Retraction

Retracted: Design of Question Answering Interactive Open Platform for Power Grid Business Acceptance Robot

Mobile Information Systems

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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.

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[1] S. Wu, "Design of Question Answering Interactive Open Platform for Power Grid Business Acceptance Robot," *Mobile Information Systems*, vol. 2022, Article ID 9472873, 10 pages, 2022.

Hindawi

Research Article

Design of Question Answering Interactive Open Platform for Power Grid Business Acceptance Robot

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In order to improve the matching degree between answers and questions of the power grid business acceptance robot question answering platform, an interactive open platform for power grid business acceptance robot question answering is designed. Firstly, an open platform of questions and answers interaction with data layer and information retrieval layer as the main body is constructed. To improve the question and answer interactive open platform database, the data layer is divided into three modules: data collecting, database setup, and data storage. At the same time, the information retrieval layer is divided into user input, answer display, query expansion, and information retrieval modules. To improve the retrieval accuracy, the corresponding answers are matched by using the similarity between questions and documents in the information retrieval module, and finally, the design of the question and answer interactive open platform of power grid business acceptance robot is realized. The experimental results demonstrate that the designed platform's service acceptance accuracy is high, the AUC curve is low, and the degree of matching between replies and queries is high.

1. Introduction

The strain on corporate management in the power sector is increasing at the moment, making power grid management and control increasingly complex. With the development of some technologies, the workflow of power grid business has been optimized to a certain extent [1]. Among them, research and development of the power grid business acceptance robot have a significant impact on power grid business acceptance efficiency [2, 3], but this method has the drawback that the power grid business acceptance robot's response is inconsistent with the needs of customers, which not only slows down business flow but also increases the workload of power grid business acceptance [4]. Reference [5] empirically compares three models by measuring the impact of powerful business intelligence systems (BIS) on Peruvian companies, namely the Delone and McLean model, the Seddon model, and the modified Seddon model. Then, the mediation and dependency structure is analyzed to determine whether their behavior is normal. The study uses a sample of 104 BIS users from several important departments

and companies. Under the quasivoluntary background, it adopts six structures: information quality, system quality, service quality, system dependence (system use), user satisfaction, and perceived usefulness (personal impact). The Seddon model seems to show the best fit and interpretation of the results. However, this method cannot use the matching answers with high similarity when the questions are similar, so it reduces the accuracy of business acceptance.

The framework of the NGPGDC application store is presented in Reference [6], which also includes essential technologies such as the application review and release process, application precise suggestion and download, application intelligent update, and application assessment feedback. Above the provincial level, the method has been tested in a few power grid dispatching and control centers. The method has been shown in practice to help improve application quality, increase the degree of software automatic release, and promote continuous application quality improvement. However, there are too many interference factors to comprehensively classify the questions. The accuracy of the classified answers in the question-and-answer interactive open platform is low, which increases the AUC curve. Reference [7] proposes a new generation of

power quantum secure communication architecture with high-security level protection to improve the security level of power information encrypted transmission.

The performance test of the proposed scheme is carried out based on the actual urban power grid lines and test environment, but the answers matched by this method are not comprehensive, and the number of answers found by using keywords is too small, which reduces the ability to mine long tails. To solve the problems existing with the above methods, the question and answer interactive open platform of power grid business acceptance robot is designed. Because the power grid business acceptance robot is rather developed at this time, the robot's interactive question and answer module are primarily designed at this time. For this module, the intelligent question and answer interactive open platform are designed from two parts: data layer and information retrieval layer. The experimental test shows that the designed intelligent question and answer interactive open platform for power grid business acceptance robot has certain practical application performance.

The rest of the paper is organized as Section 2 shows the overall structure of intelligent question answering interactive open platform, Section 3 shows the design of an interactive open platform for questions and answers, experiment and results are shown in Section 4, and Section 5 shows the conclusion.

2. Overall Structure of Intelligent Question Answering Interactive Open Platform

The intelligent question and answer interactive open platform first determines all information databases about the power grid business of the content of the power grid business acceptance robot system, crawls the data from it, creates a power grid business database, and stores the data in the most efficient manner possible by analyzing the data types in the database. Receive questions and answers, a request from users of the questions and answers, an interactive open platform; expand the questions; find the corresponding answers from the database; show all the answers to the customers; and finally retrieve the answers to realize the acceptance and questions and answers, A of power grid business. The overall structure of the open platform for question and answer interaction is shown in Figure 1.

The overall structure of the question and answer interactive open platform may be separated into two portions, as shown in Figure 1, namely the data layer and the information retrieval layer. Data include three modules: data acquisition, database establishment, and data storage. Information retrieval includes four modules: answer display, query expansion [8], information retrieval, and user input.

3. Design of Interactive Open Platform for Questions and Answers

3.1. Data Layer Design

3.1.1. Power Grid Business Data Acquisition Module. After determining the information database, this module crawls the data, does simple processing, and saves it to the

power grid business database. Its flowchart is as shown in Figure 2.

When a multithreaded crawler is used, it is first necessary to select the grid service tab as the crawler entry. The multithreaded crawler process is as follows: obtain grid service data based on a specific information URL, control the number of original pages of the URL, control the number of pages of the crawled grid Service [9], finally obtain the fixed number of grid service pages, and introduce the main information into the URL queue to crawl in turn. The thread pool takes the URL of a certain power grid service from the URL queue, acquires the related power grid service information, and stores all of the original power grid service information in the database at the same time.

3.1.2. Database Module. The database module establishes the association between entities using the original data from the separated relational database and preserves the relationship in the graphic database. Its frame composition is shown in Figure 3.

When establishing the database, Chinese word segmentation data and extracting entities are required, and DBM is used to extract its features [10]. Among them, features such as words and dictionaries can identify entities, and entity type features such as corresponding location and entities can identify interentity relationships. Among them, context window features can identify both entities and their relationships. Because the attribute of power grid business data belongs to interesting relationships, the attributes between power grid business data are also recovered when extracting the relationship between entities. The depth Boltzmann machine is used to select the appropriate features to establish the feature vector, in which the model with one visible layer and three hidden layers is added for training, and the entity and entity-relationship are saved in the Neo4j database according to the cypher query statement.

3.1.3. Data Storage Module. The database is divided into relational data (MySQL database) and nonrelational data (Neo4j graphic database). The relational MySQL database can speed up the retrieval of power grid business regulation information. The nonrelational database is characterized by that it can only save the power grid business data with a low degree of structure, so it is suitable for saving the relationship data between entity nodes. Since the data in the Neo4j graphic database are stored in the mode of nodes, two nodes can be marked arbitrarily to form labels, to narrow the search scope and form labels for all nodes. The cypher query statement is used for retrieval, and the data storage module architecture is shown in Figure 4.

As shown in Figure 4, the MySQL database contains original data. When storing data, you can check the duplicate data and use the batch insertion mode to improve the data throughput, while avoiding too much redundant data and affecting the establishment of the database. The connection part of speech based on MySQL database can be read and written through the proxy mode to separate the power grid business database, centrally process the web requests
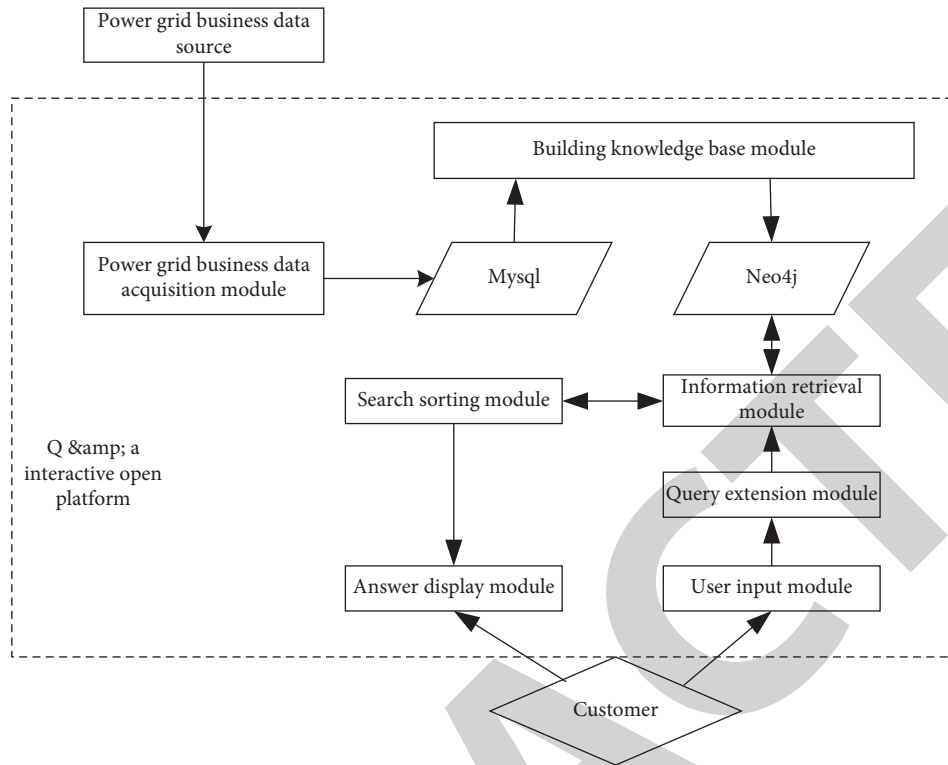
Figure 1: Overall structure of questions and answers; interactive open platform.
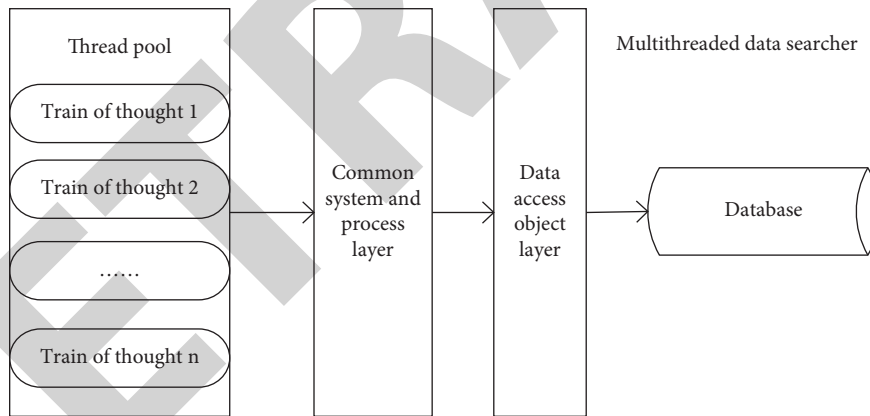

Figure 2: Multithread crawler flow chart.

and accurately divert their appropriate servers, and finally realize synchronous data reading and writing through MySQL database.

Each transaction requires independent token coding to improve the reliability of Q&A data transmission of the power grid business acceptance robot, which uses encryption and decryption operations in the process of result message production and data reception. Before the transaction, apply for token coding to the central controller in the Q & an interactive platform of power grid business acceptance robot. The tokens created by the central controller are distinct, preventing user requests from becoming confused during the intelligent interaction process. The data processing process of the power grid business acceptance robot question and answer interactive open platform is shown in Figure 5.

The specific steps of data processing shown in Figure 5 are as follows:

Step 1: use the front server of the power grid business acceptance robot question and answer interactive open platform to collect the query request information sent by the power user in real-time, add the information to the request message queue, and generate a transaction token for the user's request information in the queue.

Step 2: the front-end server of the power supplier collects the request information in the transaction token in the token queue, generates the transaction token of information according to the current time and ID variables, records all the information of the transaction token, and transmits it to the flat front-end server.
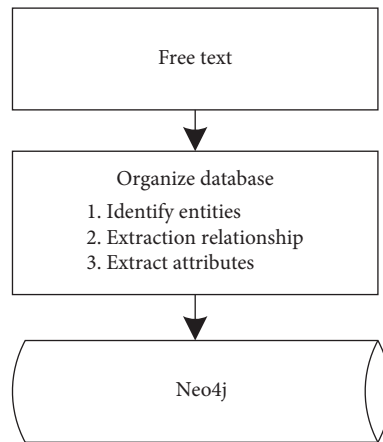
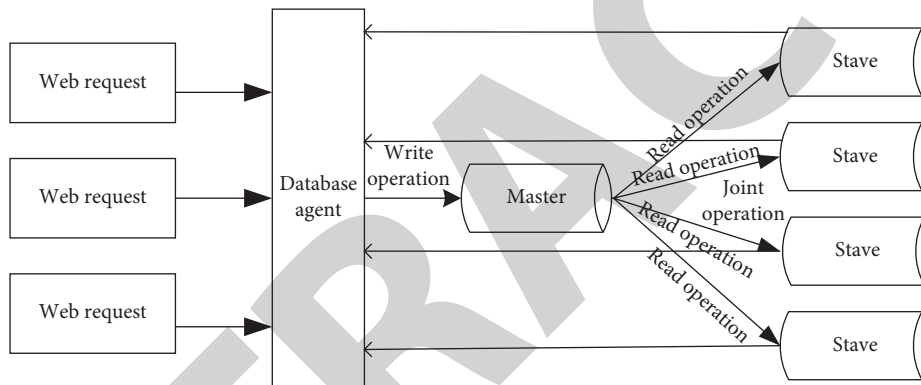Figure 3: Architecture diagram of establishing database module.

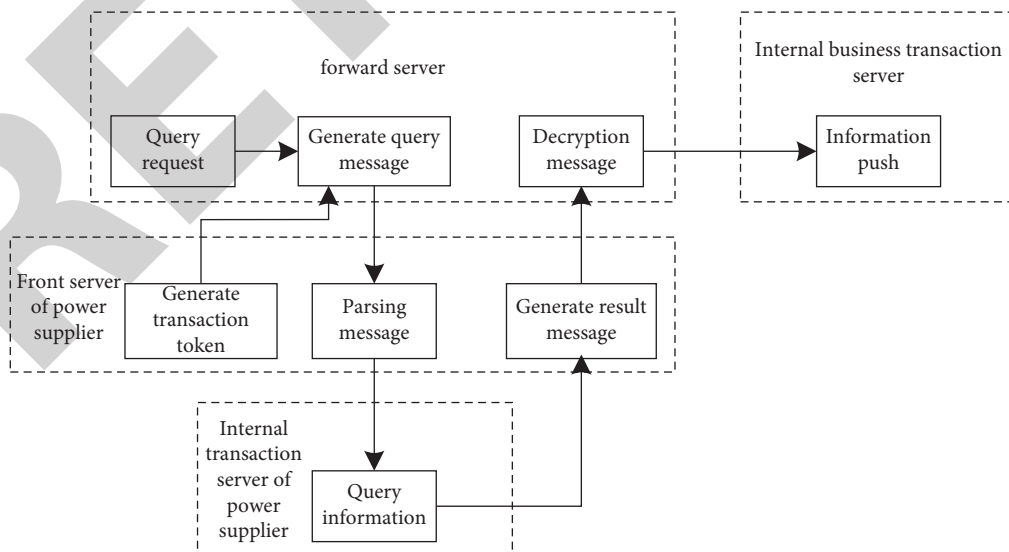Figure 4: Architecture of data storage module.

Figure 5: Data processing process.

Step 3: after the platform front-end server obtains the transaction token in the new token message queue, it generates a request message according to all user information and transmits it to the front-end server of the power supplier.

Step 4: after receiving the request message, the front-end server of the power supply party uses the token code to judge whether the token is valid. If the token is invalid, it transmits the error information to the front-end server of the platform. On the contrary, analyze the request message, filter and obtain all parameter information, and transmit all parameter information obtained by screening to the internal transaction server of the power supplier.

Step 5: The internal transaction server of the power supplier obtains the power consumption-related information of the user transaction according to the received parameter information and transmits the obtained transaction result to the front-end server of the power supplier. The front-end server of the power supplier generates a message from the transaction result, encrypts the transaction result message through the advanced encryption standard algorithm, and transmits the encryption result to the front-end server of the platform.

Step 6: the platform front-end server decrypts the encryption results according to the specified decryption algorithm, obtains the power-related information of the user transaction, and transmits it to the internal business transaction server of the power grid business acceptance robot Q & an interactive open platform.

Step 7: push power-related information to users through the internal business transaction server.

3.2. Design of Information Retrieval Layer

3.2.1. User Input Module. The first mock exam module is mainly used to filter the request of interactive open platform users, filter the corpus of Chinese instruction and Chinese word segmentation, transmit the result to the next module, and lay the foundation for the query expansion module.

3.2.2. Query Extension Module. The query expansion module receives the corpus that has been simply categorized at the top level, then queries, and expands the keywords to increase data query accuracy. This module adds linguistic technology, adds the input words to the source query, and constructs a new query module, which not only improves the query accuracy but also solves the problem of query word mismatch.

When users input query words, they may contain unrecognizable words such as daily words. Therefore, it is necessary to expand the user's query words and eliminate ambiguities to ensure the accuracy of retrieval. The flow chart is shown in Figure 6.

This module mainly relies on relevant feedback to query [11], that is, to retrieve vocabulary key points according to

the initial retrieval answers. According to Figure 6, users enter words in the question and answer interactive open platform and then obtain the answer set. At this time, the query module needs to distinguish whether the answer is a positive correlation document (positive TF-IDF value) or a negative correlation document (negative TF-IDF value) and determine the document properties before word segmentation. When the retrieval result is a negative correlation document, you need to delete the document immediately, unify all TF-IDF values, and take the TF-IDF value as the weight of the user's query vocabulary. It can be concluded that this module is to add content, delete redundant data, correct vocabulary, and other processing to realize query expansion.

3.2.3. Information Retrieval Module. The information retrieval module matches the query expanded words with the corresponding answers according to the sentence similarity measurement and sorts them. The answer with the highest similarity is the question-and-answer. Its flow chart is shown in Figure 7.

At present, calculating the similarity between power grid business regulation documents and problems is usually solved by vector space model [12]. After converting them into vector space and vector, determine the representation of the document, solve its feature weight, and finally obtain the similarity between the two vectors [13].

(1) Document Representation. If the problem is a vector t-dimensional feature, the vocabulary in the problem is regarded as a feature, and its weight is solved. All weight feature texts are combined into one document, and this document is regarded as a representative document. Assuming that document d is composed of independent words, set its weight w_k, according to the importance of each word t_k, and convert all words into coordinate axes in the n-dimensional coordinate system, with the corresponding coordinate value of $w_1, w_2, \cdots w_n$, to convert the problem into a space vector.

(2) Calculate Feature Weight. Because the feature weight operation framework (TF-IDF framework) includes two key factors, the number of occurrences of a word in the document, that is, word frequency TF, and the global parameter in the document set, that is, inverse document frequency IDF [14]. When the TF is higher, the number of related problems in the document increases, the weight is increased, and the IDF value can use the distribution of feature words to judge the degree of feature words by dividing the document set. The TF-IDF architecture multiplies TF and IDF to better distinguish problems. The better the problem differentiation impact, the higher the weight. Its expression is

$$w_k = idf_k \times tf_k = \frac{\lg N}{n_k}, \tag{1}$$

where idf_k represents t_k IDF in the document, N represents the number of documents in the power grid business
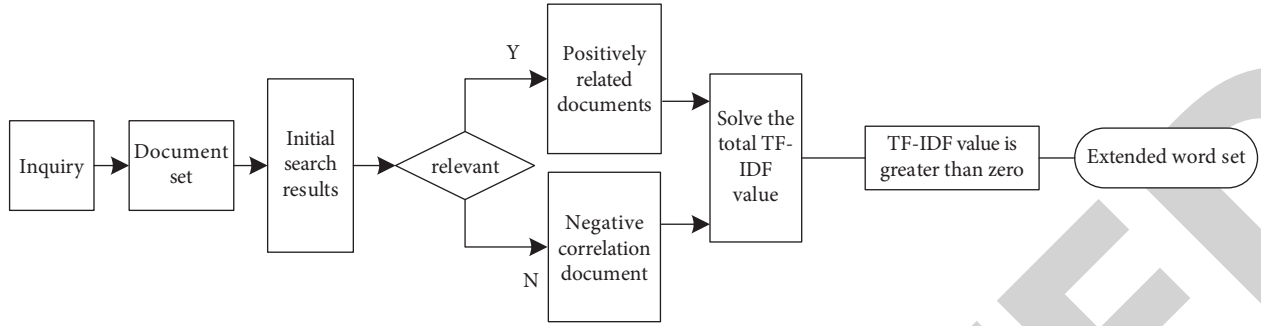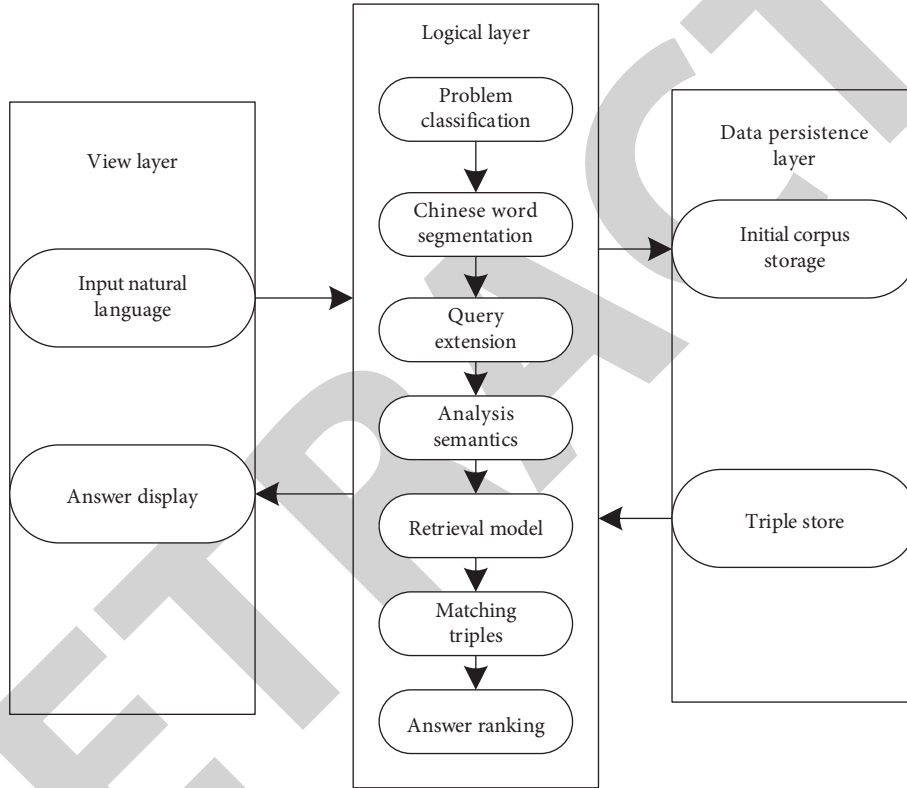
Figure 6: Flow chart of query extension module.

Figure 7: Flow chart of information retrieval.

regulation questions and answers, an interactive open platform, tf_k represents t_k TF in d, and n_k represents the number of t_k documents in the power grid business regulation questions and answers, an interactive open platform.

(3) Correlation Calculation Method. According to the document representation and feature weight, the similarity between the document and the problem is determined, and then, all documents connected to the problem are acquired. The cosine value of the angle between the document and the problem is solved by the cosine method [15]. The similarity can be obtained according to the cosine value. The larger the cosine is, the more content of the problem is contained in the document. Otherwise, the operation method is

$$s(d, q) = \frac{\sum_{k=1}^n w_k q_k}{\sqrt{\left(\sum_{k=1}^n q_k^2\right)\left(\sum_{k=1}^n w_k^2\right)}}, \qquad (2)$$

where n represents the dimension of vector space, and q_k represents the weight of vocabulary in question q.

This module uses the SM-BLSTM model to retrieve information, in which the view layer is the part to improve the visual effect and facilitate the user's operation, and the logic layer is the core part of the module. First, build a problem classifier, expand the questions asked by the user, and then classify them in detail to improve the accuracy of the output results. All words are analyzed and counted through Chinese analysis, and then, the relationship between words is established, simple retrieval is realized, and then, the query expansion part is used to expand the questions,

expand the scope of retrieval questions and answers, and improve their accuracy.

4. Experiment and Results

In this section, we will see the implementation process of power grid business robot questions and answers; an open platform, experimental preparation, experimental results, and analysis in detail.

4.1. Implementation Process of Power Grid Business Robot Questions and Answers: An Open Platform. The interactive open platform for answering questions of power grid acceptance robots includes two main workflows: application process and training process, while the outside primarily relies on the robot to regulate the questions and answers independently; an interactive open platform.

4.1.1. Power Grid Business Acceptance Process. The work process in which the power grid business acceptance robot controls multiple power grid businesses through speech is referred to as the power grid business acceptance process. One second is all it takes to complete a single power grid business approval process. The main steps are as follows.

After the power grid business acceptance robot sends voice instructions, it realizes voice acquisition through audio acquisition equipment and uses internal algorithms to realize data processing such as audio noise reduction and compression to form audio data;

The audio data are sent to the power grid business acceptance robot server, recognized through the voice/voice model, and the corresponding text, instructions, and other information are fed back to the query expansion module.

The query extension module calls the interface provided by relevant applications to realize question answering according to the received instructions.

4.1.2. Training Process. The training process is an interactive open platform that accomplishes the tuning and updating of voice/semantic models and increases recognition accuracy based on freshly gathered corpus and knowledge information in response to the power grid business acceptance robot question. The training process is time-consuming, with a single time of about 3–5 days (depending on the number of corpus), at least once a month. The main steps include the followings.

Collect and mark the newly added corpus and knowledge data of the current month, and import the new data into the corpus and knowledge base for unified management;

The training of the voice/semantic model is started regularly every month, and the test set is verified automatically. When the accuracy of the test set meets the requirements, the update conditions are met, and the new model is sent to the power grid business acceptance robot server.

The daemon of the power grid service acceptance robot server completes the model update and restarts the voice/semantic recognition service.

4.2. Experimental Preparation. It is necessary to test the service acceptance accuracy, AUC curve, and long-tail mining ability of the research method of the construction method of the question-and-answer interactive open platform of the power grid service acceptance robot, the method in reference [5], and the reference method [6] to verify the overall effectiveness of the proposed method. The experimental environment is shown in Table 1.

4.3. Experimental Results and Analysis. A mobile counter is randomly selected in the power grid company, and the intelligent interaction design of the mobile counter is carried out by using the system in this paper. The intelligent interaction results of dialogue service are shown in Figure 8.

Figure 8 shows how this platform may analyze past data and provide logical responses to the user's request questions. In the usual inquiries, users can also get a direct understanding of the power company's recent business news. Experiments suggest that this platform is capable of implementing the question-and-answer interface of the power grid business acceptance robot.

To further verify the effectiveness of the design platform, comparative tests are carried out from three aspects: business acceptance accuracy, AUC curve, and mining long-tail ability.

4.3.1. Business Acceptance Accuracy. The advantages and disadvantages of the question and answer interactive open platform can be reflected in the final number of document pages. Therefore, the order of the answer documents of the three methods can be compared. The higher the accuracy of the predicted position in the document, the higher the recall rate, so the use of $P@N$ the formula for evaluating the question and answer interactive open platform is $P@N = |R_N|/N$, where $|R_N|$ represents the number of documents related to questions in the N page documents. According to Figure 9, three methods are used to calculate its similarity and retrieve five different questions, and the first five pages of the results are extracted P@5. The values tend to be close to 1, while the retrieval results of reference [4] and reference [5] are unstable; especially, the retrieval results of reference [5] are only 0.4 in difficult problems. The reason why the proposed method can retrieve any difficult problem is that the user problem is transformed into a vector of spatial dimension by using the vector space model, which makes it easier to calculate its similarity and retrieve the answer, to improve the accuracy of business acceptance.

4.3.2. AUC Curve. AUC curve is the best standard for evaluating problem classification. It is the ratio of accuracy rate to recall rate. There is a diagonal in the AUC curve, which represents that the number of wrong classification problems in the process of classification problems is the

TABLE 1: Experimental environment.

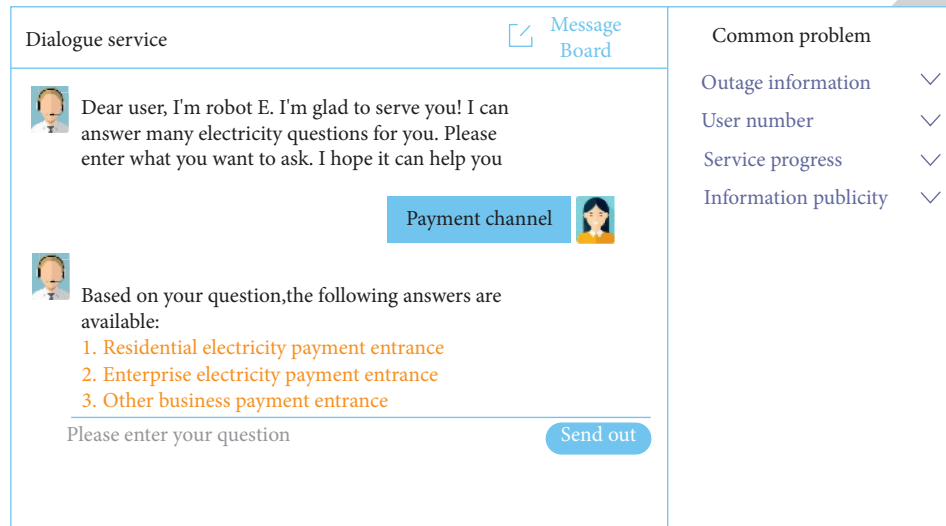| Experimental configuration	Experimental parameters
CPU	Plll667
Memory	192 MB
An interactive open platform for operation questions and answers	Window 2020 professional

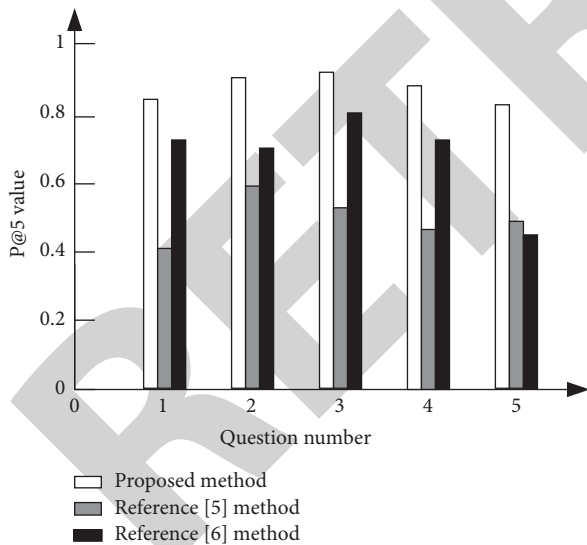FIGURE 8: Intelligent interaction results of dialog service.

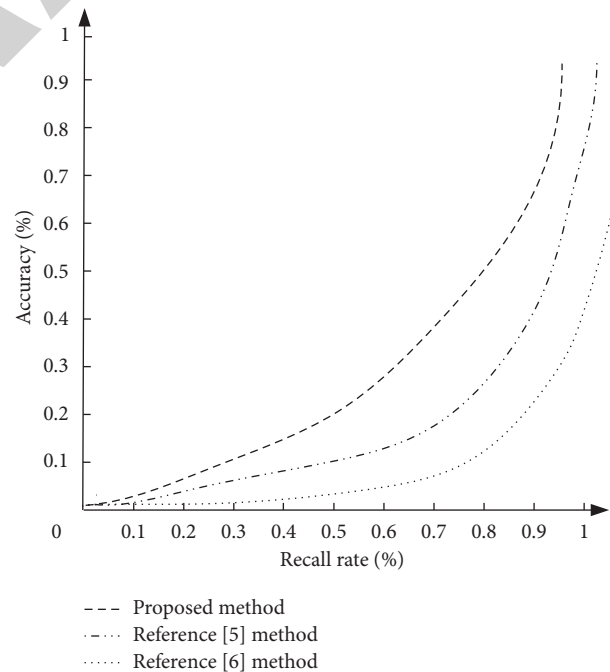FIGURE 9: Business acceptance accuracy of different methods.

FIGURE 10: AUC curves of different methods.

same as that of correct classification problems. Therefore, the higher the AUC curve, the more the number of wrong classification problems. It can be seen from Figure 10 that the proposed method has the lowest AUC curve, while the other two methods have higher AUC curves because the proposed method calculates the feature vectors of the problem in the question and answer interactive open platform, simplifies the problem, reduces the complexity of classification problems. It is applied to the information retrieval module of the interactive open platform of question answering, and information retrieval is realized.
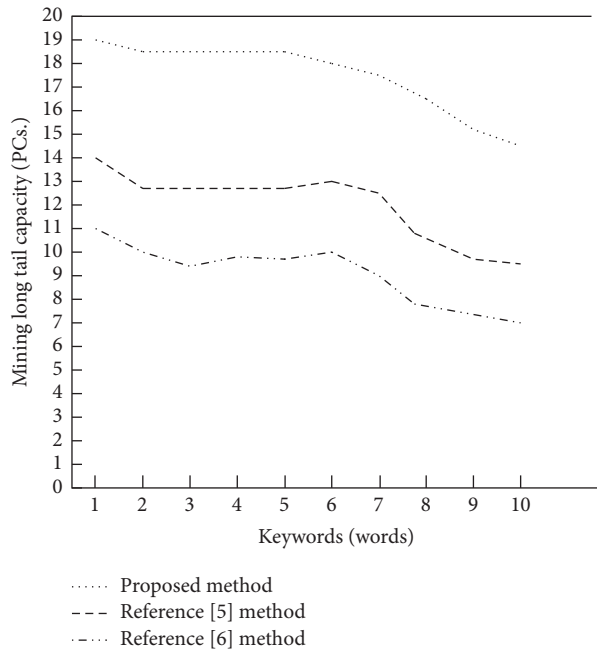
FIGURE 11: Mining long-tail capacity of three methods.

4.3.3. Long-tail Excavation Capacity. Using keywords to get question answers in the question-and-answer interactive open platform can broaden the questions so that question answers can be found in a wider range. Compare the ability of the three approaches to mine long-tail keywords with varied word counts. As shown in Figure 11, it can be seen that the number of long-tail mining is the largest in the period of 5-6 words, and the long-tail mining ability continues to decline when the number of keyword words exceeds more than 10. However, the minimum number of relevant answers mined by the proposed method is 15, while the maximum number of relevant answers in document [4] is only 14, and the number in document [5] is less than 11, because the proposed method converts all documents into feature vectors with dimensions, sets weights for all words in the document, places them in the coordinate system, and normalizes the words. Therefore, the answers to questions can be matched more comprehensively, and the number of answers that can be matched by keywords also increases, which improves the ability of mining long tails.

5. Conclusion

To solve the existing problems, a design method of question-and-answer interactive open platform for power grid business acceptance robot is proposed. To realize the construction of a question-and-answer interactive open platform for power grid business acceptance robot, this method constructs a question-and-answer interactive open platform with multiple modules and adds an algorithm to convert questions and documents into vector form to calculate their similarity. Solve the issues of low service acceptance accuracy, a high AUC curve, and a limited ability to mine the

long tail to advance the development of power grid business regulation.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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