

METHOD AND APPARATUS FOR DETERMINING DEPLOYMENT NEED FOR POINT OF INTEREST

Technical Field

The present application relates to the field of information technologies, and in particular, to a
5 method and an apparatus for determining a deployment need for a point of interest (POI).

Background Art

The issue of POI location selection has always been a general concern of various service providers. The POIs here may be various self-service terminals, fixed service places, or the like.

Currently, deployment needs of different areas for POIs having a preset function are generally
10 determined by means of artificial research, and then POI address selection is performed. Generally, according to urban area structures, the number and distribution of deployed POIs having a preset function, and so on, areas in which service providers have not yet deployed POIs having the preset function or areas in which a small number of POIs having the preset function are deployed are determined as areas in which there is a greater deployment need for the POIs,
15 for example, new rural-urban continuums formed along with the expansion of urban areas, newly developed industrial parks and development zones or industrial parks and development zones that are gradually reaching a large scale, areas into which a large number of people flow, areas having a deployment need for POIs determined by consulting actual users on site, and the like.

As cognitive one-sidedness usually exists in determining a deployment need of a user for a
20 POI by means of artificial research, it happens easily that an address selection policy made based on a research result is inconsistent with an actual need.

Therefore, a solution of objectively and automatically determining a deployment need for a POI is required, while there is no related technology in the prior art that can implement such a solution.

25 Summary of the Invention

Embodiments of the present application provide a method and an apparatus for determining a deployment need for a POI, to objectively and automatically determine a deployment need of a user for a POI, and then improve the efficiency and accuracy of POI address selection.

5 The embodiments of the present application provide a method for determining a deployment need for a POI, including:

determining, by a server based on acquired geographic location information of users, target users covered by an area to be inspected;

determining, for each of the target users according to the number of POIs having a preset function deployed in a set range of distances from the target user, a deployment need index of the target user for a POI having the preset function; and
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determining, according to the deployment need index of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected.

Optionally, the area to be inspected is determined according to the following step:

15 dividing a target geographic area range into a plurality of grid areas of the same size, and taking each of the divided grid areas as an area to be inspected.

Optionally, after a total deployment need index corresponding to each grid area in the target geographic area range is determined, the method further includes:

indicating the determined total deployment need index corresponding to each grid area to a POI server of a set service provider, such that the set service provider determines, based on the total deployment need index corresponding to each grid area, addresses for deploying POIs having the preset function in the target geographic area range.
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Optionally, the step of determining a deployment need index of the target user for a POI having the preset function includes:

25 determining, according to the number N of the POIs having the preset function deployed in the set range of distances from the target user, that the deployment need index of the target user

for a POI having the preset function is $k_1/(N+k_2)$, wherein N is a positive integer, and k_1 and k_2 are positive real numbers.

Optionally, the step of determining, according to the deployment need index of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected includes:

determining the sum of deployment need indexes of the target users covered by the area to be inspected for a POI having the preset function as the total deployment need index corresponding to the area to be inspected.

Optionally, the step of determining target users covered by an area to be inspected includes:

filtering out non-target users from the users covered by the area to be inspected, and taking the remaining users as the target users;

wherein the non-target users each satisfy one or more of the following conditions:

there is no need to use the preset function;

a POI having the preset function of the set service provider has already been deployed in the set range of distances from the non-target user; and

a POI having the preset function of a common service provider has already been deployed in the set range of distances from the non-target user, wherein the common service provider interacts with the user most frequently as compared with other service providers of the POI having the preset function.

The embodiments of the present application provide an apparatus for determining a deployment need for a POI, including:

a target user determining module configured to determine, based on acquired geographic location information of users, target users covered by an area to be inspected;

a first deployment need index determining module configured to determine, for each of the target users according to the number of POIs having a preset function deployed in a set range of distances from the target user, a deployment need index of the target user for a POI having the preset function; and

a second deployment need index determining module configured to determine, according to the deployment need index of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected.

5 In the embodiments of the present application, a server can determine, based on acquired geographic location information of users, target users covered by an area to be inspected, determine, for each of the target users according to the number of POIs having a preset function deployed in a set range of distances from the target user, a deployment need index of the target user for a POI having the preset function, and determine, according to the deployment need index
10 of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected. As such, in the embodiments of the present application, a deployment need of a user for a POI can be objectively and automatically determined, and the efficiency and accuracy of POI address selection are improved.

15 **Brief Description of the Drawings**

FIG. 1 is a schematic flowchart of a method for determining a deployment need for a POI according to a first embodiment of the present application;

FIG. 2 is a schematic flowchart of a method for determining a deployment need for a POI according to a second embodiment of the present application; and

20 FIG. 3 is a schematic structural diagram of an apparatus for determining a deployment need for a POI according to an embodiment of the present application.

Detailed Description

In the embodiments of the present application, a server can determine, based on acquired geographic location information of users, target users covered by an area to be inspected,
25 determine, for each of the target users according to the number of POIs having a preset function deployed in a set range of distances from the target user, a deployment need index of the target user for a POI having the preset function, and determine, according to the deployment need index

of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected. As such, in the embodiments of the present application, a deployment need of a user for a POI can be objectively and automatically determined, and the efficiency and accuracy of POI address selection are improved.

The embodiments of the present application will be described below in further detail with reference to the accompanying drawings of the specification.

First embodiment

As shown in FIG. 1, which is a schematic flowchart of a method for determining a deployment need for a POI according to the first embodiment of the present application, the method includes the following steps:

Step 101: A server can determine, based on acquired geographic location information of users, target users covered by an area to be inspected.

In a specific implementation process, the geographic location information may be extracted from network interaction data of users. For example, address information (longitude and latitude data) generated when a user navigates and surfs the Internet by using a mobile device can be extracted, delivery address information of a user can be extracted, and so on. According to the extracted address information and time information generated when the user stays at each address, a frequently used address of the user (that is, an address at which the user appears at a frequency exceeding a set threshold) may be determined, including a work address (an address used during working time) and/or a residential address (an address used during non-working time) and the like. That is, one user may have one or more addresses, and different areas to be inspected may cover the same user.

In a specific implementation process, each user covered by the area to be inspected may be taken as a target user. Alternatively, target users may be first filtered based on an actual need. As such, on the one hand, the computation complexity may be decreased, and on the other hand, a determined deployment need index may be much closer to an actual requirement.

Specifically, non-target users are filtered out from the users covered by the area to be inspected, and the remaining users are taken as the target users; wherein the non-target users each satisfy one or more of the following conditions:

(1) there is no need to use a preset function of a POI to be deployed. For example, the POI to be deployed is an automatic teller machine (ATM) (that is, the preset function is a self-service withdrawal function), and a user without a deposit card or a credit card has no need to use the ATM. Here, it is generally assumed that only a user with a deposit card has a deployment need for the ATM. If the number of credit card users of a certain service provider is much greater than that of deposit card users, it can be considered that the credit card users also have a deployment need for the ATM.

(2) a POI having the preset function of the set service provider has already been deployed in a set range of distances from the non-target user. Here, it can be assumed that the deployment need index for a POI determined this time is specific to a certain set service provider. If a POI of the set service provider has already been deployed in the set range of distances from a user, the user can be taken as a non-target user. For example, users within a range of 500 meters covered by an ATM of a certain set service provider can be filtered out.

(3) a POI having the preset function of a common service provider has already been deployed in the set range of distances from the non-target user, wherein the common service provider interacts with the user most frequently as compared with other service providers of the POI having the preset function. For example, if a common service provider of a certain user is another service provider other than the set service provider and an ATM of the common service provider of the user has already been deployed in a range of 500 meters from the user, the user can be taken as a non-target user.

S102: For each of the target users, a deployment need index of the target user for a POI having a preset function can be determined according to the number of POIs having the preset function deployed in a set range of distances from the target user.

In a specific implementation process, the fewer the number of POIs is, the greater the deployment need index of the target user for a POI is. Therefore, the deployment need index of the target user for a POI can be determined based on the number of POIs.

Optionally, the number of POIs may be in inverse proportion to the deployment need index of the target user for a POI, that is, it can be determined, according to the number N of the POIs having the preset function deployed in the set range of distances from the target user, that the deployment need index of the target user for a POI having the preset function is $k_1/(N+k_2)$, wherein N is a positive integer, and k_1 and k_2 are positive real numbers.

It should be noted that the deployment need index being $k_1/(N+k_2)$ is merely an implementation manner of this embodiment of the present application. Any simple modifications based on the implementation manner are within the protection scope of the present application. For example, the deployment need index may be $k_1/(N+k_2)^\mu$, wherein μ is a real number.

S103: A total deployment need index corresponding to the area to be inspected can be determined according to the deployment need index of each of the target users covered by the area to be inspected for a POI having the preset function.

In a specific implementation process, the sum of deployment need indexes of the target users covered by the area to be inspected for a POI having the preset function may be determined as the total deployment need index corresponding to the area to be inspected.

Alternatively, the deployment need index of each of the target users for a POI having the preset function may be multiplied by a weight corresponding to the target user to obtain a product, and then products corresponding to the target users are added up to determine the total deployment need index corresponding to the area to be inspected. Here, the weight corresponding to each of the target users may be related to stability of geographic location information, a credit record, and so on of the target user.

In order to further improve the accuracy of POI address selection, in the following second embodiment of the present application, a target geographic area range in which POIs are to be deployed can be divided into a plurality of grid areas of the same size, each grid area is taken as

an area to be inspected, and a total deployment need index corresponding to each area to be inspected is determined, so that POI address selection can be performed more precisely.

Second embodiment

As shown in FIG. 2, which is a schematic flowchart of a method for determining a deployment need for a POI according to a second embodiment of the present application, the method includes the following steps:

S201: Users in a target geographic area range can be determined based on acquired geographic location information of the users, non-target users can be filtered out from the users in the target geographic area range, and the remaining users can be taken as target users.

In a specific implementation process, non-target users each can be filtered out based on the following conditions:

(1) there is no need to use a preset function of a POI to be deployed;

(2) a POI having the preset function of a set service provider has already been deployed in a set range of distances from the non-target user; and

(3) a POI having the preset function of a common service provider has already been deployed in the set range of distances from the non-target user.

S202: For each of the target users in the target geographic area range, a deployment need index of the target user for a POI having a preset function can be determined according to the number of POIs having the preset function deployed in a set range of distances from the target user.

In this step, for each of the target users, it can be determined, according to the number of the POIs having the preset function deployed in the set range of distances from the target user, that the deployment need index of the target user for a POI having the preset function is $1/(N+1)$.

S203: The target geographic area range can be divided into a plurality of grid areas of the same size, and target users covered by each of the grid areas can be determined.

Here, the target users covered by each grid area can be determined according to acquired geographic location information of the target users and a geographic area range of the grid area.

In a specific implementation process, users covered by each grid area may be first determined according to the acquired geographic location information of the users, and then non-target users may be filtered out from the users covered by the grid area, to obtain the target users covered by the grid area. Alternatively, after target users covered by each grid area are determined, for each of the grid areas, deployment need indexes of the target users in the grid area for a POI having the preset function can be determined respectively.

S204: For each grid area, a total deployment need index corresponding to the grid area can be determined according to a deployment need index of each of the target users covered by the grid area for a POI having the preset function.

In this step, the sum of deployment need indexes of the target users covered by each grid area for a POI having the preset function can be determined as the total deployment need index corresponding to the grid area.

For example, there are only two users A and B in a certain grid area, three ATMs are deployed in a range of 500 meters around the user A, no ATM is deployed in a range of 500 meters around the user B, and then a total deployment need index corresponding to the grid area is $1/3+1=4/3$.

S205: The determined total deployment need index corresponding to each grid area can be indicated to a POI server of a set service provider, such that the set service provider determines, based on the total deployment need index corresponding to each grid area, addresses for deploying POIs having the preset function in the target geographic area range.

In a specific implementation process, a map including the preset geographic area range may be rendered according to the total deployment need index corresponding to each grid area. For example, the grid area having a smaller total deployment need index is in a lighter color on the map and is more transparent, while the grid area having a greater total deployment need index is in a darker color on the map and is less transparent. The rendered map may be sent to the set service provider, and the set service provider can select, based on information displayed on the map, a deployment address for a POI according to its own actual need.

Based on the same invention concept, an embodiment of the present application further provides an apparatus for determining a deployment need for a POI corresponding to the method for determining a deployment need for a POI. As the principle of the apparatus for solving the problem is similar to that of the method for determining a deployment need for a POI in the foregoing embodiment of the present application, reference may be made to the implementation of the method for implementation of the apparatus, repeated contents of which are not described.

As shown in FIG. 3, which is a schematic structural diagram of an apparatus for determining a deployment need for a POI according to an embodiment of the present application, the apparatus includes:

a target user determining module 31 configured to determine, based on acquired geographic location information of users, target users covered by an area to be inspected;

a first deployment need index determining module 32 configured to determine, for each of the target users according to the number of POIs having a preset function deployed in a set range of distances from the target user, a deployment need index of the target user for a POI having the preset function; and

a second deployment need index determining module 33 configured to determine, according to the deployment need index of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected.

Optionally, the apparatus further includes:

a division module 34 configured to divide, before the target user determining module 31 determines the target users covered by the area to be inspected, a target geographic area range into a plurality of grid areas of the same size, and take each of the divided grid areas as an area to be inspected.

Optionally, the apparatus further includes:

a sending module 35 configured to indicate, after the second deployment need index determining module 33 determines a total deployment need index corresponding to each grid

area in the target geographic area range, the determined total deployment need index corresponding to each grid area to a POI server of a set service provider, such that the set service provider determines, based on the total deployment need index corresponding to each grid area, addresses for deploying POIs having the preset function in the target geographic area range.

5 Optionally, the first deployment need index determining module 32 can be specifically configured to:

 determine, according to the number N of the POIs having the preset function deployed in the set range of distances from the target user, that the deployment need index of the target user for a POI having the preset function is $k_1/(N+k_2)$, wherein N is a positive integer, and k_1 and k_2 are
10 positive real numbers.

 Optionally, the second deployment need index determining module 33 can be specifically configured to:

 determine the sum of deployment need indexes of the target users covered by the area to be inspected for a POI having the preset function as the total deployment need index corresponding
15 to the area to be inspected.

 Optionally, the target user determining module 31 can be specifically configured to:

 filter out non-target users from the users covered by the area to be inspected, and take the remaining users as the target users;

 wherein the non-target users each satisfy one or more of the following conditions:

20 there is no need to use the preset function;

 a POI having the preset function of the set service provider has already been deployed in the set range of distances from the non-target user; and

 a POI having the preset function of a common service provider has already been deployed in the set range of distances from the non-target user, wherein the common service provider
25 interacts with the user most frequently as compared with other service providers of the POI having the preset function.

Those skilled in the art should understand that the embodiments of the present application may be provided as a method, a system, or a computer program product. Therefore, the present application may be implemented in the form of a complete hardware embodiment, a complete software embodiment, or an embodiment combining software and hardware. Moreover, the present application may be in the form of a computer program product implemented on one or more computer usable storage media (including, but not limited to, a magnetic disk memory, a CD-ROM, an optical memory, and the like) including computer usable program codes.

The present application is described with reference to flowcharts and/or block diagrams according to the method, apparatus (system) and computer program product of the embodiments of the present application. It should be understood that a computer program instruction may be used to implement each process and/or block in the flowcharts and/or block diagrams and combinations of processes and/or blocks in the flowcharts and/or block diagrams. The computer program instructions may be provided to a general-purpose computer, a dedicated computer, an embedded processor or a processor of another programmable data processing device to generate a machine, such that the computer or the processor of another programmable data processing device executes an instruction to generate an apparatus configured to implement functions designated in one or more processes in a flowchart and/or one or more blocks in a block diagram.

The computer program instructions may also be stored in a computer readable storage that can guide the computer or another programmable data processing device to work in a specific manner, such that the instruction stored in the computer readable storage generates an article of manufacture including an instruction apparatus, and the instruction apparatus implements functions designated by one or more processes in a flowchart and/or one or more blocks in a block diagram.

The computer program instructions may also be installed in a computer or another programmable data processing device, such that a series of operation steps are executed on the computer or another programmable device to generate a computer implemented processing, and therefore, the instruction executed in the computer or another programmable device provides

steps for implementing functions designated in one or more processes in a flowchart and/or one or more blocks in a block diagram.

Preferred embodiments of the present application have been described; however, once learning basic creative concepts, those skilled in the art can make other variations and
5 modifications to the embodiments. Therefore, the appended claims are intended to be explained as including the preferred embodiments and all variations and modifications falling within the scope of the embodiments of the present application.

It is apparent to those skilled in the art that various modifications and variations can be made to the present application without departing from the scope or spirit of the present application. In
10 view of the foregoing, it is intended that the present application covers modifications and variations of the present application provided they fall within the scope of the following claims and their equivalents.

CLAIMS

1. A method for determining a deployment need for a point of interest (POI), wherein the method comprises:

determining, by a server and based on acquired geographic location information of multiple users, multiple target users covered by an area to be inspected;

determining, by the server and for each of the multiple target users, a deployment need index of the target user for a POI having a preset function, wherein the deployment need index of the target user is determined according to a number of POIs having the preset function deployed within a set distance from the target user; and

determining, by the server, a total deployment need index corresponding to the area to be inspected, wherein the total deployment need index is determined according to the deployment need index of each of the target users.

2. The method of claim 1, wherein the area to be inspected is determined according to the following step:

dividing a target geographic area range into a plurality of grid areas of a same size, and taking each of the divided grid areas as an area to be inspected.

3. The method of claim 2, wherein after a total deployment need index corresponding to each grid area in the target geographic area range is determined, the method further comprises:

indicating the determined total deployment need index corresponding to each grid area to a POI server of a set service provider, such that the set service provider determines, based on the total deployment need index corresponding to each grid area, addresses for deploying POIs having the preset function in the target geographic area range.

4. The method of claim 1, wherein the step of determining a deployment need index of the target user for a POI having the preset function comprises:

determining, according to the number N of the POIs having the preset function deployed in the set range of distances from the target user, that the deployment need index of the target user for a POI having the preset function is $k_1/(N+k_2)$, wherein N is a positive integer, and k_1 and k_2 are positive real numbers.

5. The method of claim 1, wherein the step of determining, according to the deployment need index of each of the target users covered by the area to be inspected for a POI having the preset function, a total deployment need index corresponding to the area to be inspected comprises:

determining the sum of deployment need indexes of the target users covered by the area to be inspected for a POI having the preset function as the total deployment need index corresponding to the area to be inspected.

6. The method of any one of claims 1 to 5, wherein the step of determining target users covered by an area to be inspected comprises:

filtering out non-target users from the users covered by the area to be inspected, and taking the remaining users as the target users;

wherein the non-target users each satisfy one or more of the following conditions:

there is no need to use the preset function;

a POI having the preset function of the set service provider has already been deployed in the set range of distances from the non-target user; and

a POI having the preset function of a common service provider has already been deployed in the set range of distances from the non-target user, wherein the common service provider interacts with the user most frequently as compared with other service providers of the POI having the preset function.

7. The method of any one of claims 1 to 6, wherein a target user covered by an area to be inspected comprises a target user that frequently uses an address that is within the area to be inspected.

8. The method of any one of claims 1 to 7, wherein the acquired geographic location information of users comprises address information extracted from network interaction data of multiple users.

9. The method of claim 8, wherein address information extracted from network interaction data comprises address information extracted when a user uses the internet or delivery address information.

10. The method of claim 2 or 3, further comprising rendering a map including the target geographic area according to the total deployment need index corresponding to each grid area, wherein a grid area having a smaller total deployment need index is rendered in a lighter color and is more transparent than a grid area having a greater total deployment need index.

11. The method of claim 8, wherein determining the deployment need index of a target user according to a number of POIs having the preset function deployed within a set distance from the target user comprises determining a deployment need index of a target user according to the number of points of interest having a preset function deployed within a set distance from addresses specified by the address information.

12. An apparatus for determining a deployment need for a point of interest (POI), wherein the apparatus comprises multiple modules configured to perform the method of any one of claims 1 to 11.