RESPONDING METHOD AND APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority from Chinese Patent Application No. 201910399999.4, filed with the China National Intellectual Property Administration (CNIPA) on May 14, 2019, the content of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] Embodiments of the present disclosure relate to the field of natural language processing technology, in particular to a responding method and apparatus.

BACKGROUND

[0003] With the popularization of natural language processing technology, many intelligent responding systems emerge.

[0004] An intelligent responding system can gather huge amounts of Internet information, answer questions about users' lives or work, and provide convenience for one’s lives in an information age. The intelligent responding system may directly conduct a dialogue with a user, dig out information in the user's dialogue, interpret an intent in the user's question, and give an answer meeting the user's intent.

SUMMARY

[0005] Embodiments of the present disclosure propose a responding method and apparatus.

[0006] In a first aspect, embodiments of the present disclosure provide a responding method, and the method includes: performing, based on a parsing result obtained by parsing a user consultation statement, an intent analysis on the user consultation statement in an ontology layer of a pre-established knowledge graph corresponding to the user consultation statement, to obtain an intent analysis result corresponding to the user consultation statement; performing, based on the intent analysis result, answer address searching in an entity layer of the knowledge graph, to obtain an answer

matching the user consultation statement; and transmitting the obtained answer to a transmitting party, the user consultation statement being transmitted from the transmitting party.

[0007] In some embodiments, the performing, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement, includes: determining, according to a preset user consultation statement classification rule, a user consultation statement type of the user consultation statement based on the parsing result; and performing, according to an intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement.

[0008] In some embodiments, the performing, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement, includes: performing, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph, to obtain at least two candidate intent analysis results;; and determining, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement from the candidate intent analysis results.

[0009] In some embodiments, the user consultation statement type comprises a second type, where a user consultation statement of the second type includes an attribute and an ontology; the performing, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement, includes: acquiring an ontology the attribute included in the user

consultation statement belonging thereto; adding the acquired ontology the attribute belonging thereto to the ontology included in the user consultation statement; and performing, based on the attribute and the ontology included in the user consultation statement obtained by adding the acquired ontology thereto, the intent analysis on the user consultation statement in the ontology layer, to obtain the intent analysis result corresponding to the user consultation statement.

[0010] In some embodiments, the user consultation statement type comprises a third type, wherein the user consultation statement of the third type includes a relationship and an ontology; the performing, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement,, includes: acquiring ontologies connected by the relationship included in the user consultation statement; adding the acquired ontologies connected by the relationship to the ontology included in the user consultation statement; and performing, based on the relationship and the ontologies included in the user consultation statement obtained after the acquired ontologies are added thereto, the intent analysis on the user consultation statement in the ontology layer, to obtain the intent analysis result corresponding to the user consultation statement.

[0011] In some embodiments, the user consultation statement type includes a fourth type, where the user consultation statement of the fourth type includes an attribute, a relationship, and an ontology; the performing, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement, includes: acquiring an ontology the attribute included in the user consultation statement belonging thereto and ontologies connected by the relationship included in the user consultation statement; adding the acquired ontology the attribute belonging thereto and the acquired ontologies connected by the relationship to the ontology included in the user consultation statement; and performing the intent analysis on the user consultation statement in the ontology layer based on the attribute, the relationship, and the ontology included in the user consultation statement after the

acquired ontologies are added thereto, to obtain the intent analysis result corresponding to the user consultation statement.

[0012] In some embodiments, the performing, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement, includes: performing, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain at least two candidate intent analysis results; and determining, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement from the candidate intent analysis results.

[0013] In a second aspect, embodiments of the present disclosure provide a responding apparatus, and the apparatus includes: an intent analysis unit, configured to perform, based on a parsing result obtained by parsing a user consultation statement, an intent analysis on the user consultation statement in an ontology layer of a pre-established knowledge graph corresponding to the user consultation statement, to obtain an intent analysis result corresponding to the user consultation statement; an answer address searching unit, configured to perform, based on the intent analysis result, answer address searching in an entity layer of the knowledge graph, to obtain an answer matching the user consultation statement; and an answer transmitting unit, configured to transmit the obtained answer to a transmitting party, the user consultation statement being from the transmitting party.

[0014] In a third aspect, embodiments of the present disclosure provide an electronic device, the electronic device including: one or more processors; and a storage apparatus, storing one or more programs thereon, the one or more programs, when executed by the one or more processors, cause the one or more processors to implement the responding method described in any one of embodiments of the first aspect.

[0015] In a fourth aspect, embodiments of the present disclosure provide a computer readable medium, storing a computer program thereon, the computer program, when

executed by a processor, implements the responding method described in any one of the embodiments of the first aspect.

[0016] The responding method and apparatus provided by embodiments of the present disclosure, performing, based on a parsing result obtained by parsing a user consultation statement, an intent analysis on the user consultation statement in an ontology layer of a pre-established knowledge graph corresponding to the user consultation statement, to obtain an intent analysis result corresponding to the user consultation statement; performing, based on the intent analysis result, answer address searching in an entity layer of the knowledge graph, to obtain an answer matching the user consultation statement; and transmitting the obtained answer to a transmitting party, the user consultation statement being transmitted from the transmitting party. Embodiments herein are conducive to increased response efficiency and response accuracy.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] By reading detailed description of non-limiting embodiments with reference to the following accompanying drawings, other features, objectives and advantages of the present disclosure will become more apparent:

[0018] Fig. 1 is an example system architecture diagram to which an embodiment of the present disclosure may be implemented;

[0019] Fig. 2 is a flowchart of an embodiment of a responding method according to an embodiment of the present disclosure;

[0020] Fig. 2A is a schematic diagram of an ontology layer of a knowledge graph of the responding method to which an embodiment of the present disclosure may be implemented;

[0021] Fig. 2B is a schematic diagram of an entity layer of a knowledge graph of the responding method to which an embodiment of the present disclosure may be implemented;

[0022] Fig. 2C is a schematic diagram of the minimal subgraph from node A to node C of a responding method to which an embodiment of the present disclosure may be implemented;

[0023] Fig. 3 is a schematic diagram of an application scenario of a responding method according to an embodiment of the present disclosure;

[0024] Fig. 4 is a flowchart of another embodiment of the responding method according to an embodiment of the present disclosure;

[0025] Fig. 5 is a schematic structural diagram of an embodiment of a responding apparatus according to an embodiment of the present disclosure; and

[0026] Fig. 6 is a schematic structural diagram of an electronic device suitable for implementing embodiments of the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0027] Embodiments of the present disclosure will be described in detail below with reference to the accompanying drawings. It may be understood that embodiments described herein are only used to explain the related disclosure, but not to limit the disclosure. In addition, it should also be noted that, for ease of description, only parts related to the relevant disclosure are shown in the accompanying drawings.

[0028] It should be noted that embodiments in the present disclosure and features in embodiments may be combined with each other on a non-conflict basis. Embodiments of the present disclosure will be described below in detail with reference to the accompanying drawings.

[0029] Fig. 1 shows an example system architecture 100 of a responding method or a responding apparatus to which an embodiment of the present disclosure may be implemented.

[0030] As shown in Fig. 1, the system architecture 100 may include terminal devices 101, 102, 103, a network 104, and a server 105. The network 104 is used to provide a communication link medium between the terminal devices 101, 102, 103 and the server 105. The network 104 may include various types of connections, such as wired, wireless communication links, or optic fibers.

[0031] The terminal devices 101, 102, 103 interact with the server 105 through the network 104 to receive or send messages and so on. Various communication client

applications, such as smart response applications, instant messaging tools, social platform software, search applications, shopping applications, or browser applications, may be installed on the terminal devices 101, 102, and 103.

[0032] The terminal devices 101, 102, and 103 may be hardware or software. When the terminal devices 101, 102, and 103 are hardware, they may be various electronic devices having display screens and supporting communication with the server, including but not limited to smart phones, tablet computers, E-book readers, MP3 player (Moving Picture Experts Group Audio Layer III), MP4 (Moving Picture Experts Group Audio Layer IV) players, laptop portable computers, desktop computers, or the like. When the terminal devices 101, 102, and 103 are software, they may be installed in the electronic devices listed above. They may be implemented as a plurality of software or software modules (for example, for providing distributed services), or as a single software or software module, which is not specifically limited herein.

[0033] The server 105 may be a server that provides various services, for example, a backend server that receives requests sent by the terminal devices 101, 102, and 103. The backend server may process such as receive and analyze a request sent by a client, and generate a processing result.

[0034] It should be noted that the server may be hardware or software. When the server is hardware, it may be implemented as a distributed server cluster composed of a plurality of servers, or as a single server. When the server is software, it may be implemented as a plurality of software or software modules (for example, for providing distributed services), or as a single software or software module, which is not specifically limited herein.

[0035] It should be noted that the responding method provided by embodiments of the present disclosure may be performed by the server 105, or performed by the terminal device (for example, the terminal device 101, 102, or 103 shown in Fig. 1). Correspondingly, the responding apparatus may be provided in the server 105, or provided in the terminal device 101, 102, or 103.

[0036] It should be understood that the number of terminal devices, networks, and servers in Fig. 1 is merely illustrative. Depending on the implementation needs, there may be any number of terminal devices, networks, and servers.

[0037] With further reference to Fig. 2, a flow 200 of a responding method according to an embodiment of the present disclosure is illustrated. The responding method is applied to the server and includes the following steps:

[0038] Step 201, performing, based on a parsing result obtained by parsing a user consultation statement, an intent analysis on the user consultation statement in an ontology layer of a pre-established knowledge graph corresponding to the user consultation statement, to obtain an intent analysis result corresponding to the user consultation statement.

[0039] In the present embodiment, a terminal (for example, the terminals 101, 102, 103 shown in Fig. 1) and an executing body of the responding method (for example, the server 105 shown in Fig. 1) may be communicatively connected through a wired connection or a wireless connection. A user may input a user consultation statement through the terminal. The terminal may be used as a transmitting party to transmit a response request to the executing body, and receive an answer transmitted from the executing body. The executing body may receive a query request transmitted from the terminal, perform an intent analysis on the user consultation statement and an answer search, and transmit the answer to the terminal. It should be noted that the user consultation statement input method here is not limited in the present disclosure. For example, the user may input the user consultation statement through the terminal in a manual input method or a voice input method.

[0040] In the present embodiment, the user may input the user consultation statement using natural language through the terminal. Natural language is a language peculiar to human beings and cannot be directly recognized and understood by computers. The executing body may first use a natural language processing algorithm (NLP) to parse the user consultation statement to obtain a parsing result. Then, based on the parsing result, the intent analysis may be performed on the user consultation statement and an answer may be searched. It should be noted that the user consultation statement parsing here includes but is not limited to processes such as Chinese word segmentation, ontology recognition, entity recognition, attribute recognition, relationship recognition, and speech recognition. For example, the user inputs the user consultation statement "Issuing company of the section A insurance?" through the terminal. The executing body parses the user consultation statement, and a parsing result obtained may include "ontology 1:

insurance name, entity 1: section A insurance; ontology 2: issuing company".

[0041] The knowledge graph aims to describe various entities, ontologies, attributes in a real world and the relationships between them. In the knowledge graph, entities or ontologies are represented by nodes, and attributes and relationships are represented by edges. The knowledge graph is a labeled directed attribute graph. In the knowledge graph, each node has several attributes and attribute values, an edge between entities represents the relationship between nodes, a direction of the edge indicates a direction of the relationship, and the label on the edge indicates a type of the relationship.

[0042] In the present embodiment, the executing body may pre-establish a knowledge graph of a vertical industry for intent analysis and answer address searching. For different vertical industries, the executing body may establish different knowledge graphs. For example, the executing body may establish a knowledge graph of, including but not limited to, the insurance field. Here, the vertical industry involved in the pre-established knowledge graph and specific content included therein are not limited.

[0043] In the present embodiment, the knowledge graph may be logically divided into ontology layer and entity layer. The ontology layer is the core of the knowledge graph, an ontology template of the entity layer, providing a relationship between an ontology definition and the ontology in the related field. The ontology layer may be described in ontology web language (OWL). The entity layer may store data with entities as units under the constraints of the ontology layer. Entities may be expressed by using triples such as (entity 1, relationship, entity 2) and (entity, attribute, attribute value). The entity layer may use a graph database (for example, NEO4J) as a storage medium.

[0044] In the present embodiment, Fig. 2A is a schematic diagram of an ontology layer of a knowledge graph of the responding method to which an embodiment of the present disclosure may be implemented. Fig. 2B is a schematic diagram of an entity layer of a knowledge graph of the responding method to which an embodiment of the present disclosure may be implemented. It should be understood that Figs. 2A and 2B are only schematic. Depending on the implementation needs, the ontology layer and the entity layer of the knowledge graph of different vertical industries to which the responding method of an embodiment of the present disclosure is implemented may be established. The executing body may first select the pre-established knowledge graph corresponding

to the user consultation statement based on the vertical industry to which the user consultation statement belongs. Then, the executing body may perform the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph through the following steps:

[0045] The first step, searching for a knowledge link corresponding to the user consultation statement in the ontology layer of the pre-established knowledge graph.

[0046] In the present embodiment, the executing body may use an ontology parser (for example, Jena) to parse the ontology layer and load into a memory. Here, due to a fast memory access speed, parsing the ontology layer into the memory may improve an efficiency of intent analysis. Then, the executing body may search for a knowledge link corresponding to the user consultation statement from the ontology layer based on the parsing result of the user consultation statement. In the present embodiment, the executing body may search for the knowledge link corresponding to the user consultation statement from the ontology layer based on the parsing result of the user consultation statement, which may include but is not limited to the following situations:

[0047] Firstly, the ontologies included in the parsing result of the user consultation statement are on the same knowledge link.

[0048] For example, as an example, the parsing result of the user consultation statement includes three ontologies: an insurance name, a critical illness insurance, and critical illness exemption. In the ontology layer shown in Fig. 2A, there is a connection relationship directed from the insurance name to the critical illness insurance between the insurance name and the critical illness insurance, and there is a connection relationship directed from the critical illness insurance to the critical illness exemption between the critical illness insurance and the critical illness exemption. Based on the connection relationships between the three ontologies, the executing body may determine a knowledge link from the insurance name to the critical illness insurance to the critical illness exemption "insurance name→critical illness insurance→critical illness exemption".

[0049] Secondly, the ontologies included in the parsing result of the user consultation statement is on the same knowledge link after link completion.

[0050] For example, as an example, the parsing result of the user consultation statement includes two ontologies: an insurance name and a capital nature. There is no connection relationship between the insurance name and the capital nature in the ontology layer shown in Fig. 2A. But there is a company ontology between the insurance name and the capital nature. There is a connection relationship directed from the insurance name to the company between the company and the insurance name, and there is also a connection relationship directed from the company to the capital nature between the company and the capital nature. The executing body may use the company and the connection relationships between the company and the insurance name and the capital nature to complete the link, to obtain a knowledge link from the insurance name to the company to the capital nature "insurance name→company→capital nature".

[0051] Thirdly, the ontologies included in the parsing result of the user consultation statement are not on the same knowledge link.

[0052] For example, as an example, the parsing result of the user consultation statement includes three ontologies: the insurance name, the company, and the green channel. In the ontology layer shown in Fig. 2A, there is a connection relationship directed from the insurance name to the company between the insurance name and the company, there is a connection relationship directed from the insurance name to the green channel between the insurance name and the green channel. It can be seen that the company and the green channel are located on two different relationship branches of the insurance name. The executing body may split the link to obtain a knowledge link from the insurance name to the company "insurance name→company" and a knowledge link from the insurance name to the green channel "insurance name→green channel", a total of two knowledge links.

[0053] It should be noted that the example here is only an illustrative description of a process of searching for a knowledge link corresponding to the user consultation statement in the ontology layer. It is not used to limit the number of knowledge links corresponding to the user consultation statement.

[0054] The second step, performing intent anchoring on the knowledge link obtained in the first step, to obtain the intent analysis result corresponding to the user consultation statement.

[0055] In the present embodiment, the executing body may perform intent anchoring on the knowledge link obtained in the first step. A process of performing intent anchoring on the knowledge link is a process of determining on which attribute in the knowledge link an answer matching the user consultation statement appears.

[0056] In the present embodiment, the executing body may anchor the intent on a default attribute of an ontology that is the farthest from a central ontology in the knowledge link obtained in the first step. For example, as an example, the critical illness exemption description is a default attribute of the critical illness exemption ontology. The executing body may anchor the intent on the default attribute-the critical illness exemption description of the critical illness exemption ontology that is the farthest from the central ontology in the knowledge link "insurance name→critical illness insurance→critical illness exemption" obtained in the first step of this example, the link with the default attribute added is: "insurance name→ critical illness insurance→ critical illness exemption→ critical illness exemption description".

[0057] It should be noted that if the number of knowledge links corresponding to the user consultation statement obtained in the first step is at least two, The executing body may respectively perform intent anchoring for each of the at least two knowledge links.

[0058] In some alternative implementations of the present embodiment, the executing body may perform, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement through following steps:

[0059] The first step, determining, based on the parsing result, a user consultation statement type of the user consultation statement according to a preset user consultation statement classification rule.

[0060] In this alternative implementation, according to the preset user consultation statement classification rule, the user consultation statement may be classified into a first type (for example, the user consultation statement including an ontology), a second type (for example, the user consultation statement including an ontology and an attribute), a third type (for example, the user consultation statement including an ontology and a

relationship), and a fourth type (for example, the user consultation statement including an ontology, an attribute, and a relationship).

[0061] The second step, performing, according to an intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement.

[0062] In this alternative implementation, the executing body may select the intent analysis rule matching the user consultation statement type, to perform the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement. For example, as an example, for the user consultation statement of the first type which includes an ontology, the executing body may first find, in the ontology layer, a knowledge link containing the ontology included in the user consultation statement. It should be noted that the knowledge link here may be the knowledge link that contains the ontology included in the user consultation statement, or may be the knowledge link that contains the ontology included in the user consultation statement after link completion, or may be at least two knowledge links after link splitting, and each of the at least two knowledge links contains at least two ontologies included in the user consultation statement. Then, the executing body may perform intent anchoring on the default attribute of the ontology farthest from the central ontology in the knowledge link. It should be noted that, if the number of knowledge links is at least two, the executing body may respectively perform intent anchoring for each of the at least two knowledge links.

[0063] In this alternative implementation, the executing body may first classify the user consultation statement. Then, the executing body may, for a user consultation statement type having a simple semantic structure, perform an intent analysis using a relatively simple intent analysis rule matching the type, and for a user consultation statement type having a complicated semantic structure, perform an intent analysis using a relatively complicated intent analysis rule matching the type. On the one hand, it helps to allocate computing resources reasonably, and on the other hand, it helps to produce more accurate intent analysis results.

[0064] In some alternative implementations of the present embodiment, the executing body may perform, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement through following steps:

[0065] The first step, performing, according to the intent analysis rule matching the user consultation statement type, intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph, to obtain at least two candidate intent analysis results.

[0066] In this alternative implementation, the user consultation statement input by the user through the user terminal may include at least two query intents. The executing body may perform intent analysis on the user consultation statement according to the intent analysis rule matching the user consultation statement type, and may identify the at least two candidate intent analysis results included in the user consultation statement.

[0067] The second step, determining, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement in the candidate intent analysis results.

[0068] In this alternative implementation, the transmitting party may be the user terminal from which the user consultation statement comes. When the number of candidate intent analysis results obtained in the first step is greater than one, the executing body may transmit intent inquiry information to the user terminal. The user of the user terminal may select an intent analysis result from the candidate intent analysis results, and transmit the intent confirmation information to the executing body. The executing body may determine the intent analysis result corresponding to the user consultation statement based on the received intent confirmation information.

[0069] In this alternative implementation, the executing body may parse and identify a plurality of intent analysis results of the user consultation statement. The executing body may determine an intent analysis result demanded by the user from the plurality of intent analysis results through information interaction with the user terminal. In this way, in step 202, an answer demanded by the user may be obtained and transmitted to the user

terminal. On the one hand, it may improve response accuracy, on the other hand, it may reduce information transmission traffic and display resource consumption.

[0070] In some alternative implementations of the present embodiment, the user consultation statement type includes a second type, where the user consultation statement of the second type has an attribute and an ontology. The executing body may perform, according to the intent analysis rule matching the user consultation statement type, intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement through following steps:

[0071] The first step, acquiring an ontology to which the attribute included in the user consultation statement belongs.

[0072] In this alternative implementation, the user consultation statement of the second type has an attribute and an ontology. The executing body may first acquire the ontology to which the attribute included in the user consultation statement belongs.

[0073] In this alternative implementation, the attribute and the ontology included in the user consultation statement may be obtained by parsing the user consultation statement by the executing body. The attribute belongs to a certain ontology in the ontology layer. In addition, the ontology to which the attribute belongs may be an ontology included in the user consultation statement, or may be an ontology that is not included in the consultation statement.

[0074] The second step, adding the ontology to which the attribute belongs to the ontology included in the user consultation statement.

[0075] In this alternative implementation, the executing body may add the ontology to which the attribute included in the user consultation statement belongs and acquired in the first step to the ontology included in the user consultation statement. Particularly, if the ontology to which the attribute included in the user consultation statement belongs and acquired in the first step is in the user consultation statement, there is no need to add the acquired ontology to the ontology included in the user consultation statement. If the acquired ontology to which the attribute belongs and acquired in the first step is not

included in the user consultation statement, the acquired ontology to which the attribute belongs is added to the ontology included in the user consultation statement.

[0076] The third step, performing intent analysis on the user consultation statement in the ontology layer, based on the attribute and the ontology included in the user consultation statement after the acquired ontology is added thereto, to obtain the intent analysis result corresponding to the user consultation statement.

[0077] In this alternative implementation, the executing body may find in the ontology layer a knowledge link containing the attribute and the ontology included in the user consultation statement after the ontology being updated. In this alternative implementation, the executing body may find, based on the parsing result of the user consultation statement, from the ontology layer the knowledge link corresponding to the user consultation statement, which may include but is not limited to the following situations:

[0078] First, the ontology and the attribute included in the parsing result of the user consultation statement are on the same knowledge link.

[0079] For example, as an example, the parsing result of the user consultation statement includes two ontologies: insurance name and company, and an attribute: registered capital. In the ontology layer shown in Fig. 2A, there is a connection relationship directed from the insurance name to the company between the insurance name and the company, and there is a connection relationship directed from the company to the registered capital between the company and the registered capital. The executing body may determine a knowledge link from the insurance name to the company to the capital attribute "insurance name→company→registered capital".

[0080] Secondly, the ontology and the attribute included in the parsing result of the user consultation statement are on the same knowledge link after link completion.

[0081] For example, as an example, the parsing result of the user consultation statement includes an ontology: insurance name, and an attribute: registered capital. In the ontology layer shown in Fig. 2A, the registered capital attribute does not belong to any ontology that included in the user consultation statement. The executing body may use the ontology "company" to which the registered capital belongs to complete the

knowledge link, to obtain a knowledge link from the insurance name to the company to the registered capital "insurance name→company→registered capital".

[0082] Thirdly, the ontology and the attribute included in the parsing result of the user consultation statement are not on the same knowledge link.

[0083] For example, as an example, the parsing result of the user consultation statement includes two ontologies: insurance name and green channel, and an attribute: registered capital. In the ontology layer shown in Fig. 2A, the registered capital attribute does not belong to any ontology that included in the user consultation statement. The executing body may use the ontology "company" to which the registered capital belongs to complete the knowledge link. In addition, there is a connection relationship directed from the insurance name to the green channel between the insurance name and the green channel. It can be seen that the registered capital and the green channel are located on two different relationship branches of the insurance name. The executing body may split the link to obtain a knowledge link from the insurance name to the registered capital "insurance name→company→registered capital" and a knowledge link from the insurance name to the green channel "insurance name→green channel", a total of two knowledge links.

[0084] It should be noted that the example here is only an illustrative description of a process of finding the knowledge link corresponding to the user consultation statement of the second type in the ontology layer. It is not used to limit the number of knowledge links corresponding to the user consultation statement of the second type.

[0085] In this alternative implementation, the executing body may perform intent anchoring on the knowledge link to obtain the intent analysis result corresponding to the user consultation statement. A position at which intent anchoring is performed by the executing body on the knowledge link may include: the attribute included in the user consultation statement, and the default attribute of the ontology farthest from the central ontology except the ontology to which the attribute belongs in the knowledge link. For example, as an example, the executing body may use the attribute "registered capital" of the ontology "company" that is the farthest from the central ontology in the knowledge link "insurance name→company→registered capital" to perform intent anchoring. It should be noted that, if the number of knowledge links is at least two, the executing body

may respectively perform intent anchoring for each of the at least two knowledge links.

[0086] In this alternative implementation, for the user consultation statement of the second type, the executing body may use the intent analysis rule matching this type to perform the intent analysis on the user consultation statement, which helps to improve an accuracy of the intent analysis result of the user consultation statement of this type.

[0087] In some alternative implementations of the present embodiment, the user consultation statement type includes a third type, where the user consultation statement of the third type has a relationship and an ontology. The executing body may perform, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement through following steps:

[0088] The first step, acquiring ontologies connected by the relationship included in the user consultation statement.

[0089] In this alternative implementation, the user consultation statement of the third type has an ontology and relationship. The executing body may first acquire the ontologies connected by the relationship included in the user consultation statement.

[0090] In this alternative implementation, the relationship and the ontology included in the user consultation statement may be obtained by parsing the user consultation statement by the executing body. The relationship connects certain two ontologies in the ontology layer. In addition, the ontologies connected by the relationship may be an ontology included in the user consultation statement, or an ontology that is not included in the consultation statement.

[0091] The second step, adding the ontologies connected by the relationship to the ontology included in the user consultation statement.

[0092] In this alternative implementation, the executing body may add the ontologies connected by the relationship included in the user consultation statement acquired in the first step to the ontology included in the user consultation statement. Particularly, if the

ontologies connected by the relationship included in the user consultation statement acquired in the first step are included in the user consultation statement, there is no need to add the ontologies to the ontology included in the user consultation statement. If the ontologies connected by the relationship included in the user consultation statement acquired in the first step are not included in the user consultation statement, the ontologies connected by the relationship are added to the ontology included in the user consultation statement.

[0093] The third step, performing, based on the relationship and the ontology included in the user consultation statement after the ontologies are added thereto, the intent analysis on the user consultation statement in the ontology layer, to obtain the intent analysis result corresponding to the user consultation statement.

[0094] In this alternative implementation, the executing body may find in the ontology layer a knowledge link containing the relationship and the ontology included in the user consultation statement with the ontology updated. The executing body may find, based on the parsing result of the user consultation statement, in the ontology layer the knowledge link corresponding to the user consultation statement, which may include but is not limited to following situations:

[0095] First, the ontology and the relationship included in the parsing result of the user consultation statement are on the same knowledge link.

[0096] For example, as an example, the parsing result of the user consultation statement includes two ontologies: insurance name and company, and an issuance relationship. In the ontology layer shown in Fig. 2A, both ontologies connected by the issuance relationship are included in the user consultation statement. The executing body may determine a knowledge link from the insurance name to the company "insurance name→company".

[0097] Secondly, the ontology and the relationship included in the parsing result of the user consultation statement are on the same knowledge link after link completion.

[0098] For example, as an example, the parsing result of the user consultation statement includes an ontology: insurance name, and a capital composition relationship. In the ontology layer shown in Fig. 2A, the capital composition relationship does not belong to

any ontology that included in the user consultation statement. The executing body may use the ontology "company" and the "capital nature" connected by the capital composition relationship to complete the knowledge link. After the completion, a knowledge link from the insurance name to the company to the capital nature "insurance name→company→capital nature" may be obtained.

[0099] Thirdly, the ontology and the relationship included in the parsing result of the user consultation statement are not on the same knowledge link.

[0100] For example, as an example, the parsing result of the user consultation statement includes two ontologies: insurance name and green channel, and a capital composition relationship. In the ontology layer shown in Fig. 2A, the capital composition relationship does not belong to any ontology that included in the user consultation statement. The executing body may use the ontology "company" and the "capital nature" connected by the capital composition relationship to complete the knowledge link. In addition, the capital nature and the green channel are located on two different relationship branches of the insurance name. The executing body may split the link to obtain a knowledge link from the insurance name to the capital nature "insurance name→company→capital nature" and a knowledge link from the insurance name to the green channel "insurance name→green channel", a total of two knowledge links.

[0101] It should be noted that the example here is only an illustrative description of a process of finding the knowledge link corresponding to the user consultation statement of the third type in the ontology layer. It is not used to limit the number of knowledge links corresponding to the user consultation statement of the third type.

[0102] In this alternative implementation, the executing body may perform intent anchoring on the knowledge link to obtain the intent analysis result corresponding to the user consultation statement. A position at which the intent anchoring is performed by the executing body on the knowledge link may include: the default attribute of the ontology, which is farther from the central ontology, in the two ontologies connected by the relationship included in the user consultation statement, the default attribute of the ontology farthest from the central ontology except the ontologies connected by the relationship in the knowledge link. It should be noted that, if the number of knowledge links is at least two, the executing body may respectively perform intent anchoring for

each of the at least two knowledge links.

[0103] In this alternative implementation, for the user consultation statement of the third type, the executing body may use the intent analysis rule matching this type to perform the intent analysis on the user consultation statement, which helps to improve an accuracy of the intent analysis result of the user consultation statement of this type.

[0104] In some alternative implementations of the present embodiment, the user consultation statement type includes a fourth type, where the user consultation statement of the fourth type includes an attribute, a relationship and an ontology. The executing body may perform, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the preestablished knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement through following steps:

[0105] The first step, acquiring an ontology to which the attribute included in the user consultation statement belongs and ontologies connected by the relationship included in the user consultation statement.

[0106] In this alternative implementation, the user consultation statement of the fourth type has an ontology, an attribute and a relationship. The executing body may first acquire the ontology to which the attribute included in the user consultation statement belongs and the ontologies connected by the relationship included in the user consultation statement.

[0107] In this alternative implementation, the attribute, the relationship, and the ontology included in the user consultation statement may be obtained by parsing the user consultation statement by the executing body. The attribute belongs to a certain ontology in the ontology layer. The relationship connects certain two ontologies in the ontology layer. In addition, the ontology to which the attribute belongs and the ontologies connected by the relationship may be ontologies included in the user consultation statement, or ontologies that are not included in the consultation statement.

[0108] The second step, adding the ontology to which the attribute belongs and the ontologies connected by the relationship to the ontology included in the user consultation

statement.

[0109] In this alternative implementation, the executing body may add the ontology to which the attribute included in the user consultation statement belongs and the ontologies connected by the relationship included in the user consultation statement acquired in the first step to the ontology included in the user consultation statement. Particularly, if the ontology to which the attribute belongs included in the user consultation statement and the ontologies connected by the relationship included in the user consultation statement acquired in the first step are included in the user consultation statement, there is no need to add them to the ontology included in the user consultation statement. If the ontology to which the attribute belongs included in the user consultation statement and the ontologies connected by the relationship included in the user consultation statement acquired in the first step are not included in the user consultation statement, the ontology to which the attribute belongs or the ontologies connected by the relationship is added to the ontology included in the user consultation statement.

[0110] The third step, performing the intent analysis on the user consultation statement in the ontology layer based on the attribute, the relationship, and the ontology included in the user consultation statement after the ontology is added thereto, to obtain the intent analysis result corresponding to the user consultation statement.

[0111] In this alternative implementation, the executing body may find in the ontology layer a knowledge link containing the the attribute, the relationship, and the ontology included in the user consultation statement with the ontology updated. The executing body may find from the ontology layer the knowledge link corresponding to the user consultation statement, based on the parsing result of the user consultation statement, which may include but is not limited to following situations:

[0112] First, the ontology, the attribute and the relationship included in the parsing result of the user consultation statement are on the same knowledge link.

[0113] For example, as an example, the parsing result of the user consultation statement includes two ontologies: an insurance name and a company, a registered capital attribute and an issuance relationship. In the ontology layer shown in Fig. 2A, the two ontologies, the attribute and the relationship included in the parsing result of the user consultation statement are on the same knowledge link. The executing body may determine a

knowledge link from the insurance name to the company to the registered capital "insurance name→company→registered capital".

[0114] Secondly, the ontology, the attribute and the relationship included in the parsing result of the user consultation statement are on the same knowledge link after link completion.

[0115] For example, as an example, the parsing result of the user consultation statement includes an ontology: insurance name, an attribute: critical illness exemption description, and have an exemption relationship. In the ontology layer shown in Fig. 2A, the critical illness exemption description attribute does not belong to any ontology that included in the user consultation statement. The ontologies connected by the exemption relationship are also not included in the user consultation statement. The executing body may use the ontology "critical illness insurance" and the "critical illness exemption" to complete the knowledge link. After the completion, a knowledge link from the insurance name to the critical illness insurance to the critical illness exemption and then to the critical illness exemption description "insurance name→critical illness insurance→critical illness exemption→critical illness exemption description" may be obtained.

[0116] Thirdly, the ontology, the attribute and the relationship included in the parsing result of the user consultation statement are not on the same knowledge link.

[0117] For example, as an example, the parsing result of the user consultation statement includes an ontology: insurance name, an attribute: insurance description, and a green channel relationship. In the ontology layer shown in Fig. 2A, the ontology connected by the green service channel relationship is the insurance name and the green channel, and the insurance description and the green channel are located on two different relationship branches of the insurance name. The executing body may split the link to obtain a knowledge link from the insurance name to the green channel "insurance name→green channel" and a knowledge link from the insurance name to the insurance description "insurance name→insurance description", a total of two knowledge links.

[0118] It should be noted that the example here is only an illustrative description of a process of finding the knowledge link corresponding to the user consultation statement of the fourth type in the ontology layer. It is not used to limit the number of knowledge links corresponding to the fourth type of the user consultation statement.

[0119] Then, the executing body may perform intent anchoring on the knowledge link to obtain the intent analysis result corresponding to the user consultation statement. A position at which the intent anchoring is performed by the executing body on the knowledge link may include: the attribute included in the user consultation statement, the default attribute of the ontology that is farther from the central ontology in the two ontologies connected by the relationship included in the user consultation statement, the ontology to which the attribute belongs and the default attribute of the ontology farthest from the central ontology except the ontology connected by the relationship in the knowledge link. It should be noted that, if the number of knowledge links is at least two, the executing body may respectively perform an intent anchor for each of the at least two knowledge links.

[0120] In this alternative implementation, for the user consultation statement of the fourth type, the executing body may use the intent analysis rule matching this type to perform the intent analysis on the user consultation statement, which helps to improve an accuracy of the intent analysis result of the user consultation statement of this type.

[0121] Step 202, performing an answer address search in an entity layer of the knowledge graph based on the intent analysis result, to obtain an answer matching the user consultation statement.

[0122] In the present embodiment, the intent analysis result obtained in step 201 is a knowledge link including the intent anchor. The executing body may perform the answer address search in the entity layer based on the knowledge link including the intent anchor and the entity corresponding to each ontology in the knowledge link obtained in step 201, that is, to find the answer matching the user consultation statement.

[0123] In the present embodiment, the executing body may first obtain an entity link corresponding to the user consultation statement based on the knowledge link including the intent anchor and the entity corresponding to each ontology in the knowledge link. Then, the executing body may find the minimal subgraph corresponding to the entity link in the entity layer. Then, the executing body may delete entities, relationships or attributes that are not related to the entity link in the minimal subgraph. Then, the executing body may take out a value on the intent anchor in the remaining entity link as the answer matching the user consultation statement.

[0124] For example, as an example, the executing body may obtain the entity link "A→B→C" corresponding to the user consultation statement based on the knowledge link including the intent anchor and the entity corresponding to each ontology in the knowledge link, where the intent anchor is on the default attribute of entity C. The executing body may use entity A closest to the central entity in the entity link as a starting node, and use the entity C farthest from the central entity in the entity link as a terminating node. Then, the executing body may find the minimal subgraph as shown in Fig. 2c between the starting node A and the terminating node C in the entity layer. Then, the executing body may delete entity D, entity G, and entity F that are irrelevant to the physical link "A→B→C" in the minimal subgraph, and delete connection relationships between the entity A, the entity C and unrelated entities. Finally, the remaining physical link is "A→B→C", where a default attribute value of the entity C is the answer matching the user consultation statement.

[0125] It should be noted that if the number of intent analysis results corresponding to the user consultation statement obtained in step 201 is at least two, the executing body may sequentially perform an answer address search in the entity layer based on each of the at least two intent analysis results, to obtain the answer matching the user consultation statement.

[0126] Step 203, transmitting the answer to a transmitting party from which the user consultation statement comes.

[0127] In the present embodiment, the transmitting party from which the user consultation statement comes may be the user terminal (for example, the terminal 101, 102, or 103 shown in Fig. 1) that is communicatively connected with the executing body. In practice, the executing body may transmit the answer obtained in step 202 to the user terminal, and the user terminal may then display the answer on a display device of the user terminal. Here, the number of answers matching the user consultation statement obtained in step 202 and the number of answers that the executing body may transmit to the user terminal may be greater than one.

[0128] With further reference to Fig. 3, Fig. 3 is a schematic diagram of an application scenario of the responding method according to the present embodiment. In the application scenario of Fig. 3, a user may input a user consultation statement 303 through

a user terminal 301. The user terminal 301 transmits the user consultation statement 303 to a server 302, and requests the server 302 to give an answer matching the user consultation statement 303. After receiving the user consultation statement 303, the server 302 may first perform a user consultation statement parsing on the user consultation statement 303 to obtain a parsing result 304. Then, the server 302 may, based on the parsing result 304, perform an intent analysis on the user consultation statement in an ontology layer of a knowledge graph corresponding to the user consultation statement, to obtain an intent analysis result 305 corresponding to the user consultation statement. Then, the server 302 may perform answer address searching in an entity layer corresponding to the user consultation statement on the basis of the intent analysis result 305, to obtain an answer 306 matching the user consultation statement. Finally, the server 302 may transmit the answer 306 to the transmitting party 301 from which the user consultation statement comes.

[0129] The responding method provided by embodiments of the present disclosure, performing, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement loaded to a memory, to obtain the intent analysis result corresponding to the user consultation statement; then performing the answer address searching in the entity layer of the pre-established knowledge graph corresponding to the user consultation statement -based on the intent analysis result, to obtain the answer matching the user consultation statement; and transmitting the answer to the transmitting party from which the user consultation statement comes. Embodiments herein realize high efficiency of intent analysis and answer address search, may accurately identify a plurality of intents in the user consultation statement, and may give an accurate answer for each intent, which favors increased response efficiency and response accuracy.

[0130] With further reference to Fig. 4, a flow 400 of the responding method according to another embodiment of the present disclosure is illustrated. The responding method is applied to the server and includes the following steps:

[0131] Step 401, performing, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user

consultation statement, to obtain at least two candidate intent analysis results.

[0132] Step 402, determining, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement from the candidate intent analysis results.

[0133] Step 403, performing answer address searching in an entity layer of the knowledge graph based on the intent analysis result, to obtain an answer matching the user consultation statement.

[0134] Step 404, transmitting the answer to a transmitting party from which the user consultation statement comes.

[0135] In the present embodiment, the above step 401, step 403, and step 404 are respectively consistent with step 201, step 202, and step 203 in previous embodiments. The above description of step 201, step 202, and step 203 also applies to step 401, step 403 and step 404, and detailed description thereof will be omitted.

[0136] Step 402, determining, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement from the candidate intent analysis results.

[0137] In the present embodiment, the transmitting party may be the user terminal from which the user consultation statement comes. When the number of intent analysis results of the user consultation statement obtained in step 401 is greater than one, the executing body may transmit intent inquiry information to the user terminal. The user of the user terminal may select an intent analysis result from the candidate intent analysis results, and transmit the intent confirmation information to the executing body. The executing body may determine the intent analysis result corresponding to the user consultation statement based on the received intent confirmation information.

[0138] It can be seen from Fig. 4 that, compared with embodiments corresponding to Fig. 2, the flow 400 of the responding method in the present embodiment embodies that in response to receiving the intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement is determined from the candidate intent analysis results. Therefore, in the

solution described in the present embodiment, the server selects an answer required by the user from a plurality of candidate answers and transmits the answer to the transmitting party. On the one hand, the response efficiency may be improved, and on the other hand, the information transmission traffic and the display resource consumption may be reduced.

[0139] With further reference to Fig. 5, as an implementation of the method shown in the above figures, the present disclosure provides an embodiment of a responding apparatus. The apparatus embodiment corresponds to the method embodiment as shown in Fig. 2, and the apparatus may be specifically applied to various electronic devices.

[0140] As shown in Fig. 5, a responding apparatus 500 of the present embodiment includes: an intent analysis unit 501, an answer address searching unit 502 and an answer transmitting unit 503. The intent analysis unit 501 is configured to perform, based on a parsing result obtained by parsing a user consultation statement, an intent analysis on the user consultation statement in an ontology layer of a pre-established knowledge graph corresponding to the user consultation statement, to obtain an intent analysis result corresponding to the user consultation statement. The answer address searching unit 502 is configured to perform , based on the intent analysis result, answer address searching in an entity layer of the knowledge graph, to obtain an answer matching the user consultation statement. The answer transmitting unit 503 is configured to transmit the obtained answer to a transmitting party, the user consultation statement being transmitted from the transmitting party.

[0141] In the present embodiment, in the responding apparatus 500: for the detailed processing and the technical effects thereof of the intent analysis unit 501, the answer address searching unit 502 and the answer transmitting unit 503, reference may be made to the relevant descriptions of step 201, step 202, and step 203 in the embodiment corresponding to Fig. 2 respectively, and detailed description thereof will be omitted.

[0142] In some alternative implementations of the present embodiment, the intent analysis unit 501 includes: a user consultation statement type determination subunit, configured to determine, according to a preset user consultation statement classification rule, a user consultation statement type of the user consultation statement based on the parsing result; and an intent analysis subunit, configured to perform, according to an

intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement.

[0143] In some alternative implementations of the present embodiment, the intent analysis subunit includes: an intent analysis module, configured to perform, according to the intent analysis rule matching the user consultation statement type, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph, to obtain at least two candidate intent analysis results; and an intent determination module, configured to determine, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement from the candidate intent analysis results.

[0144] In some alternative implementations of the present embodiment, the user consultation statement type includes a second type, where the user consultation statement of the second type includes an attribute and an ontology; the intent analysis subunit includes: a second ontology acquisition module, configured to acquire an ontology the attribute included in the user consultation statement belonging thereto; a second ontology adding module, configured to add the acquired ontology the attribute belonging thereto to the ontology included in the user consultation statement; and a second intent analysis module, configured to perform, based on the attribute and the ontology included in the user consultation statement obtained by adding the acquired ontology thereto, the intent analysis on the user consultation statement in the ontology layer, to obtain the intent analysis result corresponding to the user consultation statement.

[0145] In some alternative implementations of the present embodiment, the user consultation statement type includes a third type, where the user consultation statement of the third type includes a relationship and an ontology; the intent analysis subunit includes: a third ontology acquisition module, configured to acquire ontologies connected by the relationship included in the user consultation statement; a third ontology adding module, configured to add the acquired ontologies connected by the relationship to the ontology included in the user consultation statement; and a third intent analysis module, configured to perform, based on the relationship and the ontologies included in the user consultation statement obtained after the acquired ontologies are

added thereto, the intent analysis on the user consultation statement in the ontology layer, to obtain the intent analysis result corresponding to the user consultation statement.

[0146] In some alternative implementations of the present embodiment, the user consultation statement type includes a fourth type, where the user consultation statement of the fourth type includes an attribute, a relationship and an ontology; the intent analysis subunit includes: a fourth ontology acquisition module, configured to acquire an ontology the attribute included in the user consultation statement belonging thereto and an ontology connected by the relationship included in the user consultation statement; a fourth ontology adding module, configured to add the acquired the acquired ontology the attribute belonging thereto and the acquired ontologies connected by the relationship to the ontology included in the user consultation statement; and a fourth intent analysis module, configured to perform the intent analysis on the user consultation statement in the ontology layer based on the attribute, the relationship, and the ontology included in the user consultation statement after the acquired ontologies are added thereto, to obtain the intent analysis result corresponding to the user consultation statement.

[0147] In some alternative implementations of the present embodiment, the intent analysis unit 501 includes: a candidate intent analysis subunit, configured to perform, based on the parsing result obtained by parsing the user consultation statement, the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain at least two candidate intent analysis results; and an intent determination subunit, configured to determine, in response to receiving intent confirmation information transmitted by the transmitting party, the intent analysis result corresponding to the user consultation statement from the candidate intent analysis results.

[0148] The responding apparatus provided by above embodiments of the present disclosure, the intent analysis unit 501 performs the intent analysis on the user consultation statement in the ontology layer of the pre-established knowledge graph corresponding to the user consultation statement, to obtain the intent analysis result corresponding to the user consultation statement. Then, the answer address searching unit 502 performs answer address searching in the entity layer of the pre-established knowledge graph corresponding to the user consultation statement based on the intent analysis result, to obtain the answer matching the user consultation statement. Then, the

answer transmitting unit 503 transmits the answer to the transmitting party from which the user consultation statement comes. Embodiments have high efficiency of intent analysis and answer address searching, may accurately identify a plurality of intents in the user consultation statement, and may give an accurate answer for each intent, which favors increased response efficiency and response accuracy.

[0149] With further reference to Fig. 6, a schematic structural diagram of an electronic device (for example, the server in Fig. 1) 600 suitable for implementing embodiments of the present disclosure is illustrated. The terminal devices in embodiments of the present disclosure may include, but are not limited to, mobile phones, notebook computers, digital broadcast receivers, PDA (personal digital assistant), PAD (tablets), PMP (portable multimedia players), vehicle-mounted terminals (for example, vehicle-mounted navigation terminals) and other mobile terminals, and fixed terminals such as digital TVs, desktop computers. The electronic device shown in Fig. 6 is merely an example, and should not impose any limitation on the function and scope of use of embodiments of the present disclosure.

[0150] As shown in Fig. 6, the electronic device 600 may include a processing apparatus (for example, a central processing unit, a graphics processor, etc.) 601, which may execute various appropriate actions and processes in accordance with a program stored in a read-only memory (ROM) 602 or a program loaded into a random access memory (RAM) 603 from a storage apparatus607. In the RAM 603, various programs and data required for the operation of the electronic device 600 are also stored. The processing apparatus 601, the ROM 602, and the RAM 603 are connected to each other through a bus 604. An input/output (I/O) interface 605 is also connected to the bus 604.

[0151] Typically, the following apparatuses may be connected to the I/O interface 605: an input apparatus 609 including such as a touch screen, a touch pad, a keyboard, a mouse, a camera, a microphone, an accelerometer, or a gyroscope; an output apparatus 608 including such as a liquid crystal display (LCD), a speaker, a vibrator; the storage apparatus 607 including such as a magnetic tape, a hard disk; and a communication apparatus 606. The communication apparatus 606 may allow the electronic device 600 to perform wireless or wired communication with other devices to exchange data. Although Fig. 6 shows the electronic device 600 having various apparatuses, it should be understood that it is not required to implement or have all the illustrated apparatuses. It

may alternatively be implemented or provided with more or fewer apparatuses. Each block shown in Fig. 6 may represent one apparatus, or may represent a plurality of apparatuses as needed.

[0152] In particular, according to embodiments of the present disclosure, the processes described above with reference to the flowcharts may be implemented in a computer software program. For example, an embodiment of the present disclosure includes a computer program product, which includes a computer program that is tangibly embedded in a computer-readable medium. The computer program includes program codes for performing the method as illustrated in the flowcharts. In such an embodiment, the computer program may be downloaded and installed from a network via the communication apparatus 606, or installed from the storage apparatus 607, or installed from the ROM 602. The computer program, when executed by the processing apparatus 601, implements the above mentioned functionalities as defined in the method of embodiments of the present disclosure.

[0153] It should be noted that the computer readable medium in embodiments of the present disclosure may be computer readable signal medium or computer readable storage medium or any combination of the above two. An example of the computer readable storage medium may include, but not limited to: electric, magnetic, optical, electromagnetic, infrared, or semiconductor systems, apparatus, elements, or a combination of any of the above. A more specific example of the computer readable storage medium may include but is not limited to: electrical connection with one or more wire, a portable computer disk, a hard disk, a random access memory (RAM), a read only memory (ROM), an erasable programmable read only memory (EPROM or flash memory), a fiber, a portable compact disk read only memory (CD-ROM), an optical memory, a magnet memory or any suitable combination of the above. In embodiments of the present disclosure, the computer readable storage medium may be any physical medium containing or storing programs which may be used by a command execution system, apparatus or element or incorporated thereto. In embodiments of the present disclosure, the computer readable signal medium may include data signal in the base band or propagating as parts of a carrier, in which computer readable program codes are carried. The propagating data signal may take various forms, including but not limited to: an electromagnetic signal, an optical signal or any suitable combination of the above.

The signal medium that can be read by computer may be any computer readable medium except for the computer readable storage medium. The computer readable signal medium is capable of transmitting, propagating or transferring programs for use by, or used in combination with, a command execution system, apparatus or element. The program codes contained on the computer readable medium may be transmitted with any suitable medium including but not limited to: wire, optical cable, RF (radio frequency), etc., or any suitable combination of the above.

[0154] A computer program code for performing operations in embodiments of the present disclosure may be compiled using one or more programming languages or combinations thereof. The programming languages include object-oriented programming languages, such as Java, Smalltalk or C++, and also include conventional procedural programming languages, such as “C” language or similar programming languages. The program code may be completely executed on a user's computer, partially executed on a user's computer, executed as a separate software package, partially executed on a user's computer and partially executed on a remote computer, or completely executed on a remote computer or server. In the circumstance involving a remote computer, the remote computer may be connected to a user's computer through any network, including local area network (LAN) or wide area network (WAN), or may be connected to an external computer (for example, connected through the Internet using an Internet service provider).

[0155] The flowcharts and block diagrams in the accompanying drawings illustrate architectures, functions and operations that may be implemented according to the systems, methods and computer program products of various embodiments of the present disclosure. In this regard, each of the blocks in the flowcharts or block diagrams may represent a module, a program segment, or a code portion, said module, program segment, or code portion including one or more executable instructions for implementing specified logic functions. It should also be noted that, in some alternative implementations, the functions denoted by the blocks may occur in a sequence different from the sequences shown in the accompanying drawings. For example, two blocks presented in succession may be executed, substantially in parallel, or they may sometimes be executed in a reverse sequence, depending on the function involved. It should also be noted that each block in the block diagrams and/or flowcharts as well as a

combination of blocks may be implemented using a dedicated hardware-based system performing specified functions or operations, or by a combination of a dedicated hardware and computer instructions.

[0156] The units involved in embodiments of the present disclosure may be implemented by means of software or hardware. The described units may also be provided in a processor, for example, may be described as: a processor including an intent analysis unit, an answer address searching unit and an answer transmitting unit. Here, the names of these units do not in some cases constitute limitations to such units themselves. For example, the intent analysis unit may also be described as "a unit configured to perform, on the basis of a parsing result produced by parsing a user consultation statement, an intent analysis with respect to the user consultation statement in an ontology layer of a preestablished knowledge graph corresponding to the user consultation statement, to produce an intent analysis result corresponding to the user consultation statement".

[0157] The computer readable medium may be included in the electronic device, or a stand-alone computer readable medium not assembled into the electronic device. The computer readable medium carries one or more programs. The one or more programs, when executed by the electronic device, cause the electronic device to: perform, on the basis of a parsing result produced by parsing a user consultation statement, an intent analysis with respect to the user consultation statement in an ontology layer of a preestablished knowledge graph corresponding to the user consultation statement, to produce an intent analysis result corresponding to the user consultation statement; perform an answer address search in a entity layer of the preestablished knowledge graph corresponding to the user consultation statement, on the basis of the intent analysis result to produce an answer matching the user consultation statement; and transmit the answer to a transmitting party from which the user consultation statement comes.

[0158] The above description only provides an explanation of the preferred embodiments of the present disclosure and the technical principles used. It should be appreciated by those skilled in the art that the inventive scope of embodiments of the present disclosure is not limited to the technical solutions formed by the particular combinations of the above-described technical features. The inventive scope should also cover other technical solutions formed by any combinations of the above-described technical features or equivalent features thereof without departing from the concept of the present disclosure.

For example, technical solutions formed by the above-described features being interchanged with, but not limited to, technical features with similar functions disclosed in embodiments of the present disclosure.