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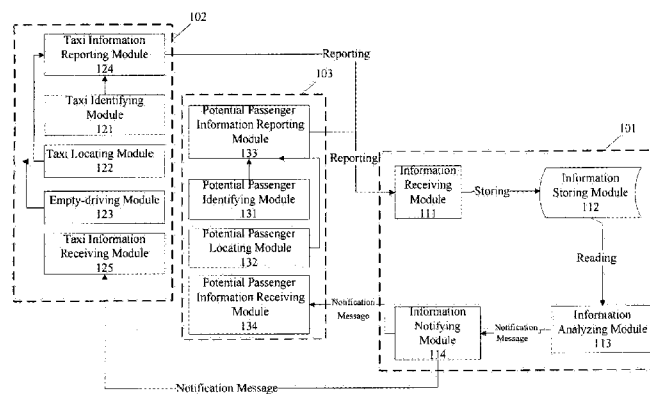


Fig. 1

(57) Abstract: A location-based taxi information communication service system, including: an information receiving module configured to receive an identification, a location, and empty-driving information of a taxi reported from a taxi terminal, and determine corresponding time information, the information receiving module being further configured to receive a call request, an identification, and a location of a potential passenger reported from a potential passenger terminal, and determine corresponding time information; an information storing module configured to store the identification, location, empty-driving information and time information of the taxi, and to store the call request, identification, location and time information of the potential passenger; an information analyzing module configured to count empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the location information, and to analyze numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message; and an information notifying module configured to send the notification message to the taxi terminal and the potential passenger terminal.



LOCATION-BASED TAXI INFORMATION COMMUNICATION SERVICE SYSTEM, TERMINALS AND METHOD

CROSS REFERENCE TO RELATED APPLICATIONS

5 This application claims benefit of priority to Chinese patent application No. 201310339287.6 filed on August 6, 2013. The aforementioned patent application is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

10 The disclosure relates to the field of electronic data and information communication applications, and in particular to a location-based taxi information communication service system, and corresponding terminals and method.

BACKGROUND

15 A taxi is a vehicle charging based on the distance traveled. With the current urban population explosion, the demand for convenient transportation grows rapidly, and many people choose to travel by taxi.

 In order to facilitate people who want to take a taxi (i.e., potential passengers), currently, there are a number of Internet-based applications for calling a taxi, such as,
20 Hailo, Di-di Taxi and so on. These existing applications search taxis near the potential passengers mainly with Location Based Service (LBS).

 LBS acquires location information (such as geographic coordinates) about users of mobile terminals over a radio communication network (such as GSM and CDMA) of telecom carriers or by means of external locating (such as GPS), and provides
25 corresponding locating services for the users of mobile terminals with support from Geographic Information System (GIS) platform.

 Generally, an LBS system is a combination of a mobile communication network and a computer network, which interact with each other through a gateway. A user sends a request from a user terminal and via the mobile communication network, and
30 then the request is sent to the LBS system through the gateway; the LBS system processes according to the user request and the user's current location and returns a result to the user through the gateway.

 Prior applications for calling a taxi are point-to-point applications, that is to say, both potential passengers' smart terminals (e.g., smart phones) and the smart terminals

on the taxis (e.g., a driver's smart phone or an on-board equipment such as a GPS) have to have an application installed for calling a taxi. With the application for calling a taxi, a potential passenger may report his or her location and request to a server and the taxis may also report their locations to the server. The server sends the potential passenger's request to the taxis near the potential passenger according to the location information reported from the potential passenger and the taxis, so that a driver may respond to the potential passenger's request and further contact with the potential passenger in a point-to-point manner (e.g., by voice communication). Then the driver may drive to the potential passenger's location according to a map on the application for calling a taxi to pick the passenger up.

However, the prior art applications for calling a taxi cannot average taxis evenly, i.e., the potential passenger can take a taxi in a short time only when there are empty loaded taxis (empty taxis) near the potential passenger; otherwise, it is hard to take a taxi, resulting in a waste of the potential passenger's time. Moreover, when there are many empty taxis but only a few potential passengers in a certain region, many taxis will be empty, i.e. the taxi travels without a passenger onboard. Resource cost (such as car losses, fuel consumption, labor fee, etc) in this state is included in the maintenance costs of the taxi. The higher the chance of empty driving, the higher the operating costs of the taxi.

This section provides background information related to the present disclosure which however does not necessarily constitute prior art in the sense of patent law.

SUMMARY

In view of the above, the present application provides a location-based information communication service system for calling a taxi, a corresponding information communication application terminal for a taxi and a corresponding information communication application terminal for a potential passenger.

According to an embodiment of the disclosure, a location-based taxi information communication service system is provided, including:

an information receiving module configured to receive an identification, a location, and empty-driving information of a taxi reported from a taxi terminal, and determine corresponding time information, the information receiving module being further configured to receive a call request, an identification, and a location of a potential passenger reported from a potential passenger terminal, and determine

corresponding time information;

an information storing module configured to store the identification, location, empty-driving information and time information of the taxi, and to store the call request, identification, location and time information of the potential passenger;

5 an information analyzing module configured to count empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the location information, and to analyze numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message; and

10 an information notifying module configured to send the notification message to the taxi terminal and the potential passenger terminal.

According to an embodiment of the disclosure, a location-based taxi information application terminal is provided, including:

a taxi identifying module configured to obtain an identification of the taxi and to
15 transmit the identification of the taxi to a taxi information reporting module;

a taxi locating module configured to obtain a location of the taxi, and to transmit the location of the taxi to the taxi information reporting module;

an empty-driving module configured to monitor whether the taxi is empty-driving or not, and to transmit empty-driving information to the taxi
20 information reporting module if the taxi is empty-driving;

the taxi information reporting module configured to report the identification, the location and the empty-driving information of the taxi to a service system; and

a taxi information receiving module configured to receive a notification message from the service system and to output the notification message.

25 According to an embodiment of the disclosure, a location-based potential passenger information application terminal is provided, including:

a potential passenger identifying module configured to obtain an identification of the potential passenger and to transmit the identification to a potential passenger information reporting module;

30 a potential passenger locating module configured to obtain a location of the potential passenger and to transmit the location to the potential passenger information reporting module;

the potential passenger information reporting module configured to report the identification and the location of the potential passenger to a service system; and

a potential passenger information receiving module configured to receive a notification message from the service system and to output the notification message.

According to an embodiment of the disclosure, a location-based taxi information communication system is provided including a service system, a taxi information application terminal and a potential passenger information application terminal,

wherein the taxi information application terminal is configured to report first information to the service system, receive a notification message from the server system and output the notification message, the first information comprising an identification, a location, and empty-driving information of the taxi;

wherein the potential passenger information application terminal is configured to report second information to the service system, receive a notification message from the server system and output the notification message, the second information comprising a call request, an identification, and a location of the potential passenger; and

wherein the service system is configured to

receive and record the first information and the second information from the taxi information application terminal and the potential passenger information application terminal, and determine corresponding time information;

count empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the location information;

analyze numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message; and

send the notification message to the taxi information application terminal and the potential passenger information application terminal.

According to an embodiment of the disclosure, a location-based taxi information communication service method is provided, including:

a taxi information recording step of receiving and recording an identification, a location and empty-driving information of a taxi reported from a taxi terminal, and recording corresponding time information;

a potential passenger information recording step of receiving and recording a call request, an identification and a location of a potential passenger from a potential passenger terminal, and recording corresponding time information;

a counting step of counting empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the

location information;

a notification message generating step of generating a corresponding notification message by analyzing numbers of the counted empty-driving taxis and potential passengers; and

5 a sending step of sending the notification message to the taxi terminal and the potential passenger terminal.

As compared with the prior art, in the application, the taxi terminal reports the identification, location and empty-driving information of the taxi and the potential passenger terminal also reports the call request, identification and location of the potential passenger. The information analyzing module counts empty-driving taxis and potential passengers at specified time and at specified locations according to this information and corresponding time information, and analyzes numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message. The information notifying module then sends the corresponding notification message to the corresponding taxi terminal and potential passenger terminal. The taxi drivers can thus be aware of information about the number of potential passengers and the number of empty-driving taxis in respective regions and at respective locations according to the notification messages, so as to avoid blindly looking for passengers. Thereby, the balance of taxi dispatch may be improved and the operating costs of the taxis may be reduced. Meanwhile, the potential passengers can be aware of information about the number of empty-driving taxis in respective regions and at respective locations according to the notification messages, so as to reasonably arrange their travel. Therefore, chances for successfully calling a taxi may be improved and waiting time of the potential passengers may be decreased.

25

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram showing a location-based taxi information communication service system according to an embodiment of the disclosure;

Fig. 2 is a flow diagram showing a location-based taxi information communication service method according to an embodiment of the disclosure; and

30 Fig. 3 illustrates an exemplary communication service system in which embodiments of the disclosure can be implemented.

DETAILED DESCRIPTION

Embodiments of the disclosure will be described in further detail with reference to the accompanying drawings.

As used herein, “specified regions” means regions partitioned in a map, and each of the regions includes at least one location. Location is a specific position, a specific site or a specific place name.

Fig. 1 is a schematic diagram showing a location-based taxi information communication service system according to an embodiment of the disclosure. Referring to Fig. 1, the system includes a service system 101, a taxi information application terminal 102 and a potential passenger information application terminal 103.

The taxi information application terminal 102 is configured to report first information to the service system, receive a notification message from the server system and output the notification message. The first information may include identification, location, and empty-driving information of the taxi.

The potential passenger information application terminal 103 is configured to report second information to the service system, receive a notification message from the server system and output the notification message. The second information may include call request, identification, and location of the potential passenger.

The service system 101 is configured to receive and record the first information and the second information sent from the taxi information application terminal 102 and the potential passenger information application terminal 103, and to determine corresponding time information. The service system 101 is further configured to count empty-driving taxis and potential passengers within a specified time period and at a specified location, according to the time information and the location information. The service system 101 is further configured to analyze numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message, and to send the notification message to the taxi information application terminal and the potential passenger information application terminal.

The service system 101 is on a side of the network, and may include an information receiving module 111, an information storing module 112, an information analyzing module 113 and an information notifying module 114.

The information receiving module 111 is configured to receive information reported from a taxi terminal (i.e., the taxi information application terminal 102), which information may comprise an identification, a location, and empty-driving

information of the taxi, to determine corresponding time information, and to store the identification, location, and empty-driving information of the taxi and the corresponding time information in the information storing module 112. The information receiving module 111 is also configured to receive information reported
5 from a potential passenger terminal (i.e., the potential passenger information application terminal 103), which information may comprise a call request, an identification, and a location of the potential passenger, to determine corresponding time information, and to store the call request, identification, location of the potential passenger and the corresponding time information in the information storing module
10 112.

The corresponding time information may be determined for example in the following way: if the reported information includes corresponding time information, this time information may be used directly; if the reported information does not include the corresponding time information, then when the reported information is
15 received, the current time is inquired and used as the time corresponding to the reported information.

The taxi information application terminal 102 may be further configured to obtain driving direction information of the taxi and to report to the service system 101 by a taxi information reporting module. The potential passenger information
20 application terminal 103 may be further configured to obtain information about the potential passenger's destination and to report to the service system 101 by a potential passenger information reporting module. The information receiving module 111 may also receive and record the driving direction information from the taxi terminal and record the corresponding time information, and receive and record the destination
25 information from the potential passenger terminal and record the corresponding time information.

The information analyzing module 113 is configured to count empty-driving taxis and potential passengers at the specified time and at the specified locations according to the time information and location information, and to analyze numbers of
30 the counted empty-driving taxis and potential passengers to generate a corresponding notification message

The information notifying module 114 is configured to send the corresponding notification message to the taxi information application terminal 102 and the potential passenger information application terminal 103.

In an embodiment, the information analyzing module 113 may include:

a partitioning unit configured to partition an electronic map into regions;

5 a first calculating unit configured to calculate, for a specified region x , a sum total ($car_count(x)$) of the empty-driving taxis whose location information falls within the region, within a specified time period; and

a second calculating unit configured to calculate, for the specified region x , a sum total ($pe_count(x)$) of the potential passengers whose location information falls within the region, within the specified time period.

10 In a further embodiment, the information analyzing module 113 further includes a first notification generating unit configured to: calculate a ratio of $car_count(x)$ to $pe_count(x)$ for the specified region x ; generate a notification message indicating that the empty-driving taxis located in the specified region x is surplus if the ratio is larger than a specified ratio, and a notification message indicating that the empty-driving taxis located in the specified region x is not enough if the ratio is smaller than the
15 specified ratio.

In an embodiment, the specified time may be a specified time period in a day, and the information analyzing module 113 may include:

20 a third calculating unit configured to calculate, for the specified region x , a mean value ($h_car(x)$) of the empty-driving taxis within the same specified time period in the same day of week; and

a fourth calculating unit configured to calculate, for the specified region x , a mean value ($h_pe(x)$) of the potential passengers within the same specified time period in the same day of week.

25 The information analyzing module 113 may further include a second notification generating unit configured to: determine, for the specified region, the current day of week and a forthcoming specified time period according to current time; subtract the mean value ($h_pe(x)$) of the potential passengers from the mean value ($h_car(x)$) of the empty-driving taxis to obtain a difference value (sur_plus) within the same specified time period in the same day of week as the current day of week; and
30 generate a notification message indicating that there will be sur_plus empty-driving taxis in the specified region if $sur_plus > 0$, and a notification message indicating that there will be sur_plus potential passengers in the specified region if $sur_plus < 0$.

The information analyzing module 113 may further include a third notification generating unit configured to: determine, for the specified region, the current day of

week and a forthcoming specified time period according to current time; compare the mean value ($h_{car}(x)$) of the empty-driving taxis against the mean value ($h_{pe}(x)$) of the potential passengers within the same specified time period in the same day of week as the current day of week; and generate a notification message indicating that there will be a bottom of need for taxis in the specified region if $h_{car}(x)$ reaches a specified multiple of $h_{pe}(x)$ or if $h_{car}(x)$ is larger than a specified threshold, and a notification message indicating that there will be a peak of need for taxis in the specified region if $h_{pe}(x)$ reaches a specified multiple of $h_{car}(x)$ or if $h_{pe}(x)$ is larger than a specified threshold.

10 In another embodiment, the specified time is a specified time period in a day, and the information analyzing module may include:

a fifth calculating unit configured to calculate, for a specified location y , a mean value ($w_{car}(y)$) of the empty-driving taxis, within the same specified time period in the same day of week;

15 a sixth calculating unit configured to calculate, for the specified location y , a mean value ($w_{pe}(y)$) of the potential passengers, within the same specified time period in the same day of week; and

a fourth notification generating unit configured to generate, for the specified location y , a notification message indicating that there will be a large number of potential passengers at the specified location y if $w_{pe}(y)$ is larger than a specified threshold, and a notification message indicating that there will be a large number of empty-driving taxis at the specified location y if $w_{car}(y)$ is larger than a specified threshold.

In another embodiment, the information receiving module 111 is further configured to: receive driving direction information reported from a taxi terminal, determine corresponding time information, and store the driving direction information and the corresponding time information in the information storing module. The information receiving module 111 is further configured to: receive information about a destination reported from a potential passenger terminal, determine corresponding time information, and store the destination information and the corresponding time information in the information storing module.

25 In the embodiment, the specified time may be a specified time period in a day, and the information receiving module 111 may further include:

a seventh calculating unit configured to calculate, for a specified location y , a

mean value ($h_{pe}(pq)$) of the potential passengers to travel from a specified initial location p to a final location q , within the same specified time period in the same day of week; and

5 a fifth notification generating unit configured to generate, for the specified time period, a notification message indicating that there will be a large number of potential passengers to travel from the specified initial location p to the final location q within the specified time period if $h_{pe}(pq)$ is larger than a specified threshold.

As shown in Fig. 1, the taxi information application terminal 102 may include:

10 a taxi identifying module 121 configured to obtain an identification of the taxi and transmit the obtained identification to a taxi information reporting module 124;

a taxi locating module 122 configured to obtain a location of the taxi, such as a location on an electronic map, and transmit the obtained location to the taxi information reporting module 124;

15 an empty-driving module 123 configured to monitor whether the taxi is empty-driving or not, and to transmit the empty-driving information to the taxi information reporting module 124 if the taxi is empty-driving;

the taxi information reporting module 124 configured to report the identification, location and empty-driving information of the taxi to the service system 101; and

20 a taxi information receiving module 125 configured to receive a notification message from the service system 101 to the taxi information application terminal, and output the notification message. The output may be carried out in the form of image, text, audio, video and so on.

The taxi information application terminal 102 may further include a driving direction module configured to obtain driving direction information of the taxi, and to
25 transmit the driving direction information to the taxi information reporting module. The taxi information reporting module in turn reports the driving direction information to the service system.

The taxi information application terminal 102 may communicate with the service system 101 via Internet, mobile Internet, short messages and other communication
30 manners.

As shown in Fig. 1, the potential passenger information application terminal 103 may include the following modules:

a potential passenger identifying module 131 configured to obtain an identification of the potential passenger and transmit the obtained identification to a

potential passenger information reporting module 133;

a potential passenger locating module 132 configured to obtain a location of the potential passenger, such as a location on an electronic map, and transmit the obtained location to the potential passenger information reporting module 133;

5 the potential passenger information reporting module 133 configured to report the identification and location of the potential passenger to the service system 101; and

10 a potential passenger information receiving module 134 configured to receive a notification message from the service system 101 to the potential passenger information application terminal, and output the notification message. The output may be carried out in the form of image, text, audio, video and so on.

The potential passenger information application terminal 103 may also include a module for reporting further information (e.g. destination information) of the potential passenger. For example, the potential passenger information application terminal 103
15 may further include a destination module configured to obtain destination information of the potential passenger and to transmit the destination information to the potential passenger information reporting module. The potential passenger information reporting module in turn reports the destination information to the service system.

20 The potential passenger information application terminal 103 may communicate with the service system 101 via Internet, mobile Internet, short messages and other communication manners.

The taxi information application terminal 102 and the potential passenger information application terminal 103 described herein may be implemented as applications installed on smart terminals. In the application, the smart terminals can
25 be those with data computing and processing functions, including but not limited to: smart phones, palmtop computers, tablets, smart TVs, onboard GPS systems and other onboard smart devices, etc. These smart terminals are installed with operating systems, including but not limited to: Android, Symbian, Windows mobile, iPhone OS and so on. These smart terminals usually have Location Based Service (LBS) service systems
30 installed, and the locating module described herein may carry out locating by these LBS service systems.

Though the foregoing description illustrates some types of smart terminals and operating systems, those skilled in the art may realize that embodiments of the application may also be applied to any other types of smart terminals and operating

systems, and is not limited to the listed types.

A location-based taxi information communication service method is also provided corresponding to the above system and terminals. Fig. 2 is a flow diagram showing the location-based taxi information communication service method according to an embodiment of the disclosure. Referring to Fig. 2, the method may include steps 201-204:

In step 201, information reported from a taxi terminal (e.g., the taxi information application terminal 102) is received and recorded, wherein the information may include an identification, a location, and empty-driving information of the taxi, and corresponding time information is recorded.

In step 202, information reported from a potential passenger terminal (e.g., the potential passenger information application terminal 103) is received and recorded, wherein the information may comprise a call request, an identification, and a location of the potential passenger, and corresponding time information is recorded.

The above step 201 and step 202 are not necessarily carried out in order.

In step 203, empty-driving taxis and potential passengers at the specified time and at the specified locations are counted according to the time information and location information, and numbers of the counted empty-driving taxis and potential passengers are analyzed to generate a corresponding notification message.

In step 204, the notification message is sent to the corresponding taxi terminal and potential passenger terminal.

Step 203 corresponds to and may be performed by the information analyzing module.

In an embodiment, step 203, in which empty-driving taxis and potential passengers at the specified time and at the specified locations are counted according to the time information and location information, may include the following steps:

A1. partitioning an electronic map into regions;

A2. for a specified region x (which may be a particularly specified region or each of the regions), calculating a sum total of the empty-driving taxis whose location information falls within the region, within a specified time period (for example, recent 1 hour), according to the following equation:

$$\text{car_count}(x) = \sum_{i=0}^m C_i \quad (1)$$

where m is the number of locations in the region x and C_i is the number of

empty-driving taxis at the i -th location;

A3. for the specified region x , calculating a sum total of the potential passengers whose location information falls within the region, within a specified time period (for example, recent 1 hour), according to the following equation:

$$pe_count(x) = \sum_{i=0}^m PE_i \quad (2)$$

Where m is the number of locations in the region x and PE_i is the number of potential passengers at the i -th location.

Step 203 in which the numbers of the counted empty-driving taxis and potential passengers are analyzed to generate a corresponding notification message may include:
 10 for a specified region x (which may be a particularly specified region or each of the regions), calculating a ratio of $car_count(x)$ to $pe_count(x)$; generating a notification message indicating that the empty-driving taxis located in the specified region x is surplus if the ratio is larger than a specified ratio (for example, usually is 1), and a notification message indicating that the empty-driving taxis located in the specified
 15 region x is not enough, if the ratio is smaller than the specified ratio.

Step 204 in which the notification message is sent to the corresponding taxi terminal and potential passenger terminal may include sending the notification message indicating that the empty-driving taxis located in the specified region x are surplus or the notification message indicating that the empty-driving taxis located in
 20 the specified region x are not enough to the taxi terminals and potential passenger terminals in the specified region. In this way, the taxi drivers may be aware in which regions empty-driving taxis are surplus and in which regions empty-driving taxis are not enough within a recent specified time period according to the notification message, and they can drive to the regions not having enough empty taxis to increase the
 25 chance of carrying a passenger, and decrease the operating costs due to empty driving. At the same time, more empty taxis can be provided in these regions and thus the chance for potential passengers to take a taxi can be increased so that they do not need to waiting too long. Meanwhile, the potential passengers may be aware in which region empty-driving taxis are surplus and in which region empty-driving taxis are not
 30 enough according to the notification message, so that they can more reasonably arrange their travel or move to the regions having surplus empty-driving taxis.

In the calculation of steps A2 and A3, the specified time may be a specified time period in a day, such as 10:00 to 11:00, 11:00 to 12:00 of Monday, and the like. Based

on the result of calculation, the step of counting empty-driving taxis and potential passengers at the specified time and at the specified locations according to the time information and location information may include following steps A4 and/or A5.

A4. for a specified region x , calculating a mean value of the empty-driving taxis, within the same specified time period in the same day of week, according to the following equation:

$$h_car(x) = \frac{\sum_{i=1}^n car_count(x)_{7*i}}{n} \quad (3)$$

Where n is the number of the counted cycles. For example, if the specified time period is 10:00 to 11:00 of Monday, then the same specified time period in the same day of week refers to 10:00 to 11:00 of each Monday for the recent n weeks. The $h_car(x)$ is calculated for predicting the number of empty-driving taxis in the same region and during 10:00 to 11:00 on Monday according to historical statistics information, so as to generate corresponding notification messages and average taxis more evenly. In the embodiment, one week or 7 days is usually taken as a cycle. $7*i$ in Equation (3) means that the historical data are not obtained in a continuous way, but 7, 14 and 21 ... separately as the value of i changes from 1 to n . In other words, the data are obtained within the same time period in the same day of week as the current time; for example, if the current time to count is 10:00 to 11:00 of Monday, then the obtained data are data of 10:00 to 11:00 on the last Monday, data of 10:00 to 11:00 on the Monday before last, and so on.

A5. for the specified region x , calculating a mean value of the potential passengers, within the same specified time period in the same day of week, according to the following equation:

$$h_pe(x) = \frac{\sum_{i=1}^n pe_count(x)_{7*i}}{n} \quad (4)$$

Where n is the number of the counted cycles. For example, if the specified time period is 10:00 to 11:00 of Monday, then the same specified time period in the same day of week refers to 10:00 to 11:00 of each Monday for the recent n weeks. The $h_pe(x)$ is calculated for predicting the number of potential passengers in the same region and during 10:00 to 11:00 on Monday according to historical statistics information, so as to generate corresponding notification messages and average taxis more evenly. In the

embodiment, one week or 7 days is usually taken as a cycle. $7*i$ in Equation (4) means that the historical data are not obtained in a continuous way, but 7, 14 and 21 ... separately as the value of i changes from 1 to n . In other words, the data are obtained within the same time period in the same day of week as the current time; for example, if the current time to count is 10:00 to 11:00 of Monday, then the obtained data are data of 10:00 to 11:00 on the last Monday, data of 10:00 to 11:00 on the Monday before last, and so on.

Based on the calculated results in steps A4 and A5, step 203 in which numbers of the counted empty-driving taxis and potential passengers are analyzed to generate a corresponding notification message may include: for a specified region x (which may be a particularly specified region or each of the regions), determining the current day of week and a forthcoming specified time period according to the current time; subtracting the mean value ($h_{pe}(x)$) of the potential passengers from the mean value ($h_{car}(x)$) of the empty-driving taxis to obtain a difference value (sur_plus) within the same specified time period in the same day of week as the current day of week; and generating a notification message indicating that there will be sur_plus empty-driving taxis in the specified region if $sur_plus > 0$, and a notification message indicating that there will be sur_plus potential passengers in the specified region if $sur_plus < 0$.

The two notification messages are two prediction messages for the forthcoming time period. For example, if the current time is 9:50 of a Monday, the forthcoming time period will be 10:00 to 11:00 of Monday. Therefore, the forthcoming numbers of empty-driving taxis and potential passengers may be predicted by the two notification messages.

Step 204 in which the notification message is sent to the corresponding taxi terminal or potential passenger terminal may include sending the notification message indicating that there will be sur_plus empty-driving taxis in the specified region or the notification message indicating that there will be sur_plus potential passengers in the specified region to the taxi terminals and/or potential passenger terminals in the specified region. In this way, the taxi drivers may be aware that there will be sur_plus potential passengers waiting for taxis in the specified region and within the next recent time period according to the notification message, and they can drive to the region, so as to increase the chance of carrying a passenger, and decrease the operating costs due to empty driving. At the same time, more empty taxis can be provided in these regions and thus the chance for potential passengers to take a taxi

can be increased so that they do not need to waiting too long. Meanwhile, the potential passengers may be aware that there will be sur_plus empty taxis in the specified region according to the notification message, so that they can more reasonably arrange their travel or move to the regions having surplus empty-driving taxis.

In another embodiment, based on the calculated results in steps A4 and A5, step 203 in which the numbers of the counted empty-driving taxis and potential passengers are analyzed to generate a corresponding notification message may include: for a specified region x (which may be a particularly specified region or each of the regions), determining the current day of week and a forthcoming specified time period according to current time; comparing the mean value ($h_car(x)$) of the empty-driving taxis against the mean value ($h_pe(x)$) of the potential passengers within the same specified time period in the same day of week as the current day of week; and generating a notification message indicating that there will be a bottom of need for taxis in the specified region if $h_car(x)$ reaches a specified multiple (for example, twice) of $h_pe(x)$ or if $h_car(x)$ is larger than a specified threshold, and a notification message indicating that there will be a peak of need for taxis in the specified region if $h_pe(x)$ reaches a specified multiple (for example, twice) of $h_car(x)$ or $h_pe(x)$ is larger than a specified threshold.

Step 204 in which the notification message is sent to the corresponding taxi terminal and potential passenger terminal may include sending the notification message indicating that there will be a bottom of need for taxis in the specified region or the notification message indicating that there will be a peak of need for taxis in the specified region to the taxi terminals and/or potential passenger terminals in the specified region. In this way, the taxi drivers may be aware in which regions the bottom of need for taxis will appear and the peak of need for taxis will appear according to the notification message, and they can drive to the regions where the peak of need for taxis will appear, so as to increase the chance of carrying a passenger, and decrease operating costs due to empty driving. At the same time, more empty taxis can be provided in these regions and thus the chance for potential passengers to take a taxi can be increased so that they do not need to waiting too long. Meanwhile, the potential passengers may be aware in which region empty-driving taxis are surplus and in which region empty-driving taxis are not enough according to the notification message, so that they can more reasonably arrange their travel or move to the regions

having surplus empty-driving taxis. The taxis are averaged more evenly and a waste of resources is avoided.

In another embodiment, the specified time is a specified time period in a day. Step 203 in which empty-driving taxis and potential passengers at the specified time and at the specified locations are counted according to the time information and location information may include the following steps B1 and/or B2.

B1. for a specified location y (i.e., a site, which may be a particularly specified site or each of the sites) calculating a mean value of the empty-driving taxis, within the same specified time period in the same day of week, according to the following equation:

$$w_car(y) = \frac{\sum_{i=1}^n w_car_count(y)_{7*i}}{n} \quad (5)$$

Where $w_car_count(y)$ is the number of empty-driving taxis at the specified location y and within the same time period in the specified date, and n is the number of the counted cycles. For example, if the specified time period is 10:00 to 11:00 of Monday, then the same specified time period in the same day of week refers to 10:00 to 11:00 of each Monday for the recent n weeks. The $w_car(y)$ is calculated for predicting the number of empty-driving taxis at the same location (i.e., site) y and during 10:00 to 11:00 on Monday according to historical statistics information, so as to generate corresponding notification messages and average taxis more evenly. In the embodiment, one week of 7 days is usually taken as a cycle. $7*i$ in Equation (5) means the historical data are not obtained in a continuous way, but 7, 14 and 21 ... separately as the value of i changes from 1 to n . In other words, the data are obtained within the same time period in the same day of week as the current time, for example, if the current time is 10:00 to 11:00 on Monday, then the obtained data are data of 10:00 to 11:00 on the last Monday, data of 10:00 to 11:00 on the Monday before last, and so on.

B2. for the specified location y , calculating a mean value ($w_pe(y)$) of the potential passengers, within the same specified time period in the same day of week, according to the following equation:

$$w_pe(y) = \frac{\sum_{i=1}^n w_pe_count(y)_{7*i}}{n} \quad (6)$$

Where $w_pe_count(y)$ is the number of potential passengers at the specified location y and within the same time period in the specified date, and n is the number of the counted cycles. For example, if the specified time period is 10:00 to 11:00 of Monday, then the same specified time period in the same day of week refers to 10:00 to 11:00 of each Monday for the recent n weeks. The $w_pe(y)$ is calculated for predicting the number of potential passengers at the same location y and during 10:00 to 11:00 on Monday according to historical statistics information, so as to generate corresponding notification messages and average taxis more evenly.

Based on the calculated results in steps B1 and B2, step 203 in which numbers of the counted empty-driving taxis and potential passengers are analyzed to generate a corresponding notification message may include: for the specified location y , generating a notification message indicating that there will be a large number of potential passengers at the location y if the $w_pe(y)$ is larger than a specified threshold, and a notification message indicating that there will be a large number of empty-driving taxis at the specified location y if the $w_car(y)$ is larger than a specified threshold.

Step 204 in which the notification message is sent to the corresponding taxi terminal and potential passenger terminal may include: sending the notification message indicating that there will be a large number of potential passengers at the specified location y to the taxi terminals and sending the notification message indicating that there will be a large number of empty-driving taxis at the specified location y to the potential passenger terminals. In this way, the taxi drivers may be aware in which locations a large number of potential passengers will appear, and they can drive to these locations so as to solve the difficulty for calling a taxi at these locations. Meanwhile, the potential passengers may be aware at which locations a large number of empty-driving taxis will appear, so that they can reasonably arrange their travel and increase the chance of calling a taxi. The taxis thus can be averaged more evenly.

In another embodiment, in Step 201, the information receiving module 111 may receive and record driving direction information reported from a taxi terminal, and record corresponding time information. In Step 202, the information receiving module 111 may receive and record information about a destination reported from a potential passenger terminal, and record corresponding time information. The specified time is a specified time period in a day. Step 203 in which empty-driving taxis and potential

passengers at the specified time and at the specified locations are counted according to the time information and location information may include:

C1. calculating a mean value of the potential passengers to travel from a specified initial location p to a final location q, within the same specified time period

5 in the same day of week, according to the equation
$$h_pe(pq) = \frac{\sum_{i=1}^n pe_count(pq)_{7^*i}}{n},$$

where $pe_count(pq)$ is the number of potential passengers to travel from the specified initial location p to the final location q within the same specified time period in a particular day. For example, if the specified time period is 10:00 to 11:00 of Monday, then the same specified time period in the same day of week refers to 10:00
10 to 11:00 of each Monday for the recent n weeks. The $h_pe(pq)$ is calculated for predicting the number of potential passengers to travel from the location p to the location q during 10:00 to 11:00 on Monday according to historical statistics information, so as to generate the corresponding notification message and average taxis more evenly.

15 Based on the calculated results in step C1, step 203 in which numbers of the counted empty-driving taxis and potential passengers are analyzed to generate a corresponding notification message may include generating a notification message indicating that there will be a large number of potential passengers to travel from the specified initial location p to the final location q within the specified time period if the
20 $h_pe(pq)$ is larger than a specified threshold.

Step 204 in which the notification message is sent to the corresponding taxi terminal and potential passenger terminal may include sending to the taxi terminals the notification message indicating that there will be a large number of potential passengers to travel from the specified initial location p to the final location q within
25 the specified time period if the $h_pe(pq)$ is larger than a specified threshold. In this way, the taxi drivers may be aware of an estimated number of potential passengers who will travel from a location to another within a certain time period, so that they can adjust their route to decrease empty-driving ratio.

In order to show the notification messages, the taxi information application
30 terminal and potential passenger information application terminal may show the number of empty-driving taxis and the number of potential passengers in respective regions in various forms, including but not limited to maps, text and the like. In an embodiment of the application, map is used for presentation. The ratio of the number

of empty-driving cars to the number of potential passengers may be identified by quantity or different colors, such as, red, yellow, blue and the like.

Embodiments of the disclosure enable a macroscopic and balanced dispatch of taxis in a city scale, and the needs for taxis within respective time periods and respective regions can be predicted according to historical data, so as to provide a maximum balance between the difficulty for calling a taxi and the empty-driving issue. Moreover, as the prior applications for calling a taxi are point-to-point applications, only those who have smart terminals with the corresponding applications can benefit. By means of balanced dispatch, embodiments of the disclosure dispatch taxis and potential passengers across the whole city according to historical data, so that supply and demand balance between the taxis and the potential drivers is relatively high and those who have no smart terminals or are not able to use the smart terminals (for example, the aged) can also benefit.

Fig. 3 illustrates an exemplary communication service system 300 which can implement embodiments of the disclosure. The communication service system 300 includes at least one server 301 and one or more clients 303 or 304 communicate with the at least one server 301 over a communication network 302. The communication service system 300 may include, but not limited to, one or more processors and one or more memories or storage devices, such as, RAM, ROM, Flash memory or any other suitable storage devices. The clients 303 or 304 may be any devices that communicate with the server over network, such as, a smart phone, a locator, a tablet, a laptop, a desktop computer and so on. The communication network 302 may be any type of network, e.g., any combination of Internet, intranet, local area network (LAN), wide area network (WAN), wired network, wireless network, etc. The clients 303 or 304 may send information to or receive information from the server 301 over the communication network 302. The server 301 may receive information from the clients, store, analyze, and process the received information, and in turn send a response to the clients. Though only two clients and one server are shown in Fig. 3, those skilled in the art will appreciate that any number of clients and servers may be included in the communication service system 300.

The embodiments of the disclosure can be implemented by data processing programs performed by a data processing device, such as, a computer. Further, the data processing programs, usually stored on non-transitory storage media, may be performed by being directly read from the storage media or installed on or copied to a

storage device (such as, a hard disk or a memory) of the data processing device. Therefore, such storage media also form a part of the application. The storage media may use any recording modes, for example, paper storage media (such as paper tape, etc.), magnetic storage media (such as, floppy disks, hard disks, flash memory, etc.),
5 optical storage media (such as, CD-ROMs, etc.), magneto-optical storage media (such as, MO, etc.).

Therefore, a storage medium is also provided on which data processing programs are stored. The data processing programs are configured to perform any embodiments of the above method of the application.

10 The above embodiments only show examples of the disclosure, and should not be interpreted as limiting the application. It should be noted that any modifications, alternations or improvements falling within the spirit and principle of the invention as claimed should be covered by the protection scope of the application.

What is claimed is:

1. A location-based taxi information communication service system, comprising:
an information receiving module configured to receive an identification, a location, and empty-driving information of a taxi reported from a taxi terminal, and determine corresponding time information, the information receiving module being further configured to receive a call request, an identification, and a location of a potential passenger reported from a potential passenger terminal, and determine corresponding time information;

an information storing module configured to store the identification, location, empty-driving information and time information of the taxi, and to store the call request, identification, location and time information of the potential passenger;

an information analyzing module configured to count empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the location information, and to analyze numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message; and

an information notifying module configured to send the notification message to the taxi terminal and the potential passenger terminal.

2. The system according to claim 1, wherein the information analyzing module comprises:

a partitioning unit configured to partition an electronic map into regions;

a first calculating unit configured to calculate, for a specified region x , a sum total ($car_count(x)$) of the empty-driving taxis whose location information falls within the region x , within a specified time period;

a second calculating unit configured to calculate, for the specified region x , a sum total ($pe_count(x)$) of the potential passengers whose location information falls within the region x , within the specified time period.

3. The system according to claim 2, wherein the information analyzing module further comprises:

a first notification generating unit configured to calculate a ratio of $car_count(x)$ to $pe_count(x)$ for the specified region x , and to generate a notification message

indicating that the empty-driving taxis located in the specified region x is surplus if the ratio is larger than a specified ratio, and a notification message indicating that the empty-driving taxis located in the specified region x is not enough if the ratio is smaller than the specified ratio.

4. The system according to claim 2, wherein:

the specified time is a specified time period in a day; and

the information analyzing module further comprises:

a third calculating unit configured to calculate, for the specified region x , a mean value ($h_{car}(x)$) of the empty-driving taxis, within the same specified time period in the same day of week;

a fourth calculating unit configured to calculate, for the specified region x , a mean value ($h_{pe}(x)$) of the potential passengers, within the same specified time period in the same day of week.

5. The system according to claim 4, wherein the information analyzing module further comprises:

a second notification generating unit configured to determine for the specified region the current day of week and a forthcoming specified time period according to current time, to obtain a difference value (sur_plus) by subtracting the mean value ($h_{pe}(x)$) of the potential passengers from the mean value ($h_{car}(x)$) of the empty-driving taxis within the same specified time period in the same day of week as the current day of week, and to generate a notification message indicating that there will be sur_plus empty-driving taxis in the specified region if $sur_plus > 0$ and a notification message indicating that there will be sur_plus potential passengers in the specified region if $sur_plus < 0$.

6. The system according to claim 4, wherein the information analyzing module further comprises:

a third notification generating unit configured to determine for the specified region the current day of week and a forthcoming specified time period according to current time, to compare the mean value ($h_{car}(x)$) of the empty-driving taxis against the mean value ($h_{pe}(x)$) of the potential passengers within the same specified time period in the same day of week as the current day of week, and to generate a

notification message indicating that there will be a bottom of need for taxis in the specified region if $h_car(x)$ reaches a specified multiple of $h_pe(x)$ or $h_car(x)$ is larger than a specified threshold, and a notification message indicating that there will be a peak of need for taxis in the specified region if $h_pe(x)$ reaches a specified multiple of $h_car(x)$ or $h_pe(x)$ is larger than a specified threshold.

7. The system according to claim 1, wherein:

the specified time is a specified time period in a day; and

the information analyzing module further comprises:

a fifth calculating unit configured to calculate, for a specified location y , a mean value ($w_car(y)$) of the empty-driving taxis, within the same specified time period in the same day of week;

a sixth calculating unit configured to calculate, for the specified location y , a mean value ($w_pe(y)$) of the potential passengers, within the same specified time period in the same day of week; and

a fourth notification generating unit configured to generate, for the specified location y , a notification message indicating that there will be a large number of potential passengers at the specified location y if $w_pe(y)$ is larger than a specified threshold, and a notification message indicating that there will be a large number of empty-driving taxis at the specified location y if $w_car(y)$ is larger than a specified threshold.

8. The system according to claim 1, wherein:

the information receiving module is further configured to receive driving direction information reported from the taxi terminal, determine corresponding time information, and store the driving direction information and the time information in the information storing module, and to receive destination information reported from the potential passenger terminal, determine corresponding time information, and store the destination information and the time information in the information storing module;

the specified time is a specified time period in a day; and

the information analyzing module further comprises:

a seventh calculating unit configured to calculate, for a specified location y , a mean value ($h_pe(pq)$) of the potential passengers to travel from a specified initial

location p to a final location q, within the same specified time period in the same day of week; and

a fifth notification generating unit configured to generate, for the specified time period, a notification message indicating that there will be a large number of potential passengers to travel from the specified initial location p to the final location q within the specified time period if $h_{pe}(pq)$ is larger than a specified threshold.

9. A location-based taxi information application terminal, comprising:

a taxi identifying module configured to obtain an identification of the taxi and to transmit the identification of the taxi to a taxi information reporting module;

a taxi locating module configured to obtain a location of the taxi, and to transmit the location of the taxi to the taxi information reporting module;

an empty-driving module configured to monitor whether the taxi is empty-driving or not, and to transmit empty-driving information to the taxi information reporting module if the taxi is empty-driving;

the taxi information reporting module configured to report the identification, the location and the empty-driving information of the taxi to a service system; and

a taxi information receiving module configured to receive a notification message from the service system and to output the notification message.

10. The terminal according to claim 9, further comprises:

a driving direction module configured to obtain driving direction information of the taxi and to transmit the driving direction information to the taxi information reporting module for reporting to the service system.

11. A location-based potential passenger information application terminal, comprising:

a potential passenger identifying module configured to obtain an identification of the potential passenger and to transmit the identification to a potential passenger information reporting module;

a potential passenger locating module configured to obtain a location of the potential passenger and to transmit the location to the potential passenger information reporting module;

the potential passenger information reporting module configured to report the

identification and the location of the potential passenger to a service system; and

a potential passenger information receiving module configured to receive a notification message from the service system and to output the notification message.

12. The terminal according to claim 11, further comprises:

a destination module configured to obtain destination information of the potential passenger, and to transmit the destination information to the potential passenger information reporting module for reporting to the service system.

13. A location-based taxi information communication system comprising a service system, a taxi information application terminal and a potential passenger information application terminal,

wherein the taxi information application terminal is configured to report first information to the service system, receive a notification message from the server system and output the notification message, the first information comprising an identification, a location, and empty-driving information of the taxi;

wherein the potential passenger information application terminal is configured to report second information to the service system, receive a notification message from the server system and output the notification message, the second information comprising a call request, an identification, and a location of the potential passenger; and

wherein the service system is configured to

receive and record the first information and the second information from the taxi information application terminal and the potential passenger information application terminal, and determine corresponding time information;

count empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the location information;

analyze numbers of the counted empty-driving taxis and potential passengers to generate a corresponding notification message; and

send the notification message to the taxi information application terminal and the potential passenger information application terminal.

14. The system according to claim 13, wherein:

the taxi information application terminal is further configured to obtain driving

direction information of the taxi, and to report the driving direction information to the service system; and

the potential passenger information application terminal is further configured to obtain destination information of the potential passenger, and to report the destination information to the service system.

15. A location-based taxi information communication service method, comprising:

a taxi information recording step of receiving and recording an identification, a location and empty-driving information of a taxi reported from a taxi terminal, and recording corresponding time information;

a potential passenger information recording step of receiving and recording a call request, an identification and a location of a potential passenger from a potential passenger terminal, and recording corresponding time information;

a counting step of counting empty-driving taxis and potential passengers at specified time and at a specified location according to the time information and the location information;

a notification message generating step of generating a corresponding notification message by analyzing numbers of the counted empty-driving taxis and potential passengers; and

a sending step of sending the notification message to the taxi terminal and the potential passenger terminal.

16. The method according to claim 15, wherein the counting step further comprises:

partitioning an electronic map into regions;

calculating, for a specified region x , a sum total ($car_count(x)$) of the empty-driving taxis whose location information falls within the region x , within a specified time period; and

calculating, for the specified region x , a sum total ($pe_count(x)$) of the potential passengers whose location information falls within the region x , within the specified time period.

17. The method according to claim 16, wherein the notification message

generating step further comprises: calculating a ratio of $car_count(x)$ to $pe_count(x)$ for the specified region x to generate a notification message indicating that the empty-driving taxis located in the specified region x is surplus if the ratio is larger than a specified ratio, and a notification message indicating that the empty-driving taxis located in the specified region x is not enough if the ratio is smaller than the specified ratio; and

the sending step further comprises: sending the notification message indicating that the empty-driving taxis located in the specified region x is surplus or the notification message indicating that the empty-driving taxis located in the specified region x is not enough to the taxi terminal and/or the potential passenger terminal in the specified region.

18. The method according to claim 16, wherein:

the specified time is a specified time period in a day; and

the counting step further comprises:

calculating, for the specified region x , a mean value ($h_car(x)$) of the empty-driving taxis, within the same specified time period in the same day of week; and

calculating, for the specified region x , a mean value ($h_pe(x)$) of the potential passengers, within the same specified time period in the same day of week.

19. The method according to claim 18, wherein the notification message generating step further comprises: determining for the specified region the current day of week and a forthcoming specified time period according to current time, obtaining a difference value (sur_plus) by subtracting the mean value ($h_pe(x)$) of the potential passengers from the mean value ($h_car(x)$) of the empty-driving taxis within the same specified time period in the same day of week as the current day of week, and generating a notification message indicating that there will be sur_plus empty-driving taxis in the specified region if $sur_plus > 0$, and a notification message indicating that there will be sur_plus potential passengers in the specified region if $sur_plus < 0$; and

the sending step further comprises: sending the notification message indicating that there will be sur_plus empty-driving taxis in the specified region or the notification message indicating that there will be sur_plus potential passengers in the specified region to the taxi terminal and/or the potential passenger terminal in the

specified region.

20. The method according to claim 18,

wherein the notification message generating step further comprises:

determining for the specified region the current day of week and a forthcoming specified time period according to current time;

comparing the mean value ($h_{car}(x)$) of the empty-driving taxis against the mean value ($h_{pe}(x)$) of the potential passengers within the same specified time period in the same day of week as the current day of week; and

generating a notification message indicating that there will be a bottom of need for taxis in the specified region if $h_{car}(x)$ reaches a specified multiple of $h_{pe}(x)$ or $h_{car}(x)$ is larger than a specified threshold, and a notification message indicating that there will be a peak of need for taxis in the specified region if $h_{pe}(x)$ reaches a specified multiple of $h_{car}(x)$ or $h_{pe}(x)$ is larger than a specified threshold, and

wherein the sending step further comprises:

sending the notification message indicating that there will be a bottom of need for taxis in the specified region or the notification message indicating that there will be a peak of need for taxis in the specified region to the taxi terminal and/or the potential passenger terminal in the specified region.

21. The method according to claim 15, wherein the specified time is a specified time period in a day, and wherein the counting step further comprises:

calculating, for a specified location y , a mean value ($w_{car}(y)$) of the empty-driving taxis, within the same specified time period in the same day of week; and

calculating, for the specified location y , a mean value ($w_{pe}(y)$) of the potential passengers, within the same specified time period in the same day of week.

22. The method according to claim 21, wherein the notification message generating step further comprises generating, for the specified location y , a notification message indicating that there will be a large number of potential passengers at the specified location y if the $w_{pe}(y)$ is larger than a specified threshold, and a notification message indicating that there will be a large number of empty-driving taxis at the specified location y if the $w_{car}(y)$ is larger than a specified

threshold; and

the sending step further comprises sending the notification message indicating that there will be a large number of potential passengers at the specified location y to the taxi terminal, or sending the notification message indicating that there will be a large number of empty-driving taxis at the specified location y to the potential passenger terminal.

23. The method according to claim 15, further comprising:

receiving and recording, at the information receiving module, driving direction information of the taxi reported from the taxi terminal, and recording corresponding time information; and

receiving and recording, at the information receiving module, destination information of the potential passenger reported from the potential passenger terminal, and recording corresponding time information;

wherein the specified time is a specified time period in a day; and

the counting step further comprises calculating a mean value ($h_{pe}(pq)$) of the potential passengers to travel from a specified initial location p to a final location q , within the same specified time period in the same day of week.

24. The method according to claim 23, wherein the notification message generating step further comprises generating, for the specified time period, a notification message indicating that there will be a large number of potential passengers to travel from the specified initial location p to the final location q within the specified time period if $h_{pe}(pq)$ is larger than a specified threshold; and

the sending step further comprises sending to the taxi terminal the notification message indicating that there will be a large number of potential passengers to travel from the specified initial location p to the final location q within the specified time period.

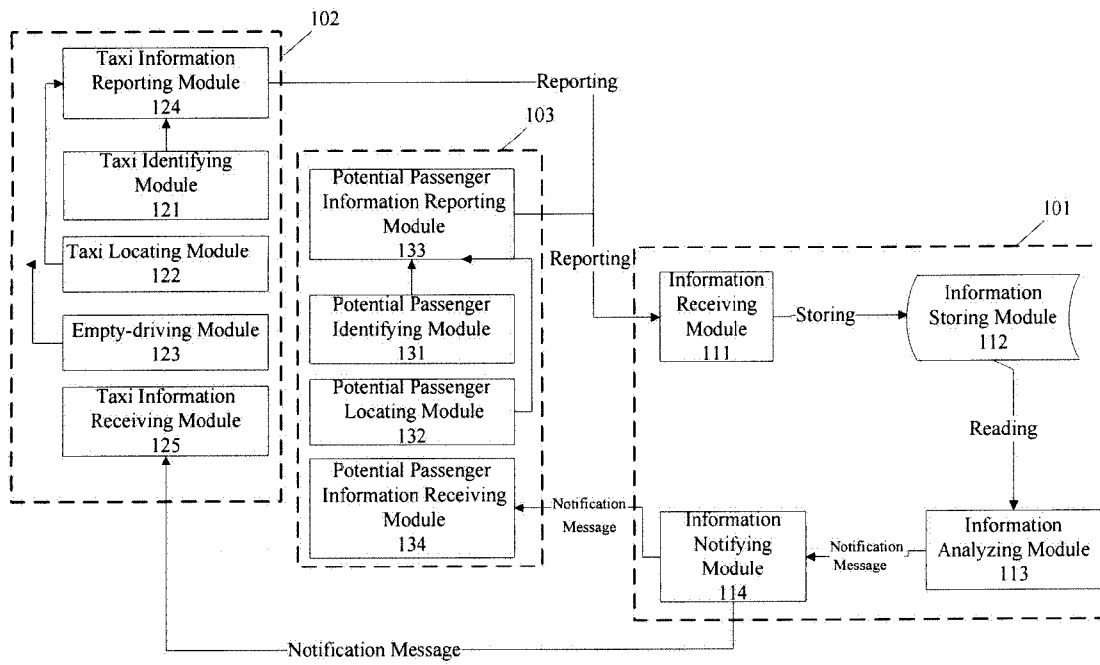


Fig. 1

2/3

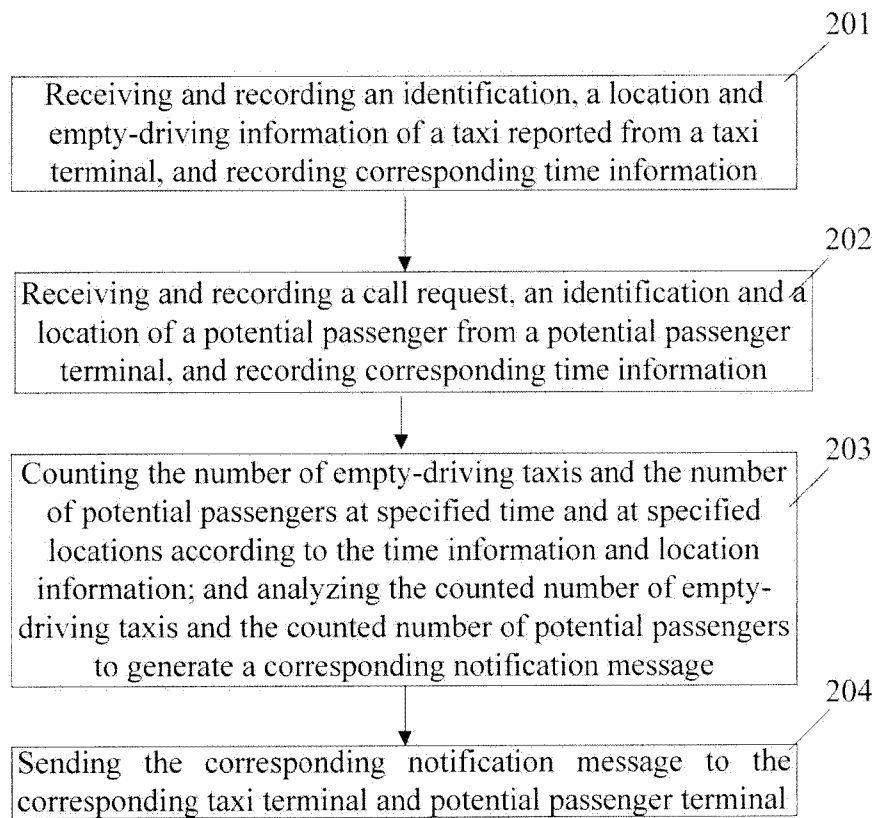


Fig. 2

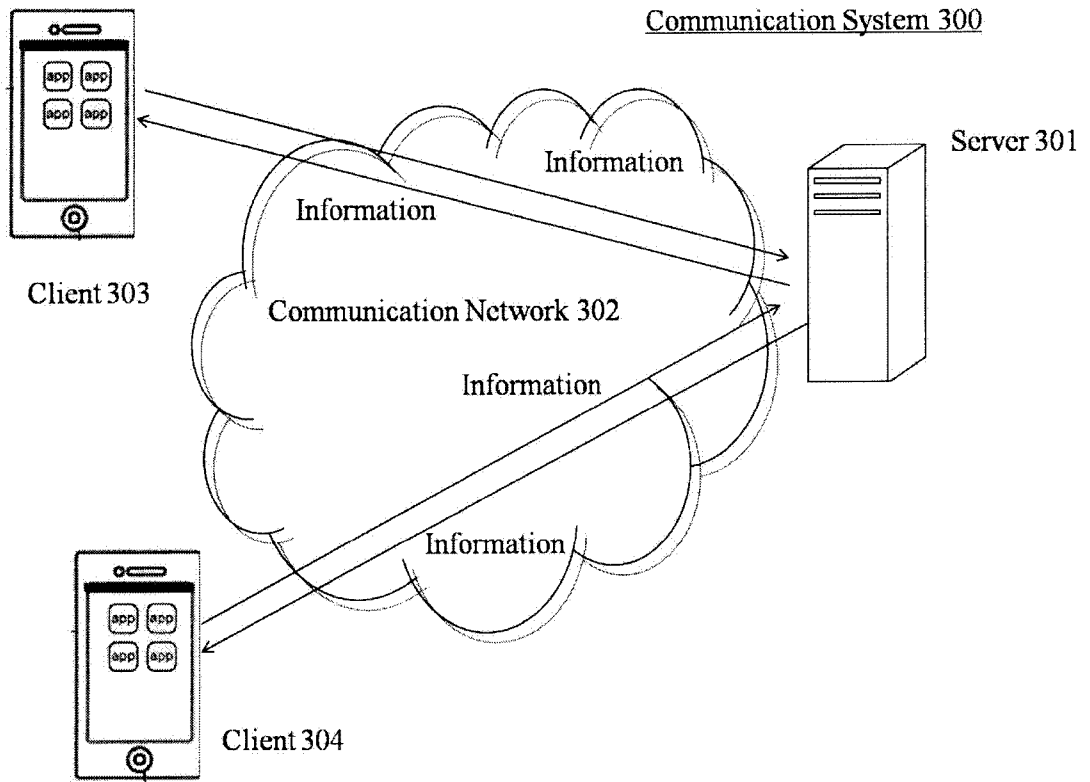


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2014/083681

A. CLASSIFICATION OF SUBJECT MATTER

G08G 1/00(2006.01)i; G08G 1/123(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W; G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT,CNKI,WPI,EPODOC:taxi,location,empty,driv+,time,passenger,analy+,calculat+,ratio,week

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102404297 A (ZHEJIANG YISHANG TECHNOLOGY CO., LTD.) 04 April 2012 (2012-04-04) description, paragraphs [0166], [0172] and [0187]-[0189]	9-12
Y	CN 102404297 A (ZHEJIANG YISHANG TECHNOLOGY CO., LTD.) 04 April 2012 (2012-04-04) description, paragraphs [0166], [0172] and [0187]-[0189]	1-8, 13-24
Y	CN 101620781 A (XANAVI INFORMATICS KK) 06 January 2010 (2010-01-06) description, page 7 line 27 to page 8 line 18, page 16 line 16 to page 17 line 19 and figures 5 to 15	1-8, 13-24
A	CN 102903236 A (HANGZHOU JIUSHU NETWORK TECHNOLOGY CO., LTD.) 30 January 2013 (2013-01-30) the whole document	1-24
A	CN 103000025 A (BEIJING BAIDU NETCOM SCIENCE AND TECHNOLOGY CO., LTD.) 27 March 2013 (2013-03-27) the whole document	1-24

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

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