 6 bidders entered the detailed review stage, as shown in Table 2 for the allocation of evaluation indicators.

4.3.2. Optimization Analysis of the Number of Evaluators. Study 1 uses the $p \times i \times r$ design model for reliability analysis. Table 3 shows the results of processing the score data using the Analyze-General Linear Model-Univariate program in the SPSS software.

First, the sample size of the fixed evaluation index remains unchanged, and the relationship between the relative error of the sample size of the experts for bid evaluation and the generalization coefficient is shown in Table 4.

It can be seen from the research results of D above that if the number of evaluation indicators remains unchanged, the generalization coefficient of the bid evaluation results increases with the increase in the number of bid evaluation experts. Evaluation experts believe that reliable results will bring a higher degree. If there are 5 bidding evaluation experts, the factor is usually 0.9796, which is unreliable; the generalization factor from 5 to 15 is 0.9825, with an increase of 0.0029. However, in this process, the increase of generalization factor is getting smaller and smaller, and the

TABLE 2: Evaluation index and score table.

Evaluation index	Tender offer	Construction method and technology	Construction safety assurance measures	Quality assurance measures	Construction schedule	Construction machinery and equipment level	Composition of technical personnel
Points	35	8	8	8	8	8	8

TABLE 3: $p \times i \times r$ G-study variance component estimation for design evaluation.

Source of variation	df	SS	MS	Variance component estimate	% of variance
P	6	177.924	35.682	0.1525	53.41%
I	6	52.327	10.468	0.3233	14.97%
R	5	4.712	1.172	0.0142	0.66%
Pi	27	22.314	0.892	0.0632	2.99%
Pr	25	15.623	0.754	0.0321	1.45%
Ir	25	9.432	0.472	-0.0165	0
Pir	100	55	0.512	0.572	26.52%

TABLE 4: $p \times i \times r$ D research variance component and generalization coefficient of design evaluation ($ni' = 6, nr' = 5 \sim 15$).

Source of variation	$nr' = 5$	7	9	11	13	15
σ^2 (P)	1.1501	1.1501	1.1501	1.1501	1.1501	1.1501
σ^2	0.0532	0.0532	0.0532	0.0532	0.0532	0.0532
σ^2 (R)	0.0023	0.0021	0.0014	0.0013	0.0011	0.0010
σ^2 (PI)	0.0107	0.0107	0.0107	0.0107	0.0107	0.0107
σ^2 (PR)	0.0063	0.0055	0.0036	0.0026	0.0021	0.0025
σ^2 (IR)	0	0	0	0	0	0
σ^2 (PIR)	0.0152	0.0163	0.0105	0.0085	0.0071	0.0043
σ^2 (δ)	0.0365	0.0287	0.0248	0.0221	0.2054	0.0195
Ep2	0.9796	0.9752	0.9789	0.9811	0.9825	0.9837

number of experts is still increasing, which is accompanied by the problem of “cost-effectiveness.” The summary factor is shown in Figure 4. When the number of experts increased to 15, the generalization factor only increased to more than 0.98, but the number of experts doubled. As the number of experts increases, so does the consideration cost, which is economically inappropriate. From this perspective, we cannot blindly pursue the value of high reliability. When the number of experts actually increases to 11, the generalization coefficient is 0.98 or higher, and its reliability is already high. Therefore, in the evaluation activity of this bid, when the evaluation index is 6, it is necessary to set the number of experts, as shown in Figure 4.

Through the analysis of Study 1, it can be seen that when the number of experts increases from 5 to 15, the generalization coefficient increases from 0.9796 to 0.9837. The value of $\Delta E\rho^2$ in this process is shown in Table 5.

4.3.3. Optimization Analysis of Evaluation Indicators. This study uses the $p \times r$ design model for reliability analysis. After performing error and reliability analysis on each specific index and processing the data through SPSS software, various variables are shown in Table 6.

Change the number of experts and observe the change in the summary coefficient of each indicator. The calculation results are shown in Table 7.

Looking at the data in Table 7, we can see that the more the bid evaluation experts, the higher the generalization

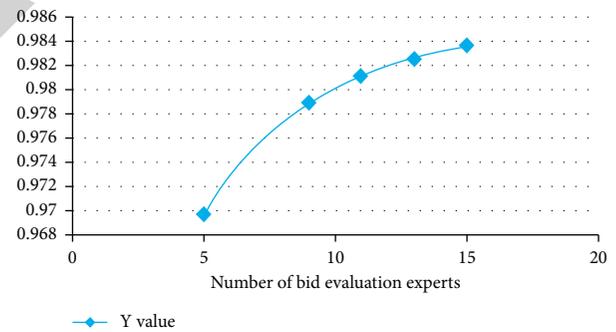


FIGURE 4: The relationship between the number of experts and the generalization coefficient.

TABLE 5: Change of generalization coefficient and increase in $\Delta E\rho^2$ value.

Number of experts n	$E\rho^2$	$\Delta E\rho^2$
5	0.9796	—
7	0.9756	0.0052
9	0.9789	0.0031
11	0.9815	0.0025
13	0.9837	0.0016
15	0.9826	0.0015

factor of all indicators. The construction methods of the six evaluation indicators, the level of mechanical equipment in the technical process, and the engineer’s composition of the

TABLE 6: $p \times r$ G-study variance component estimation and percentage of design evaluation.

	σ^2	σ^2	σ^2
Construction method and technology	1.2266 (68.39%)	0 (0)	0.567 (31.61%)
Construction safety assurance measures	1.0232 (60.18%)	0 (0)	0.677 (39.82%)
Quality assurance measures	0.6266 (51.07%)	0.0533 (4.34%)	0.547 (44.58%)
Construction schedule	0.7566 (56.45%)	0.1267 (9.45%)	0.457 (34.10%)
Construction machinery and equipment level	1.6566 (69.21%)	0 (0)	0.737 (30.79%)
Technical staff composition	1.9966 (76.01%)	0 (0)	0.63 (23.99%)

TABLE 7: The value of the generalization coefficient in the study.

Number of experts	Construction method and technology	Construction safety assurance measures	Quality assurance measures	Construction schedule	Construction machinery equipment level	Technical staff composition
5	0.9154	0.8831	0.8514	0.8922	0.9183	0.9406
7	0.9381	0.9137	0.8892	0.9205	0.9402	0.9569
9	0.9511	0.9315	0.9116	0.9371	0.9529	0.9661
11	0.9597	0.9433	0.9265	0.9480	0.9611	0.9721
13	0.9657	0.9515	0.9370	0.9555	0.9669	0.9763
15	0.9701	0.9578	0.9450	0.9613	0.9712	0.9794

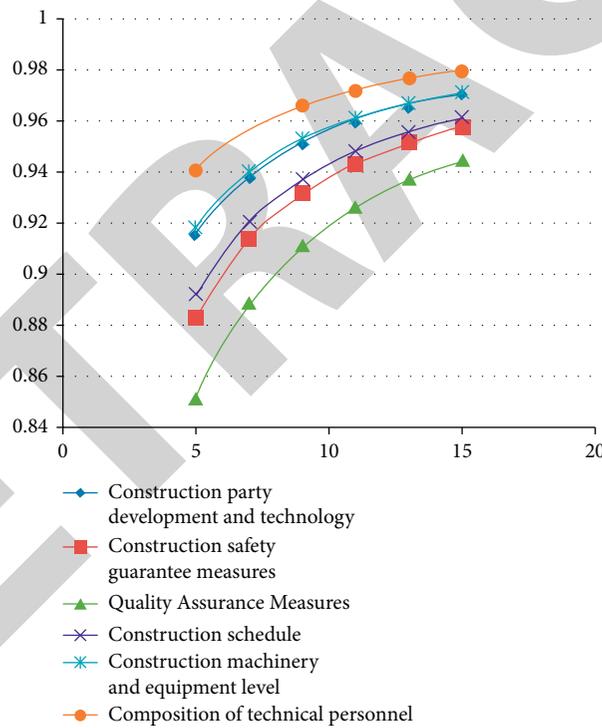


FIGURE 5: Change trend of generalization coefficient of each indicator dimension.

three indicators have high reliability, and the comprehensive coefficient during review is high, provided by five experts at 0.9 or higher. The scores of the three indicators of safety measures, quality assurance measures, and construction progress are unreliable, and without increasing the number of experts, all general coefficients are less than 0.9. Therefore, by observing the generalization factor, we can know that if we want to improve the reliability of the overall bid evaluation results and increase the number of evaluation experts, the evaluation and design methods of specific evaluation

indicators can be improved. In this study, we only focus on the three main indicators of building safety measures, quality assurance measures, and some sources of errors in the building and can improve the reliability of the evaluation of these three main indicators. The result of the overall bid evaluation provides very useful feedback information for subsequent similar projects to optimize the overall decision of the bid evaluation. Figure 5 shows the changing trend of the generalization coefficient on each evaluation indicator dimension.

5. Conclusion

The subject of this article is mainly based on heterogeneous networks, and the rapid development of heterogeneous networks has produced various types of massive data, and the existing open source distributed database technology is used to partition the data. When considering various types of reasonable storage mechanisms, the distributed database used in this article is currently the most widely used HBase. The innovation of this paper is that the data from heterogeneous networks is divided into two categories. According to the characteristics of HBase column storage, based on the analysis of existing HBase compression algorithms, a new CSC compression algorithm is designed according to the characteristics of structured data in heterogeneous networks, while increasing the proportion of unstructured data. Larger multimedia data can enhance the storage mechanism of HBase and improve the performance of distributed databases.

After repeated improvements and tests, the solution in this article plays an important role in the data age, that is, the solution of using NoSQL database technology to store data in a heterogeneous network.

Data Availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The authors declare that they have no known conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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