CLAIMS

1. A method for updating a knowledge graph, wherein the method comprises performing a plurality of rounds of incremental update on a knowledge graph, wherein one round of incremental update comprises:

obtaining an initial knowledge graph in the round of incremental update, wherein:

when the round of incremental update is a first round of incremental update, the initial knowledge graph in the round of incremental update is obtained by performing entity normalization based on an entity linking result of a knowledge graph constructed by using full service data; or

when the round of incremental update is not a first round of incremental update, the initial knowledge graph in the round of incremental update is obtained by performing entity normalization based on an incremental entity linking result of an initial knowledge graph in a previous round of incremental update; and

performing an update step that comprises a repeatedly performed real-time update operation and an incremental update operation in a case in which a preset incremental update condition is met, wherein the real-time update operation comprises: updating, in response to receiving new service data, an updated knowledge graph in a previous real-time update operation by using the received service data, and the incremental update operation comprises: updating the initial knowledge graph by using service data generated during the round of incremental update, to use an updated knowledge graph as an initial knowledge graph in a next round of incremental update.

2. The method according to claim 1, wherein the real-time update operation and the incremental update operation each comprise the following entity linking process: determining whether there are at least two nodes that correspond to service subjects that have the same characteristic; and

when there are at least two nodes that correspond to service subjects that have the same characteristic, the following entity normalization process is further performed for an entity linking result: combining nodes that have the same characteristic into one node, and superposing corresponding entity description information of the nodes that have the same characteristic as entity description information of the combined node.

3. The method according to claim 2, wherein the full entity linking result of the knowledge graph constructed by using full service data is obtained in the following manner:

for nodes in the knowledge graph constructed by using full service data, separately obtaining entity description information corresponding to the nodes;

extracting feature vectors respectively corresponding to the nodes based on the entity description

information respectively corresponding to the nodes;

detecting a similarity between pairwise nodes based on pairwise feature vectors; and

identifying, based on whether a similarity between the pairwise feature vectors meets a predetermined homogeneity condition, whether the corresponding pairwise nodes have the same characteristic.

4. The method according to claim 2, wherein the initial knowledge graph comprises a first node, first service data for the first node is currently received new service data, and updating, in response to generating new service data in a current service, an updated knowledge graph in a previous real-time update operation by using the received service data comprises:

updating first entity description information of the first node by using the first service data;

extracting a first feature vector from updated first entity description information;

comparing similarities that are in a one-to-one correspondence and that are between the first feature vector and other feature vectors of other nodes;

obtaining, based on whether the similarities meet a predetermined homogeneity condition, a real-time entity linking result indicating whether there is another node that has the same characteristic as the first node; and

updating the updated knowledge graph in the previous real-time update operation based on the real-time entity linking result.

5. The method according to claim 2, wherein the method further comprises:

adding currently received new service data to a current incremental dataset as incremental data; and

updating the initial knowledge graph by using service data generated during the round of incremental update comprises:

performing incremental entity linking on the initial knowledge graph in the round of incremental update by using each piece of incremental data in the current incremental dataset; and

updating the initial knowledge graph by using an incremental entity linking result.

6. The method according to claim 1, wherein the incremental update condition comprises: a predetermined period arrives or a quantity of pieces of service data generated during the round of incremental update reaches a predetermined quantity.

7. The method according to claim 1, wherein when the round of incremental update is not a first round of incremental update, the update step further comprises:

obtaining each real-time update result obtained based on a real-time update operation performed after the preset incremental update condition is met in a previous round of incremental update; and

updating the initial knowledge graph in the round of incremental update based on each real-time update result.

8. The method according to any one of claims 2 to 4, wherein the entity description information comprises at least one of attribute information and connection information.

9. The method according to any one of claims 2 to 4, wherein the feature vector comprises one of the following or a vector obtained by performing embedding on a plurality of items in the following: a text semantic vector, a trajectory vector, a graph structure vector, and a graph representation vector.

10. The method according to claim 5, wherein a real-time entity linking process is completed by using an online search engine, and updating a current knowledge graph based on real-time entity linking is completed by using an online graph storage engine; and updating the initial knowledge graph by using an incremental entity linking result comprises:

synchronizing the incremental entity linking result to the online search engine and the online graph storage engine by using a data dump mechanism, to replace each real-time entity linking result generated during the round of incremental update with the incremental entity linking result, so as to update the initial knowledge graph by using the incremental entity linking result.

11. The method according to claim 2, wherein when a second service subject involved in incremental data does not have a corresponding node in the initial knowledge graph in the round of incremental update, the incremental update operation further comprises:

adding a second node corresponding to the second service subject to the initial knowledge graph in the round of incremental update; and

performing incremental entity linking based on a knowledge graph obtained after the second node is added.

12. The method according to claim 1, wherein when the round of incremental update is a first round of incremental update, a first real-time update operation in the round of incremental update is:

updating the initial knowledge graph in the round of incremental update by using the received service data.

13. An apparatus for updating a knowledge graph, wherein the apparatus comprises:

an obtaining unit, configured to obtain an initial knowledge graph in each round of incremental update, wherein:

when the round of incremental update is a first round of incremental update, the initial knowledge graph in the round of incremental update is obtained by performing entity normalization based on an entity linking result of a knowledge graph constructed by using full service data; or

when the round of incremental update is not a first round of incremental update, the initial knowledge graph in the round of incremental update is obtained by performing entity normalization based on an incremental entity linking result of an initial knowledge graph in a previous round of incremental update; and

an update unit, configured to perform, in each round of incremental update, an update step that comprises a repeatedly performed real-time update operation and an incremental update operation in a case in which a preset incremental update condition is met, wherein the real-time update operation comprises: updating, in response to receiving new service data, an updated knowledge graph in a previous real-time update operation by using the received service data, and the incremental update operation comprises: updating the initial knowledge graph by using service data generated during the round of incremental update, to use an updated knowledge graph as an initial knowledge graph in a next round of incremental update.

14. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program, and when the computer program is executed in a computer, the computer is enabled to perform the method according to any one of claims 1 to 12.

15. A computing device, comprising a memory and a processor, wherein the memory stores executable code, and when the processor executes the executable code, the method according to any one of claims 1 to 12 is implemented.