

QUESTION-ANSWER INTERACTION METHOD AND DEVICE, COMPUTER DEVICE AND COMPUTER READABLE STORAGE MEDIUM

CROSS-REFERENCE TO RELATED APPLICATION

5 [0001] This application claims priority to Chinese patent application No. 201810339766.0, filed on April 16, 2018, all contents of which are incorporated herein in its entirety by reference.

TECHNICAL FIELD

[0002] The present application relates to the field of human-computer interaction
10 technologies, and more particularly to a question-answer interaction method and device, a computer device and a computer readable storage medium.

BACKGROUND

[0003] Human-Computer Interaction (HCI) is a science that studies the interaction
between a system and a user. The system may be a variety of machines, or a
15 computerized system and software. For example, various artificial intelligence systems, such as intelligent customer service systems, voice control systems, etc., may be realized by the Human-Computer Interaction.

[0004] An intelligent question-answer system is a typical application of the
Human-Computer Interaction. In a traditional intelligent question-answer system, by
20 fuzzy search or similarity calculation, a knowledge point related to or close to a question of a user is searched in a knowledge base, and an answer corresponding to the knowledge point is sent to the user. However, this method is required to carry out the fuzzy search and the similarity calculation for each question of the user, and therefore, the amount of calculation is very large, resulting in low calculation
25 efficiency. In addition, the above method can only answer the question of the user in a "question-and-answer" manner. When the user wants to consult a plurality of questions, the user needs to perform a plurality of input operations. Therefore, a

question-answer interaction process is cumbersome, resulting in poor experience of the user.

SUMMARY

5 [0005] In view of this, an object of the present application is to provide a question-answer interaction method and device, a computer device, and a computer readable storage medium, which can improve calculation efficiency and simplify a question-answer interaction process.

10 [0006] An aspect of the present application provides a question-answer interaction method, including: receiving a question of a user; acquiring an answer corresponding to the question, and acquiring at least one recommendation relevancy between each of at least one intention in a preset intention library and the question; determining an intention corresponding to a recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention; and sending the answer to the user, and pushing the recommendation intention to the user.

15 [0007] In an embodiment of the present application, the acquiring at least one recommendation relevancy between each of at least one intention in a preset intention library and the question includes: performing a word segmentation processing on the question to obtain a plurality of words; matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

20 [0008] In an embodiment of the present application, the matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library includes: matching each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model including at least one probability of the at least one important element; and the determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question includes: determining, according to a probability of an important element that matches the plurality of words in

the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0009] In an embodiment of the present application, the matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library includes: matching each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set including a confidence of the at least one frequent item; and the determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question includes: determining, according to the confidence of a frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0010] In an embodiment of the present application, the acquiring an answer corresponding to the question includes: performing a word segmentation processing on the question to obtain a plurality of words; matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and executing, according to a matching result, a corresponding preset branch process to obtain the answer corresponding to the branch process.

[0011] In an embodiment of the present application, the executing a corresponding preset branch process includes: determining whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library; and if each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library, outputting a corresponding answer; or if each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, acquiring at least one important element for triggering the answer by using a context intention reasoning method.

[0012] In an embodiment of the present application, the question-answer interaction method further includes: establishing, according to a plurality of questions raised by each of at least one user recorded in an interaction log, the preset intention library by using a big data analysis method. The preset intention library includes a corresponding relationship between each of the at least one intention and at least one important element.

[0013] In an embodiment of the present application, the pushing the recommendation intention to the user includes: pushing a question sentence for the recommendation intention to the user; and the question-answer interaction method further includes: sending the answer corresponding to the question sentence for the recommendation intention to the user according to a feedback from the user.

[0014] In an embodiment of the present application, the pushing the recommendation intention to the user includes: pushing a commodity content for the recommendation intention to the user.

[0015] Another aspect of the present application provides a question-answer interaction device, including: a receiving module, configured to receive a question of a user; an acquiring module, configured to acquire an answer corresponding to the question, and acquire at least one recommendation relevancy between each of at least one intention in a preset intention library and the question; a determining module, configured to determine an intention corresponding to a recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention; and a sending module, configured to send the answer to the user, and push the recommendation intention to the user.

[0016] In an embodiment of the present application, the acquiring module includes: a processing unit, configured to perform a word segmentation processing on the question to obtain a plurality of words; a matching unit, configured to match each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and a determining unit, configured to determine, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0017] In an embodiment of the present application, the matching unit is configured to match each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model including at least one probability of the at least one important element, and the determining unit is configured to determine, according to a probability of an important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0018] In an embodiment of the present application, the matching unit is configured to

match each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set including a confidence of the at least one frequent item, and the determining unit is configured to determine, according to the confidence of
5 a frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0019] In an embodiment of the present application, the acquiring module includes: a processing unit, configured to perform a word segmentation processing on the question to
10 obtain a plurality of words; a matching unit, configured to match each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and an executing unit, configured to execute, according to a matching result, a corresponding preset branch process to obtain the answer corresponding to the branch process.

15 [0020] In an embodiment of the present application, the executing unit is configured to determine whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library; and if each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library, output a
20 corresponding answer; or if each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, acquire at least one important element for triggering the answer by using a context intention reasoning method.

[0021] In an embodiment of the present application, the question-answer interaction
25 device further includes: a library establishing module, configured to establish, according to a plurality of questions raised by each of at least one user recorded in an interaction log, the preset intention library by using a big data analysis method. The preset intention library includes a corresponding relationship between each of the at least one intention and at least one important element.

30 [0022] In an embodiment of the present application, the sending module is configured to push a question sentence for the recommendation intention to the user, and send the answer corresponding to the question sentence for the recommendation intention to the user according to a feedback from the user.

[0023] In an embodiment of the present application, the sending module is configured to push a commodity content for the recommendation intention to the user.

[0024] Still another aspect of the present application provides a computer device, including: a memory; a processor; and an executable instruction stored in the memory and executed in the processor. When the executable instruction is executed by the processor, the processor performs the question-answer interaction method according to any one of embodiments described above.

[0025] Yet still another aspect of the present application provides a computer readable storage medium storing an executable instruction that, when executed by a processor, cause the processor to perform a question-answer interaction method according to any one of embodiments described above.

[0026] According to the technical solutions provided in the embodiments of the present application, by performing the following steps: receiving the question of the user; acquiring the answer corresponding to the question, acquiring the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question, determining the intention corresponding to the recommendation relevancy exceeding the preset relevancy threshold in the at least one recommendation relevancy as the recommendation intention, sending the answer to the user, and pushing the recommendation intention to the user, the calculation efficiency can be improved and the question-answer interaction process can be simplified.

[0027] It should be understood that the above general description and the following detailed description are only exemplary and explanatory, and cannot limit the present application.

BRIEF DESCRIPTION OF DRAWINGS

[0028] The accompanying drawings herein are incorporated into the specification and constitute a part of the specification, show embodiments consistent with the present application, and are used to explain the principles of the present application with the specification together.

[0029] FIG. 1 is a flow chart of a question-answer interaction method according to an exemplary embodiment of the present application.

[0030] FIG. 2 is a flow chart of a question-answer interaction method according to

another exemplary embodiment of the present application.

[0031] FIG. 3 is a flow chart of a question-answer interaction method according to another exemplary embodiment of the present application.

[0032] FIG. 4 is a flow chart of a question-answer interaction method according to
5 another exemplary embodiment of the present application.

[0033] FIG. 5 is a block diagram of a question-answer interaction device according to an exemplary embodiment of the present application.

[0034] FIG. 6 is a block diagram of a question-answer interaction device according to another exemplary embodiment of the present application.

10 [0035] FIG. 7 is a block diagram of a question-answer interaction device according to another exemplary embodiment of the present application.

[0036] FIG. 8 is a block diagram of a question-answer interaction device according to another exemplary embodiment of the present application.

[0037] FIG. 9 is a block diagram of a device 900 for question-answer interaction
15 according to an exemplary embodiment of the present application.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0038] A clear and complete description of technical solutions of the embodiments of the present application will be given below, in combination with the accompanying drawings in the embodiments of the present application. Apparently,
20 the embodiments described below are a part, but not all, of the embodiments of the present application. All of other embodiments, obtained by those skilled in the art based on the embodiments of the present application without any inventive efforts, fall into the protection scope of the present application.

[0039] FIG. 1 is a flow chart of a question-answer interaction method according to
25 an exemplary embodiment of the present application. The question-answer interaction method of FIG. 1 may be executed by a human-computer interaction device (for example, an intelligent question-answer system, etc.). As shown in FIG. 1, the question-answer interaction method includes the following steps.

[0040] 110. Receiving a question of a user.

30 [0041] In an embodiment of the present application, the question of the user may be in a form of natural language sentences, phrases, vocabulary, or the like. The

question of the user may contain only one intention or a plurality of intentions, and the present application is not limited thereto. For example, the question of the user is "please check my remaining traffic", and then the question only contains one intention "query remaining traffic". For another example, the question of the user is
5 "query call fee and points", and then the question contains two intentions "query call fee" and "query points".

[0042] Further, the question of the user may be text information input by the user through a keyboard, a touch screen, a tablet, or the like; or may be voice information input by the user through a microphone, or the like; or may also be a text message, a
10 data link, a voice message, a picture message, an image message, a video message, and the like, input by the user through an interactive terminal, and the present application is not limited thereto. Herein, the interactive terminal is equipment that can interact with the intelligent question-answer system, such as a smart phone, a tablet, a personal computer or other intelligent terminals. For example, the user may
15 ask the question to the intelligent question-answer system through voice or video, while sending a corresponding data link to the intelligent question-answer system through the interactive terminal.

[0043] It should be noted that when the received question is the voice message, the picture message, the image message or the video message, the intelligent
20 question-answer system may convert the voice message, the picture message, the image message or the video message into the text message through a voice recognition module, a picture recognition module or a video recognition module.

[0044] 120. Acquiring an answer corresponding to the question, and acquiring at least one recommendation relevancy between each of at least one intention in a
25 preset intention library and the question.

[0045] In an embodiment of the present application, before acquiring the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question, according to a plurality of questions raised by each of at least one user recorded in an interaction log, the preset intention library
30 (also known as a knowledge library) is established firstly by using a big data analysis method. Herein, the preset intention library may include a corresponding relationship between each of the at least one intention and at least one important element.

[0046] Specifically, the intention may be obtained by matching with intention

knowledge points preset in a database by using a natural language processing method. Herein, the database is an intention library on which the intention knowledge points are stored. The intention library may include a plurality of intention knowledge points, and each of the plurality of intention knowledge points may include the answer and/or the recommendation relevancy of at least one corresponding question.

[0047] Further, the question of the user may be analyzed for the intention according to results of a word segmentation processing or sentence segmentation processing, for example, semantic analysis, intention matching, and the like; a plurality of words after the word segmentation processing may also be arranged and combined according to the result of the word segmentation processing, and the question of the user may be analyzed for the intention according to result of vocabulary combination; or a sentence processing may be performed on the question by other natural language analysis models obtained by corpus training to obtain a semantic content of the question, and the question of the user may be analyzed for the intention according to the semantic content of the question, and the application is not limited thereto.

[0048] Specifically, the word segmentation processing may use one or more of the followings: a bidirectional maximum matching method, a Viterbi algorithm, a Hidden Markov Model (HMM) algorithm, and a Conditional Random Field (CRF) algorithm. The sentence segmentation processing uses commas, semicolons, periods, question marks, exclamation marks, and the like, as separators for the sentence segmentation, to divide the question of the user into a plurality of short sentences; or, the question of the user is split according to fixed words. The vocabulary combination is to arrange and combine the plurality of words together, and the intention expressed by these words after arrangement and combination may be one or multiple. The semantic content may be obtained by performing overall semantic analysis on the question of the user by the other natural language analysis models obtained by the corpus training.

[0049] Further, each of the plurality of words may be matched with at least one important element corresponding to each of the at least one intention in the intention library, and a corresponding preset branch process is executed according to a matching result, thereby acquiring the answer corresponding to the branch process.

[0050] Specifically, if each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the intention library, the answer corresponding to the question is directly acquired from the intention library; if

each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the intention library, at least one important element for triggering the answer is acquired from the intention library by a context intention reasoning method.

5 [0051] 130. Determining an intention corresponding to a recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention.

[0052] In an embodiment of the present application, the relevancy may be calculated by the following method: extracting a plurality of questions that the user continues to ask
10 after asking a first question from an interaction log between the user and the intelligent question-answer system, counting the number of people corresponding to each of the plurality of questions that the user continues to ask, and calculating a proportion of the number of people corresponding to each question in the interaction log according to a statistical result.

15 [0053] Specifically, taking an intelligent online customer service system of China Merchants Bank as an example, the interaction log between 2,000 users and the intelligent online customer service system is selected as sample data. By using big data analysis of the sample data, it may be seen that 1000 users asked question A "What is the amount of my credit card that should be repaid in this period"; then, according to statistics
20 of questions asked by these 1000 users after asking question A, it can be seen that 500 users asked question B "what is my due date for repayment" after asking question A, 300 users asked question C "What is my minimal repayment" after asking question A, and 200 users asked question D "Can I apply for installment repayment" after asking question A. Further, according to the statistical result, by calculating the proportion of the number
25 of people corresponding to each question in the interaction log, it can be seen that the relevancy between question B and question A is 0.5, the relevancy between question C and question A is 0.3, and the relevancy between question D and question A is 0.2. It should be noted that, in addition to the above-described method for calculating the relevancy, the relevancy may also be calculated by a correlation analysis method such as
30 an Apriori algorithm, a FP-growth algorithm, and the like, and the present application is not limited thereto.

[0054] Next, the calculated relevancy is compared with a relevancy threshold. If the relevancy is greater than the relevancy threshold, the intention corresponding to the

relevancy is determined as the recommendation intention; if the relevancy is less than the relevancy threshold, the intention corresponding to the relevancy is ignored. Herein, the relevancy threshold may be preset in, or may be adjusted according to actual needs, and the present application is not limited thereto.

5 [0055] Further, if a preset relevancy threshold is 0.1, the relevancy between question A and each of question B, question C, and question D are all greater than the relevancy threshold; that is, the intentions corresponding to question B, question C, and question D are the content that the user may want to know more about, so the intentions corresponding to question B, question C, and question D are determined as the
10 recommendation intentions. If the preset relevancy threshold is 0.25, only the relevancy between the question A and each of the question B and the question C are greater than the relevancy threshold; that is, the intentions corresponding to the question B and the question C are the content that the user may want to know more about, the intention corresponding to the question D may not be the content that the user may want to know
15 more about. Therefore, the intentions corresponding to the question B and the question C are determined as the recommendation intentions, while the intention corresponding to the question D is ignored.

[0056] 140. Sending the answer to the user, and pushing the recommendation intention to the user.

20 [0057] In an embodiment of the present application, the answer and/or the recommendation intention may be sent to the user in one or more ways of a text, a voice, a picture, an image, a video, a link, and the like.

[0058] Specifically, taking the intelligent online customer service system of China Merchants Bank as an example, if the user inputs "how to make a credit card repayment"
25 in text, the intelligent online customer service system of China Merchants Bank may reply in text as "you may make a repayment at a counter or an ATM of China Merchants Bank, or you may make a repayment by online banking, automatic transfer, and the like." At the same time, location information of China Merchants Bank around the user's current location may be displayed on a user interface of the intelligent online customer
30 service system, and the user may navigate to the nearby China Merchants Bank for repayment by clicking the location information.

[0059] According to the technical solutions provided in the embodiments of the application, by performing the following steps: receiving the question of the user,

acquiring the answer corresponding to the question, acquiring the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question, determining the intention corresponding to the recommendation relevancy exceeding the preset relevancy threshold in the at least one recommendation relevancy as the recommendation intention, sending the answer to the user, and pushing the recommendation intention to the user, the calculation efficiency can be improved and the question-answer interaction process can be simplified.

[0060] In another embodiment of the present application, the acquiring at least one recommendation relevancy between each of at least one intention in a preset intention library and the question includes: performing a word segmentation processing on the question to obtain a plurality of words; matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0061] Specifically, the word segmentation processing is performed on the question of the user according to a preset word segmentation rule and a preset word segmentation dictionary to obtain the plurality of words. Herein, the word segmentation rule may include, but is not limited to, a forward maximum matching method, a reverse maximum matching method, a word-by-word traversal method or a word frequency statistics method, a minimum segmentation method, a bidirectional matching method, and the like. For example, if the question of the user is "how many points do I still have currently", the intelligent question-answer system may perform the word segmentation processing on the question of the user "how many points do I still have" by the word-by-word traversal method to obtain the plurality of words "I", "currently", "still ", "how many", and "points". It should be noted that the question of the user may or may not include punctuation marks, and the present application is not limited thereto.

[0062] Then, a filtering processing is performed on the plurality of words to obtain at least one keyword. A method of the filtering processing may be to filter the plurality of words according to part of speech, and the like, to remove prefix and suffix; may also be to filter the plurality of words according to frequency to remove stop words; or may also be to remove the prefix and suffix first firstly, and then remove the stop words, and the like, and the present application is not limited thereto. Herein, removing the stop words

refers to remove words which don't help much with recognition but frequently appear in the question, such as "this", "of", "and", and the like. These words may introduce large errors in a process of similarity calculation, which may be regarded as a kind of noise. It should be noted that the filtering processing may also remove some words which doesn't help with recognition, such as, "I", "want", "what", and the like.

[0063] Further, the semantic analysis is performed on the at least one keyword to obtain semantic information of the plurality of words. Generally, the semantic information refers to information provided by any meaningful language, words, data, symbols, and the like. In the embodiment of the present application, the semantic information is the intention in the question of the user, which may be obtained by a method such as part-of-speech replacement, named entity recognition and the like. Herein, the semantic information may include, but is not limited to, synonyms and/or the combination of synonyms of the words, similar words and/or the combination of similar words of the words, and entities having the same or similar structure as the words.

[0064] Further, semantic similarity calculation is performed on the semantic information and the at least one important element corresponding to each of the at least one intention in the preset intention library, and the important element with the highest semantic similarity is used as at least one important element matched. Herein, the semantic similarity refers to a matching degree between the semantic information of the plurality of words and a plurality of preset intention knowledge points in the intention library based on characters and words, and the high similarity of semantics. The semantic similarity calculation may adopt one or more combinations of a calculation method based on a Vector Space Model (VSM), a calculation method based on a Latent Semantic Indexing (LSI), a semantic similarity calculation method based on an attribute theory, and a semantic similarity calculation method based on a Hamming distance. It should be noted that the semantic similarity calculation method may also be other calculation methods for the semantic similarity.

[0065] Finally, according to a result of the semantic similarity calculation, the at least one recommendation relevancy between the question and the intention corresponding to each of the at least one important element matched is determined.

[0066] In another embodiment of the present application, the matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library includes: matching each of the plurality

of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model including at least one probability of the at least one important element. The determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question includes: determining, according to a probability of an important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[0067] Specifically, the topic model is a modeling method for implied topics in a text. The topic model can discover a latent semantic relationship (i.e. topic) between a word and a document. By treating the document as a mixed distribution of a group of topics, and the topic is a probability distribution of the words, so that a high-dimensional vector space of the "word-document" is mapped to low-dimensional spaces of "word-topic" and "topic-document", which effectively improves a processing performance of text information. Herein, the topic may be a concept, an aspect, which is expressed as a series of related words. In addition, if described in viewpoint of mathematics, the topic is the probability distribution of the words on the vocabulary. The more closely related to the topic, the greater the probability, on the contrary, the smaller the probability.

[0068] For example, if an article refers to the topic "Tencent", words such as "WeChat", "Glory of the King", "Huateng Ma " and the like may appear with a high frequency; and if the topic "price" is involved, words such as "price", "performance-price ratio", "discount" and the like may appear frequently. For another example, it is supposed that there are two sentences, a first sentence is "Jobs is a perfectionist", and a second sentence is "Will apple' price be reduced", although there is no common word between the two sentences, the two sentences have a strong correlation, because although the "apple" in the second sentence may refer to the apple that was eaten, since "Jobs" is in the first sentence, it is natural to understand the "apple" in the second sentence as an Apple's product. It can be seen that the word "apple" involves both the topic "Apple" and the topic "fruit".

[0069] In addition, the topic model may also be a generating model. Each word of an article is obtained through a process of "selecting a topic with a certain probability and selecting a word from the topic with a certain probability", and therefore, if a document is to be generated, the probability of each word appearing in the document is:

$$p(\text{word}|\text{document}) = \sum_{\text{topic}} p(\text{word}|\text{topic}) * p(\text{topic}|\text{document})$$

[0070] The $p(\text{word}|\text{document})$ represents the probability of each word appearing in each document, the $p(\text{word}|\text{topic})$ represents the probability of each word appearing in each topic, and the $p(\text{topic}|\text{document})$ represents the probability of each topic appearing in each document.

5 [0071] Herein, it is supposed that there are many documents (for example, a large number of web pages), the word segmentation is performed on these documents firstly to obtain a vocabulary list; then, as for each word, the number of times that the word appears in the document is divided by the total number of all words in the document to obtain the probability of the word appearing in the document. It can be seen that, as for any
10 document, since the $p(\text{word}|\text{document})$ is known, and the $p(\text{word}|\text{topic})$ and the $p(\text{topic}|\text{document})$ are unknown, the topic model is to infer a "word-topic" matrix $p(\text{word}|\text{topic})$ and a "topic-document" matrix $p(\text{topic}|\text{document})$ by using a large number of known "word-document" matrices $p(\text{word}|\text{document})$ and a series of training.

[0072] Further, the topic model may include, but is not limited to, a Probabilistic Latent
15 Semantic Analysis (PLSA), a Latent Dirichlet Allocation (LDA), and a Label Latent Dirichlet Allocation (L-LDA). Further, the topic model may be extended according to different application needs, for example, the context information of the words and the context information of geographical location may be introduced into the PLSA model; time information of the text corpus may also be introduced to study evolution of the topic
20 over time; or user's rating information of products or blogs may be introduced into the basic LDA model.

[0073] Optionally, as another embodiment, the matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library includes: matching each of the plurality of words with at least
25 one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set including a confidence of the at least one frequent item; and the determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question includes: determining, according
30 to the confidence of the frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least

one intention in the preset intention library and the question.

[0074] Specifically, the sequence pattern is to give a set of different sequences, and each sequence is arranged in order by different elements, each element (transaction) is composed of different items, and a minimum support threshold specified by the user is given. Sequence pattern mining is to find out all frequent subsequences, that is, the frequency of a subsequence appearing in a sequence set is not lower than the minimum support threshold specified by the user. In other words, all frequent item sets need to be found out firstly, and the frequency of occurrence of these sets is at least as frequently as a predefined minimum support; then a relevancy rule is generated by the frequent item set, and these rules must satisfy the minimum support and a minimum confidence.

[0075] Herein, the relevancy rule represents an implicit relevancy in data. For example, a user who purchases goods X tends to purchase goods Y. Support means a probability that the goods X and the goods Y appear at the same time. If the probability that the goods X and the goods Y appear at the same time is small, it means that the relevancy between the goods X and the goods Y is small; if the probability that the goods X and the goods Y appear at the same time is large, it means that the relevancy between the goods X and the goods Y is large. Further, a formula of the support is: $\text{support}(\{X, Y\}) = \frac{\text{the number of people who purchase } \{X, Y\} \text{ at the same time}}{\text{the total number of people}}$. The confidence means a probability that the user who purchases the goods X purchases the goods Y at the same time. If the confidence is high (for example, greater than 90%), it means that the user who purchases the goods X may purchase the goods Y at the same time; if the confidence is low (for example, less than 10%), it means that the user who purchases the goods X may not purchase the goods Y. Further, a formula of the confidence is: $\text{confidence}(X \rightarrow Y) = \frac{\text{the number of people who purchase } \{X, Y\} \text{ at the same time}}{\text{the number of people who purchase } X}$. It should be noted that there is no order of the support, that is, the support of $\{X, Y\}$ is equal to the support of $\{Y, X\}$.

[0076] For example, transaction records of 10,000 users in supermarkets are selected as sample data. Among them, 1000 users purchased drinks, 2000 users purchased beers, 500 users purchased breads, 800 users purchased both drinks and beers at the same time, and 100 users purchased both drinks and breads at the same time, and then the support of $\{\text{drink}, \text{beer}\}$ (that is, the probability of $\{\text{drink}, \text{beer}\}$ appearing at the same time) is $800/10000=0.08$, and the support of $\{\text{drink}, \text{bread}\}$ is $100/10000=0.01$, the confidence of $(\text{drink} \rightarrow \text{beer})$ (that is, the probability that the user who purchases the drink purchases the

beer at the same time) is $800/1000=0.8$, and the confidence of (beer->drink) is $800/2000=0.4$.

[0077] Further, a sequence mining algorithm may include, but is not limited to, an Apriori algorithm, a Generalized Sequential Pattern (GSP) algorithm, a FreeSpan algorithm, and a PrefixSpan algorithm. Herein, the Apriori algorithm is a frequent item set algorithm for mining the relevancy rule, and a core idea of the Apriori algorithm is to mine the frequent item set by two stages: candidate set generation and plot downward closed detection. The GPS algorithm is similar to the Apriori algorithm, and a core idea of the GPS algorithm is to generate a candidate sequence by using a large sequence generated during the previous scan every time when a database is scanned, and calculate the support of the candidate sequence while scanning, a candidate sequence that satisfies the support being used as the large sequence for the next scan. The FreeSpan algorithm is a sequence mining algorithm based on pattern projection, and a basic idea of the FreeSpan algorithm is to project a sequence database recursively onto a group of smaller projection databases by using a frequent sequence set currently mined, and increase the subsequence on each projection database respectively. The PrefixSpan algorithm is an improved algorithm of FreeSpan, and a basic idea of the PrefixSpan algorithm is not to consider all frequent subsequences that may appear in projection, only to check a prefix sequence, and then project a corresponding suffix into the projection database.

[0078] In another embodiment of the present application, the acquiring an answer corresponding to the question includes: performing a word segmentation processing on the question to obtain a plurality of words; matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and executing, according to a matching result, a corresponding preset branch process to obtain the answer corresponding to the branch process.

[0079] Specifically, it is determined whether each of the plurality of words after the word segmentation processing matches the at least one important element corresponding to each of the at least one intention in the preset intention library. If each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library, the answer corresponding to the question is directly acquired and output. If each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, at least one important element for triggering the answer is acquired by

using the context intention reasoning method.

[0080] Further, according to an order of similarity from high to low, one of a plurality of extension questions that has a high similarity to the question in the intention library is found. It is determined whether at least one remaining word contained in the extension question after consuming the at least one important element can be found in a previous question. If each of the at least one remaining word contained in the extension question after consuming the at least one important element cannot be found in the previous question, the extended question is directly deleted, and whether the next extended question meets a requirement of context intention is further determined. If at least one remaining word in the at least one remaining word contained in the extension question after consuming the at least one important element can be found in the previous question, the answer corresponding to the extension question is acquired and output.

[0081] In another embodiment of the present application, the pushing the recommendation intention to the user includes: pushing a question sentence for the recommendation intention to the user; and the question-answer interaction method further includes: sending the answer corresponding to the question sentence for the recommendation intention to the user according to a feedback from the user.

[0082] Specifically, the intelligent question-answer system may push the question sentence for the recommendation intention to the user while answering a current question of the user, and send the answer corresponding to the question sentence for the recommendation intention to the user according to the feedback from the user.

[0083] Herein, still taking the intelligent online customer service system of China Merchants Bank as an example, it is assumed that the question of the user is "how many points do I have on my credit card", the answer of the intelligent online customer service system is "your current available points are 7600 points; do you want to know an activity of spending little points to win a big prize?". Further, if the user answers "yes", the intelligent online customer service system may send the answer corresponding to the "activity of spending little points to win a big prize" to the user.

[0084] In another embodiment of the present application, the pushing the recommendation intention to the user includes: pushing a commodity content for the recommendation intention to the user.

[0085] Specifically, the intelligent question-answer system may push the commodity content corresponding to the recommendation intention to the user. Herein, the product

may be food, such as a banana, milk, jam, and the like; the product may also be goods, such as a mobile phone, a book, a toy, and the like, and the present application is not limited thereto. In addition, the commodity content may include, but is not limited to, an advertisement content of the product in the form of a picture, a video, a link, and the like.

5 [0086] All of the above optional technical solutions may be combined in any way to form optional embodiments of the present application, and detailed descriptions are not provided herein.

[0087] FIG. 2 is a flow chart of a question-answer interaction method according to another exemplary embodiment of the present application. As shown in FIG. 2, the
10 question-answer interaction method includes the following steps.

[0088] 210: Receiving a question of a user.

[0089] In the embodiment of the present application, the question of the user may include only one intention or a plurality of intentions, and the present application is not limited thereto. For example, the question of the user is "I want to make a credit card
15 repayment ", and then the question contains only one intention "credit card repayment". For another example, the question of the user is "please tell me the weather in Beijing and Shanghai today", and then the question contains two intentions "weather in Beijing" and "weather in Shanghai".

[0090] It should be noted that the question of the user may be one or more of a text
20 message, a voice message, a picture message, an image message and a video message. In addition, it should be noted that punctuation marks may or may not be included in the question of the user.

[0091] 220: Performing a word segmentation processing on the question to obtain a plurality of words.

25 [0092] In the embodiment of the present application, the word segmentation processing is performed on the question of the user according to a preset word segmentation rule and a preset word segmentation dictionary to obtain the plurality of words. Herein, the word segmentation rule may include, but is not limited to, a forward maximum matching method, a reverse maximum matching method, a word-by-word traversal method or a
30 word frequency statistics method, a minimum segmentation method, a bidirectional matching method, and the like. The word segmentation processing may adopt one or more of a bidirectional maximum matching method, a Viterbi algorithm, an implied Markov model algorithm and a conditional random field algorithm.

[0093] It should be noted that the method for processing the question in the present application is not limited to the word segmentation processing, but may be other suitable methods, such as a sentence segmentation processing, a vocabulary combination, and the like.

5 [0094] 230: Matching each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model including at least one probability of the at least one important element.

10 [0095] In the embodiment of the present application, semantic analysis is performed on each of the plurality of words to obtain semantic information of the plurality of words; semantic similarity calculation is performed on the semantic information and the at least one important element in the topic model corresponding to each of the at least one intention in the preset intention library, and the important element with the highest semantic similarity is used as at least one important element matched.

15 [0096] The topic model may include the at least one probability of the at least one important element. Herein, the topic model is a common method for processing unstructured data, and a main function of the topic model is to extract potential topic information from text data. In the topic model, a topic of each topic model is actually a probability distribution of the words on the vocabulary. In addition, unlike other search
20 methods based on rules or dictionaries, the topic model is an unsupervised learning method.

[0097] 240: Determining, according to the probability of the important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset
25 intention library and the question.

[0098] In the embodiment of the present application, according to a result of the semantic similarity calculation, the at least one recommendation relevancy between the question and the intention corresponding to each important element in the at least one important element matched is determined. Herein, the semantic similarity refers to a
30 matching degree between the semantic information of the plurality of words and a plurality of preset intention knowledge points in the intention library based on characters and words, and the high similarity of semantics.

[0099] Further, the semantic similarity calculation may adopt one or more combinations

of a calculation method based on a Vector Space Model (VSM), a calculation method based on a Latent Semantic Indexing (LSI), a semantic similarity calculation method based on an attribute theory, and a semantic similarity calculation method based on a Hamming distance. It should be noted that the semantic similarity calculation method
5 may also be other calculation methods for the semantic similarity.

[00100] 250: Determining an intention corresponding to the recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention.

[00101] In the embodiment of the present application, the relevancy may be calculated by
10 the following method: extracting a plurality of questions that the user continues to ask after asking a first question from an interaction log between the user and the intelligent question-answer system, counting the number of people corresponding to each of the plurality of questions that the user continues to ask, and calculating a proportion of the number of people corresponding to each question in the interaction log according to a
15 statistical result.

[00102] Further, the calculated relevancy is compared with a relevancy threshold. If the relevancy is greater than the relevancy threshold, the intention corresponding to the relevancy is determined as the recommendation intention; if the relevancy is less than the relevancy threshold, the intention corresponding to the relevancy is ignored.

20 [00103] It should be noted that the relevancy threshold may be set in advance, or may be adjusted according to actual needs, and the present application is not limited thereto.

[00104] 260: Sending the answer to the user, and pushing the recommendation intention to the user.

[00105] In an embodiment of the present application, the intelligent question-answer
25 system may push a question sentence for the recommendation intention to the user while sending the answer to the user, and send the answer corresponding to the question sentence for the recommendation intention to the user according to a feedback from the user. The intelligent question-answer system may also push a commodity content for the recommendation intention to the user while sending the answer to the user, and the
30 present application is not limited thereto. In addition, the answer may be presented to the user in a way of a text, a voice, a picture, a link, and the like.

[00106] According to the technical solutions provided in the embodiments of the present application, by using the topic model, the topic corresponding to the document may be

found out from massive data, and the probability of the words generated under the topic may be found out by the topic. Therefore, ability for processing the text information is improved, active marketing is realized, and experience of the user is further improved.

[00107] Next, taking an intelligent question-answer system of the Jingdong as an example, the above question-answer interaction method may be described in detail.

[00108] Specifically, a preset topic model is stored on the intelligent question-answer system, and the topic model includes four topics, i.e., topic 1, topic 2, topic 3, and topic 4. The probability distributions of the words in the vocabulary of the topic 1, the topic 2, the topic 3, and the topic 4 are shown in Table 1. It should be understood that qualifiers of the first, the second and the like mentioned in the embodiments of the present application are only used to describe the use of the technical solutions of the embodiments of the present application more clearly, and cannot be used to limit the protection scope of the present application.

[00109] Table 1

Topic 1		Topic 2		Topic 3		Topic 4	
Apple	0.34821	Apple	0.350378	Eat	0.209405	Apple	0.412311
Yuan	0.016344	Mobile	0.209086	Apple	0.194601	Say	0.064458
Xiaomi	0.011127	Samsung	0.034672	Favorite	0.052487	English	0.025209
Sale	0.010803	Easy to use	0.010979	Want	0.042075	British	0.019067
Android	0.009488	Voice	0.006371	Banana	0.021495	Delicious	0.018999

[00110] It is supposed that the question of the user A is "which is delicious, apple or pear?", and the question of the user B is "which is easy to use, Apple or Android?", then the intelligent question-answer system respectively performs the word segmentation processing on the above questions according to a preset word segmentation rule and a preset word segmentation dictionary and by using methods of removing prefix, suffix, and stop words, and obtains that the words corresponding to the question of user A are "apple", "pear" and "delicious", and the words corresponding to the question of the user B are "Apple", "Android" and "easy to use".

[00111] Further, the words "apple", "pear" and "delicious" corresponding to the question of user A are compared with the words in the vocabulary of each topic in the preset topic model, and according to a comparison result, the probability of belonging to the third 3 is the highest. Therefore, the advertisement content of the product corresponding to the

topic 3 is pushed to user A. Similarly, the words "Apple", "Android" and "easy to use" corresponding to the question of the user B are compared with the words in the vocabulary of each topic in the preset topic model, and according to the comparison result, the probability of belonging to the topic 1 is the highest. Therefore, the advertisement content of the product corresponding to the topic 1 is pushed to user B.

[00112] FIG. 3 is a flow chart of a question-answer interaction method according to another exemplary embodiment of the present application. As shown in FIG. 3, the question-answer interaction method includes the following contents.

[00113] 310: Receiving a question of a user.

10 [00114] 320: Performing a word segmentation processing on the question to obtain a plurality of words.

[00115] 330: Matching each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set including a confidence of the at least one frequent item.

15 [00116] 340: Determining, according to the confidence of the frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

20 [00117] 350: Determining an intention corresponding to the recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention.

[00118] 360: Sending the answer to the user, and pushing the recommendation intention to the user.

25 [00119] According to the technical solutions provided in the embodiments of the present application, by using a sequence pattern, behavior of the user may be modeled, so that future behavior of the user may be inferred according to the previous behavior of the user. Therefore, the active marketing of the product is realized and the experience of the user is further improved.

30 [00120] Next, taking an intelligent question-answer system of the China Mobile as an example, the above question-answer interaction method may be described in detail.

[00121] Specifically, a preset sequence pattern is stored in the intelligent question-answer system, and the sequence pattern is obtained based on behavior data of the user and by

big data analysis. Herein, taking the sequence pattern of an package as an example, most users may select “Global System for Mobile communications (GSM) package” after selecting “package”, may select “GSM Internet package” after selecting the “GSM package”, may select " GSM Internet package 58 Yuan class" after selecting the “GSM Internet package”, and may select "open GSM Internet package 58 Yuan class " after selecting after selecting the "GSM Internet package 58 Yuan class ". Table 2 shows the confidence of each item in the sequence pattern of the package.

[00122] Table 2

Package → GSM package →		Package → GSM package → GSM Internet package →	
Predicted value	Confidence	Predicted value	Confidence
GSM Internet package	0.27	GSM Internet package 58 Yuan class	0.41
Introduction of GSM	0.22	GSM Internet package 88 Yuan class	0.25
GSM local package	0.19	GSM Internet package 1288 Yuan class	0.17

[00123] It is supposed that the user logs into the client of the China Mobile and clicks the "package". As can be seen from data on the left of Table 2, the "GSM Internet package" has the highest confidence; that is to say, the user usually selects the "GSM Internet package" after selecting the "package". Therefore, when it is detected that the user clicks the "package", the intelligent question-answer system automatically pushes the "GSM Internet package" to the user. Further, as can be seen from data on the right side of Table 2, the "GSM Internet package 58 Yuan class" has the highest confidence; that is to say, the user usually selects the "GSM Internet package 58 Yuan class" after selecting the "GSM Internet package". Therefore, when it is detected that the user clicks the "GSM Internet package", the intelligent question-answer system automatically pushes the "GSM Internet package 58 Yuan class" to the user.

[00124] FIG. 4 is a flow chart of a question-answer interaction method according to another exemplary embodiment of the present application. As shown in FIG. 4, the question-answer interaction method includes the following contents.

[00125] 410: Receiving a question of a user.

[00126] 420: Performing a word segmentation processing on the question to obtain a plurality of words.

[00127] 430: Matching each of the plurality of words with the at least one important

element corresponding to each of the at least one intention in the preset intention library.

[00128] 440: Determining whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library.

5 [00129] 450: If each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library, outputting a corresponding answer.

[00130] 460: If each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library,
10 acquiring at least one important element for triggering the answer by using a context intention reasoning method.

[00131] According to the technical solutions provided in the embodiments of the present application, by executing the context intention reasoning method, the difficulty of constructing the intention library is reduced, the calculation efficiency is improved, the
15 question-answer interaction process is simplified, and a new intention combined by a plurality of sentences is realized.

[00132] In the following, taking an intelligent question-answer system for house purchase as an example, the above question-answer interaction method may be described in detail.

[00133] Specifically, preset intention knowledge points are stored in the intelligent
20 question-answer system. The intention knowledge points may include a first intention knowledge point "I want to buy a house", a second intention knowledge point "how to get a loan when buying a house", a third intention knowledge point "what conditions are required for getting a loan" and a fourth intention knowledge point "what conditions are required for getting a loan when buying a house", and the like. Further, expressions
25 corresponding to these intention knowledge points are [buy a house], [how] [get a loan] [buy a house], [what] [conditions] [get a loan] and [what] [conditions] [get a loan] [buy a house].

[00134] Then, it is supposed that a first question of the user is "I want to buy a house", then the word segmentation processing is performed on the first question to obtain the
30 plurality of words "I", "want to" and "buy a house". Because the word "buy a house" is directly matched with the expression [buy a house] corresponding to the first intention knowledge point, a second question is continued. Further, it is supposed that the second question of the user is "how to get a loan", and then the word segmentation processing is

performed on the second question to obtain the plurality of words "how" and "get a loan". Because the intention knowledge point matching with the words "how" and "get a loan" cannot be found directly in the intention library, a branch process of the context intention reasoning is executed.

5 [00135] To continue, because the first question is not answered by the context intention, it is needed to find out an extension question similar to the second question "how to get a loan" in the intention library, and the extension question is sorted according to a principle of similarity from high to low, so as to obtain an extension question candidate set. The extension question candidate set may include a first extension question [get a loan] [what]
10 [conditions], a second extension question [buy a house] [how] [get a loan], and a third extension question [buy a house] [get a loan] [what] [conditions].

[00136] Further, remaining words contained in the first extension question [get a loan] [what] [conditions] after removing the words "get a loan" in the second question are "conditions" (required) and "what" (optional). Since neither of these two words cannot be
15 found in the first question "I want to buy a house", the first extension question in the extension question candidate set is deleted, and the same process is continuing to perform on the second extension question. Remaining words contained in the second extension question [buy a house] [how] [get a loan] after removing the words "get a loan" in the second question are "buy a house" and "how". Since the word "buy a house" can be found
20 out in the first question "I want to buy a house", that is to say, the second extension question satisfies the requirement of the context intention, the answer corresponding to "how to get a loan when buying a house" is outputted.

[00137] The following is device embodiments of the present application, which may be used to execute the method embodiments of the present application. For details not
25 disclosed in the device embodiments of the present application, please refer to the method embodiments of the present application.

[00138] FIG. 5 is a block diagram of a question-answer interaction device 500 according to an exemplary embodiment of the present application. As shown in FIG. 5, the question-answer interaction device 500 includes a receiving module 510, an acquiring
30 module 520, a determining module 530, and a sending module 540.

[00139] The receiving module 510 is configured to receive a question of a user.

[00140] The acquiring module 520 is configured to acquire an answer corresponding to the question, and acquire at least one recommendation relevancy between each of at least

one intention in a preset intention library and the question.

[00141] The determining module 530 is configured to determine an intention corresponding to a recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention.

5 [00142] The sending module 540 is configured to send the answer to the user, and push the recommendation intention to the user.

[00143] According to the technical solutions provided in the embodiments of the present application, by performing the following steps: receiving the question of the user; acquiring the answer corresponding to the question, and acquiring the at least one
10 recommendation relevancy between each of the at least one intention in the preset intention library and the question; determining the intention corresponding to the recommendation relevancy exceeding the preset relevancy threshold in the at least one recommendation relevancy as the recommendation intention; and sending the answer to the user, and pushing the recommendation intention to the user, the calculation efficiency
15 can be improved and the question-answer interaction process can be simplified.

[00144] In another embodiment of the present application, the acquiring module 520 includes a processing unit 5201, a matching unit 5202 and a determining unit 5203. The processing unit 5201 is configured to perform a word segmentation processing on the question to obtain a plurality of words; the matching unit 5202 is configured to match
20 each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and the determining unit 5203 is configured to determine, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

25 [00145] In another embodiment of the present application, the matching unit 5202 is configured to match each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model including at least one probability of the at least one important element, and the determining unit 5203 is configured to determine, according to a
30 probability of an important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[00146] In another embodiment of the present application, the matching unit 5202 is

configured to match each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set including a confidence of the at least one frequent item, and the determining unit 5203 is configured to determine, according to
5 the confidence of a frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

[00147] In another embodiment of the present application, the acquiring module includes a processing unit 5201, a matching unit 5202, and an executing unit 5204. The processing
10 unit 5201 is configured to perform a word segmentation processing on the question to obtain a plurality of words; the matching unit 5202 is configured to match each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and the executing unit 5204 is configured to execute, according to a matching result, a corresponding preset branch
15 process to obtain the answer corresponding to the branch process.

[00148] In another embodiment of the present application, the executing unit 5204 is configured to determine whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library; if each of the plurality of words matches the at least one important
20 element corresponding to each of the at least one intention in the preset intention library, output a corresponding answer; or if each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, acquire at least one important element for triggering the answer by using a context intention reasoning method.

[00149] In another embodiment of the present application, the question-answer
25 interaction device 500 of FIG. 5 further includes a library establishing module 550, configured to establish, according to a plurality of questions raised by each of at least one user recorded in an interaction log, the preset intention library by using a big data analysis method. The preset intention library includes a corresponding relationship between each
30 of the at least one intention and at least one important element.

[00150] In another embodiment of the present application, the sending module 540 is configured to push a question sentence for the recommendation intention to the user, and send the answer corresponding to the question sentence for the recommendation intention

to the user according to a feedback from the user.

[00151] In another embodiment of the present application, the sending module 540 is configured to push a commodity content for the recommendation intention to the user.

[00152] With respect to the devices in the above embodiments, the specific manners for performing operations for individual modules therein have been described in detail in the embodiments regarding the methods, which will not be elaborated herein.

[00153] FIG. 6 is a block diagram of a question-answer interaction device 600 according to another exemplary embodiment of the present application. As shown in FIG. 6, the question-answer interaction device 600 includes a receiving module 610, a processing module 620, a matching module 630, a determining module 640 and a sending module 650.

[00154] The receiving module 610 is configured to receive a question of a user.

[00155] The processing module 620 is configured to perform a word segmentation processing on the question to obtain a plurality of words.

[00156] The matching module 630 is configured to match each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model including at least one probability of the at least one important element.

[00157] The determining module 640 is configured to determine, according to the probability of the important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question, and determine an intention corresponding to the recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention.

[00158] The sending module 650 is configured to send the answer to the user, and push the recommendation intention to the user.

[00159] According to the technical solutions provided in the embodiments of the present application, by using the topic model, the topic corresponding to the document may be found out from massive data, and the probability of the words generated under the topic may be found out by the topic. Therefore, ability for processing the text information is improved, active marketing is realized, and experience of the user is further improved.

[00160] FIG. 7 is a block diagram of a question-answer interaction device 700 according to another exemplary embodiment of the present application. As shown in FIG. 7, the

question-answer interaction device 700 includes a receiving module 710, a processing module 720, a matching module 730, a determining module 740 and a sending module 750.

[00161] The receiving module 710 is configured to receive a question of a user.

5 [00162] The processing module 720 is configured to perform a word segmentation processing on the question to obtain a plurality of words.

[00163] The matching module 730 is configured to match each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set
10 including a confidence of the at least one frequent item.

[00164] The determining module 740 is configured to determine, according to the confidence of a frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question, and determine an intention
15 corresponding to the recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention.

[00165] The sending module 750 is configured to send the answer to the user, and push the recommendation intention to the user.

[00166] According to the technical solutions provided in the embodiments of the present
20 application, by using the sequence pattern, behavior of the user may be modeled, so that future behavior of the user may be inferred according to the previous behavior of the user. Therefore, the active marketing of the product is realized and the experience of the user is further improved.

[00167] FIG. 8 is a block diagram of a question-answer interaction device 800 according
25 to another exemplary embodiment of the present application. As shown in FIG. 8, the question-answer interaction device 800 includes a receiving module 810, a processing module 820, a matching module 830 and a determining module 840.

[00168] The receiving module 810 is configured to receive a question of a user.

[00169] The processing module 820 is configured to perform a word segmentation
30 processing on the question to obtain a plurality of words.

[00170] The matching module 830 is configured to match each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library.

[00171] The determining module 840 is configured to determine whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library; if each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library, a corresponding answer is output; and if each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, the at least one important element for triggering the answer is acquired by using a context intention reasoning method.

[00172] According to the technical solutions provided in the embodiments of the present application, by executing the context intention reasoning method, the difficulty of constructing the intention library is reduced, the calculation efficiency is improved, the question-answer interaction process is simplified, and a new intention combined by a plurality of sentences is realized.

[00173] FIG. 9 is a block diagram of a device 900 for question-answer interaction according to an exemplary embodiment of the present application.

[00174] Referring to FIG. 9, the device 900 includes a processing component 910 that further includes one or more processors, and a memory resource represented by a memory 920 for storing an instruction executable by the processing component 910, such as an application program. The application program stored on the memory 920 may include one or more modules, and each module corresponds to a set of instructions. In addition, the processing component 910 is configured to execute the instruction to perform the question-answer interaction method described above.

[00175] The device 900 may also include a power component 930 configured to perform power management of the device 900, a wired or wireless network interface 940 configured to connect the device 900 to a network, and an input/output (I/O) interface 950. The device 900 may operate based on an operating system stored in the memory 920, such as Windows ServerTM, Mac OS XTM, UnixTM, LinuxTM, FreeBSDTM, or the like.

[00176] A non-transitory computer readable storage medium is disclosed, when the an instruction in the storage medium are executed by the processor of the above device 900, cause the above device 900 to perform a question-answer interaction method, including: receiving a question of a user; acquiring an answer corresponding to the question, and acquiring at least one recommendation relevancy between each of at least one intention in

a preset intention library and the question; determining an intention corresponding to the recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention; and sending the answer to the user, and pushing the recommendation intention to the user.

5 [00177] Persons of ordinary skill in the art may realize that units and algorithm steps of examples described in conjunction with the embodiments disclosed herein can be implemented by electronic hardware, or a combination of computer software and electronic hardware. Whether these functions are executed by hardware or software depends on specific applications and design constraints of the technical solutions.

10 Professional technicians may use different methods to implement the described functions for each specific application, but such implementation should not be considered beyond the scope of this application.

[00178] Those skilled in the art may clearly understand that for the convenience and conciseness of the description, the specific working process of the system, device and unit described above may refer to the corresponding process in the foregoing method

15 embodiments, which may not be repeated here.

[00179] In the several embodiments provided in this application, it should be understood that the disclosed system, device, and method may be implemented in other ways. For example, the device embodiments described above are only schematic. For example, a

20 division of the units is only a division of logical functions. In actual implementation, there may be other divisions, for example, a plurality of units or components may be combined or may be integrated into another system, or some features may be ignored, or not implemented. In addition, the displayed or discussed mutual coupling or direct coupling or communication connection may be indirect coupling or communication connection

25 through some interfaces, devices or units, and may be in electrical, mechanical, or other forms.

[00180] The units described as separate components may or may not be physically separated, and the components displayed as the units may or may not be physical units, i.e., may be integrated or may be distributed to a plurality of network units. Some or all of

30 the units may be selected to achieve the purposes of the solutions of the embodiments according to actual needs.

[00181] In addition, each functional unit in the embodiments of the present application may be integrated in a processing unit, or each unit may exist alone physically, or two or

more units may be integrated into one unit.

[00182] If the function is implemented in the form of a software functional unit and sold or used as an independent product, it may be stored in a computer readable storage medium. Based on this understanding, the technical solutions of the present application essentially or part of the technical solutions contributed to the existing technology or part of the technical solutions may be embodied in the form of a software product. The computer software product is stored in one storage medium, including several instructions for enabling a computer device (which may be a personal computer, a server, or a network device, etc.) to perform all or part of the steps of the methods described in the embodiments of the present application. The aforementioned storage medium includes: a U disk, a mobile hard disk, a Read-Only Memory (ROM), a Random Access Memory (RAM), a magnetic disk or an optical disc and other medium that may store program verification code.

[00183] The above is only the embodiments of this application, but the scope of protection of this application is not limited thereto, changes or replacements easily thought by any person skilled in the art and within the technical scope disclosed in this application should be covered by the protection scope of this application. Therefore, the protection scope of the present application shall be subject to the protection scope of the claims.

What is claimed is:

1. A question-answer interaction method, comprising:

receiving a question of a user;

5 acquiring an answer corresponding to the question, and acquiring at least one recommendation relevancy between each of at least one intention in a preset intention library and the question;

determining an intention corresponding to a recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention; and

10 sending the answer to the user, and pushing the recommendation intention to the user.

2. The question-answer interaction method according to claim 1, wherein the acquiring at least one recommendation relevancy between each of at least one intention in
15 a preset intention library and the question comprises:

performing a word segmentation processing on the question to obtain a plurality of words;

matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and

20 determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

3. The question-answer interaction method according to claim 2, wherein the
25 matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library comprises:

matching each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in the preset intention library, the topic model comprising at least one probability of the at least one important
30 element; and

the determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question comprises:

determining, according to a probability of an important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

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4. The question-answer interaction method according to claim 2, wherein the matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library comprises:

10 matching each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at least one intention in the preset intention library, the frequent item set comprising a confidence of the at least one frequent item; and

15 the determining, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question comprises:

determining, according to the confidence of a frequent item that matches the plurality of words in the at least one frequent item, the at least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

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5. The question-answer interaction method according to claim 1, wherein the acquiring an answer corresponding to the question comprises:

performing a word segmentation processing on the question to obtain a plurality of words;

25 matching each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and

executing, according to a matching result, a corresponding preset branch process to obtain the answer corresponding to the branch process.

30 6. The question-answer interaction method according to claim 5, wherein the executing a corresponding preset branch process comprises:

determining whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset

intention library; and

if each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library, outputting a corresponding answer; or

5 if each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, acquiring at least one important element for triggering the answer by using a context intention reasoning method.

10 7. The question-answer interaction method according to any one of claims 1 to 6, further comprising:

establishing, according to a plurality of questions raised by each of at least one user recorded in an interaction log, the preset intention library by using a big data analysis method, wherein the preset intention library comprises a corresponding relationship
15 between each of the at least one intention and at least one important element.

8. The question-answer interaction method according to claim 1 or 2, wherein the pushing the recommendation intention to the user comprises:

pushing a question sentence for the recommendation intention to the user; and
20 the question-answer interaction method further comprises:
sending the answer corresponding to the question sentence for the recommendation intention to the user according to a feedback from the user.

9. The question-answer interaction method according to claim 1 or 2, wherein the
25 pushing the recommendation intention to the user comprises:

pushing a commodity content for the recommendation intention to the user.

10. A question-answer interaction device, comprising:

a receiving module, configured to receive a question of a user;
30 an acquiring module, configured to acquire an answer corresponding to the question, and acquire at least one recommendation relevancy between each of at least one intention in a preset intention library and the question;

a determining module, configured to determine an intention corresponding to a

recommendation relevancy exceeding a preset relevancy threshold in the at least one recommendation relevancy as a recommendation intention; and

a sending module, configured to send the answer to the user, and push the recommendation intention to the user.

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11. The question-answer interaction device according to claim 10, wherein the acquiring module comprises:

a processing unit, configured to perform a word segmentation processing on the question to obtain a plurality of words;

10 a matching unit, configured to match each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset intention library; and

a determining unit, configured to determine, according to a matching result, the at least one recommendation relevancy between each of the at least one intention in the
15 preset intention library and the question.

12. The question-answer interaction device according to claim 11, wherein the matching unit is configured to match each of the plurality of words with the at least one important element in a topic model corresponding to each of the at least one intention in
20 the preset intention library, the topic model comprising at least one probability of the at least one important element, and

the determining unit is configured to determine, according to a probability of an important element that matches the plurality of words in the at least one important element, the at least one recommendation relevancy between each of the at least one
25 intention in the preset intention library and the question.

13. The question-answer interaction device according to claim 11, wherein the matching unit is configured to match each of the plurality of words with at least one frequent item in a frequent item set in a sequence pattern corresponding to each of the at
30 least one intention in the preset intention library, the frequent item set comprising a confidence of the at least one frequent item, and

the determining unit is configured to determine, according to the confidence of a frequent item that matches the plurality of words in the at least one frequent item, the at

least one recommendation relevancy between each of the at least one intention in the preset intention library and the question.

14. The question-answer interaction device according to claim 10, wherein the
5 acquiring module comprises:

a processing unit, configured to perform a word segmentation processing on the question to obtain a plurality of words;

a matching unit, configured to match each of the plurality of words with at least one important element corresponding to each of the at least one intention in the preset
10 intention library; and

an executing unit, configured to execute, according to a matching result, a corresponding preset branch process to obtain the answer corresponding to the branch process.

15. The question-answer interaction device according to claim 14, wherein the
15 executing unit is configured to determine whether each of the plurality of words matches the at least one important element corresponding to each of the at least one intention in the preset intention library; and

if each of the plurality of words matches the at least one important element
20 corresponding to each of the at least one intention in the preset intention library, output a corresponding answer; or

if each of the plurality of words does not match the at least one important element corresponding to each of the at least one intention in the preset intention library, acquire at least one important element for triggering the answer by using a context intention
25 reasoning method.

16. The question-answer interaction device according to any one of claims 10 to 15, further comprising:

a library establishing module, configured to establish, according to a plurality of
30 questions raised by each of at least one user recorded in an interaction log, the preset intention library by using a big data analysis method, wherein the preset intention library comprises a corresponding relationship between each of the at least one intention and at least one important element.

17. The question-answer interaction device according to claim 10 or 11, wherein the sending module is configured to push a question sentence for the recommendation intention to the user, and send the answer corresponding to the question sentence for the recommendation intention to the user according to a feedback from the user.

18. The question-answer interaction device according to claim 10 or 11, wherein the sending module is configured to push a commodity content for the recommendation intention to the user.

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19. A computer device, comprising:
a memory;
a processor; and
an executable instruction stored in the memory and executed in the processor,
wherein when the executable instruction is executed by the processor, the processor performs a question-answer interaction method according to any one of claims 1 to 9.

20. A computer readable storage medium storing an executable instruction that, when executed by a processor, causes the processor to perform a question-answer interaction method according to any one of claims 1 to 9.

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