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(54) **Title**: PROVIDING VIEW INFORMATION WITH DIRECTIONS

(57) **Abstract**: A system and method provides view information together with directions. Route information is generated for a route to a target destination, wherein the route information comprises path data for the route, and directions to the target destination. One or more points where line of sight breaks are calculated using the path data. View information is obtained responsive to one or more of said line of sight breaks.

Providing view information with directions

Field

This invention relates to providing view information with directions.

Background

Route planning systems have been developed which calculate a route from a start location to a selected destination. Such systems generate directions comprising a number of steps for the user to follow in order to reach their target destination. Each step defines an instruction for a particular point along the route, e.g: turn left or turn right, or continue straight on.

Route planning system have been developed which provide directions to mobile devices such as smartphones. However, paying attention to step by step directions and keeping an eye on the road at the same time can be difficult, and can be especially dangerous for cyclists and drivers.

Summary

Embodiments of the invention described hereinafter provide view information together with directions. The view information may for example comprise information relating to the vista at the end of one or more roads.

In embodiments, path data for a route is used to calculate one or more line of sight breaks, and view information is obtained responsive to one or more of the calculated line of sight breaks.

In some embodiments, view information is obtained responsive to one or more changes in direction or altitude which are identified along the route.

Brief Description of the Drawings

In order that the invention may be more fully understood, embodiments thereof will now be described by way of illustrative example with reference to the accompanying drawings, in which:

Figure 1 shows view information incorporated into directions according to an exemplary implementation of the invention;

Figure 2 is a schematic block diagram of a system configured in accordance with an embodiment of the present invention;

Figure 3 illustrates exemplary steps in the operation of the system of Figure 2;

Figure 4 is a schematic block diagram of an exemplary directions system;

Figure 5 shows decision points (D) and calculated vista locations (V) according to an exemplary embodiment;

Figure 6 illustrates an exemplary method of operation of the directions system;

Figure 7 illustrates an exemplary implementation of a procedure of obtaining view information.

Detailed Description

Overview

Directions systems according to embodiments of the present invention incorporate information about the view which can be seen at certain points along a suggested route into the directions which are provided to a user. In many locations along a route, and especially on shorter streets or near the end of a street, there is a vista at the end of that road, e.g: a building, a park or a body of water. Showing or describing what is at the end of a road confirms to the user that they are on the right track, and may reduce the stress of following step by step directions so that the user can concentrate on other things, such as keeping an eye on the traffic or being social.

Figure 1 illustrates one way in which view information can be incorporated into the directions which are provided to a user. As shown, view information in the form of text 101 is incorporated into the directions to describe what will be seen at the end of the road for certain steps along the route. View information in the form of image 102 is also provided for step 3, to show the user a picture of the view at the end of the road.

As used herein, the term "road" includes motorised ways such as highways and city streets, non-motorised ways such as foothpaths and trails, whether paved or unpaved, and any other thoroughfare between two places over land or water.

System Architecture

Figure 2 is a schematic block diagram of a system configured in accordance with an embodiment of the present invention. The system includes a client 1 which

communicates with a web serving system 2 over a network 3, and a directions system 4 which communicates with the web serving system 2. The directions system 4 is configured to receive, via web serving system 2, a request from the client 1 to calculate a route between a start location and a target destination. The directions system 4 is configured to generate directions responsive to the request, and to cause the generated directions to be sent back to the client 1 via the web serving system 2. Other clients 1 may also be in communication with the serving system 2 via the network 3.

The client 1 may be of any type of device which is configured for computing, such as a smartphone or other mobile communications device, a personal computer, laptop, a PDA, a navigation system located in a vehicle, a handheld GPS system, and so on. The client 1 may include a browser 5 (or other similar application) that allows the user to interface and communicate with the web serving system 2.

The web serving system 2 is the part of the overall system that delivers content to the client 1. The content may for example include HTML (hypertext markup language), images, scripting language (e.g: JavaScript, Jscript, Visual Basic Script) and other elements that are used by the browser on the client 1. Note that the serving system 2 may include one or more servers operating under a load balancing scheme, with each server (or a combination of servers) configured to respond to and interact with the client 1.

The network 3 may comprise any suitable network such as the Internet or other WAN, a wireless telecommunications network or LAN, which may be wired or wireless, or a local area network (e.g: intranet), or a combination of networks.

The directions system 4 can comprise a single server or a plurality of servers which operate together to generate directions. As shown in Figure 4, the directions system 4 includes a number of processing modules. It will be appreciated that the term "module" refers to computer logic utilised to provide specified functionality. Thus, a module can be implemented in hardware, firmware and/or software controlling a processor. In one embodiment, the modules are program files stored on a storage device, loaded into memory and executed by a processor, or can be provided from computer program products, for example computer executable instructions, that are stored in a tangible computer-readable storage medium such as RAM, hard disk, or optical or magnetic media.

Also, it will be appreciated that embodiments of the directions system can have different or other modules to the ones described herein, with the described functionalities distributed amongst the modules in a different manner.

Figure 3 illustrates steps in an exemplary interaction involving the client 1, the web serving system 2 and the directions system 4. As shown, the browser 5 requests 301 content from the web serving system 2. The web serving system 2 then responds by providing 302 a HTML document which permits the user to enter a request for directions comprising a start location and target destination. The user enters a request for directions 303, which is sent by the web serving system 2 to the directions system 4. The directions system processes the request and generates directions 304 comprising a series of instructions and points along the route at which the instructions are to be followed. The directions system also obtains 305 view information relating to one or more vistas along the route, which are provided with the directions. The directions and view information are then transmitted 306 back to the web serving system 2. The web serving system processes the received directions and view information and adds them to the HTML document that the user is looking at.

Many variations of the system of Figure 2 are possible. For example, in some implementations, rather than communicating with the directions system via a web serving system, the client may communicate with the directions system directly, e.g: by way of a native application running on the client.

Directions system

Figure 4 is a block diagram of an exemplary configuration of directions system 4.

As shown, the directions system 4 of Figure 4 includes an interface module 6 and a directions generating module 7. Interface module 6 comprises an application programming interface (API) for two-way communication with both the web serving system 2 and the directions generating module 7. Directions generating module 7 generates route information for a route to the selected target destination, including directions comprising instructions for the user to follow at each of a plurality of points along the route.

The directions generating module 7 includes one or more modules (not shown) for generating directions using conventional technology, or as described in U.S. application Ser. Nos. 11/088,542 and 11/051,534. The generated directions comprise a series of steps, each step comprising an instruction. The directions also include the coordinates of the points along the route at which each instruction should be followed. In the art, these points are termed "waypoints", and are also referred to as "decision points". The instructions provided at decision points may for example be turning instructions or instructions to continue past a junction. However, alternatively an instruction at a "decision point" may simply confirm to the user that they should carry on, e.g continue along a road that they are currently on. Thus, the term "decision point" is used herein to denote a point for which an instruction is provided, whether or not a decision is actually required by the user at that particular point.

As shown in Figure 4, directions generating module 7 comprises a view information module 8. The view information module 8 evaluates at each step whether there is an opportunity to mention or show view information, and if there is, obtains view information for the step.

As shown in Figure 4, the directions generating module 7 also includes a path generating module 9. The path generating module 9 accesses stored data (e.g: stored data relating to one or more road networks), and generates path data comprising an array of coordinates that describes the entire route between the user-selected start and end locations.

The directions system 4 also includes a line of sight module 10. The line of sight module 10 processes the path data generated by the path generating module 9 to identify one or more points along the route where a line of sight is broken, referred to herein as "vista locations". In an embodiment, vista locations are determined as locations along the path where the path deviates from a straight line. By iterating through the path and detecting deviations from a straight line, a line of sight can be determined, and also where the line of sight is broken. Figure 5 is an illustration showing a path P, decision points (D1, D2, D3) and calculated vista locations (V1, V2, V3). As shown, vista locations V1, V2 and V3 are identified at points along the route where the path P deviates from being straight.

In some implementations, the line of sight module 10 determines a vista location where the path changes in direction by more than a threshold amount at a particular point. For example, the view information module 8 may determine a vista location where the path changes by 10 degrees or more, 15 degrees or more, or 20 degrees or more at a particular point. Alternatively, vista locations may be determined as points where the path changes in direction by more than a threshold amount over a predetermined distance starting from the vista location.

In some implementations, line of sight may also be determined when the altitude increases or decreases along the path. The line of sight module 10 may access stored data, e.g: at a map database, relating to the altitude of each point along the path. The line of sight module 10 may determine a vista location where the altitude changes by a predetermined threshold amount at a particular point, or over a predetermined distance starting from a particular point. In some implementations, a vista location may also be determined for the end of the route (e.g: V4 of Figure 5).

Figure 6 illustrates an exemplary method of operation of the directions system 4 in accordance with an embodiment of the present invention.

As shown, the interface module 6 receives 601 a request for directions and sends 602 the request to the directions generating module 7.

Following the receipt of a request for directions at the directions generating module 7, path data for a route from the start location to the target destination is generated 603 by the path generating module 9.

Vista locations may be identified on a step by step basis by the line of sight module 10. That is, for each step, the line of sight module 10 may iterate through the route path starting from the decision point from that step to try to identify 604 a point where the line of sight from the decision point breaks, thereby to determine a vista location.

If the line of sight module 10 finds a vista location within a predetermined distance of a decision point, the view information module 8 may determine 605 that view information should be provided for that step. For example, if a vista location is identified less than 500 meters from the decision point along the path of the calculated route, the view information module 8 may determine that view information should be

provided for that step. If a sufficiently close vista location is not identified, the view information module 8 determines that view information should not be provided for that step 606.

If the view information module 8 finds a sufficiently close vista location, the module 8 attempts to obtain 607 view information for the step. The view information can comprise text and/or image information about the view that can be seen from the decision point.

In exemplary implementations, the view information module 8 queries one or more databases (e.g: a landmark database or a business listings database) to obtain text relating to a place such as a landmark within a predetermined radius (e.g: 20 meters) of the vista location. The text may for example include a name and/or type for the place. The place may for example be an establishment (e.g: a business, a museum or an opera), or an area such as a park. In an embodiment, the module 8 may specify longitude and latitude coordinates of a vista location to the Google places API, described at https://developers.google.com/maps/documentation/places/ in order to the obtain view information for a particular step.

Additional or alternative view information may be obtained for a step by querying one or more image databases to obtain an image of what the user will see after he or she follows the instruction for that step. For example, the view information module may query a database of geolocated photographs (e.g: Panoramio) to obtain a geolocated at or near the vista location. Alternatively, or in addition, the view information module 8 may specify coordinates of a decision point, along with an orientation (e.g: compass heading), to the Google Street View Image API, described at https://developers.google.com/maps/documentation/streetview/, and in this way retrieve an image for use as, or inclusion in the view information for the step. The compass heading which is provided to the API is the compass heading along the route from the decision point for the step, as determined from the path data.

The procedure of identifying 604 line of sight breaks, and then if necessary obtaining 607 view information is repeated for each directions step.

The directions and view information are sent to the interface module 6, which transforms the data into a web-friendly format and provides it to the web serving

system 2. The web serving system 2 processes the received directions and view information and adds them to the HTML document that the user is looking at.

View information may be incorporated into directions by displaying the view information which has been obtained for a step together with the instruction for that step. For example, as shown in Figure 1, text information 101 is provided together with the "Head northwest" instruction for step 1. The text information confirms to the user that they will see the North End Cathedral at the end of the road.

Text information is also provided together with the "Turn right at Northwood Av" instruction for step 3, along with image information 102. The view information 101, 102 provides text and an image to confirm to the user that they will see the Opera building at the end of the road.

As determined for example by the procedure of Figure 6, in some cases view information may not be obtained or displayed for certain steps, as is the case for step 2 of Figure 1.

As shown in Figure 1, the text and/or images obtained by the view information module 8 may be supplemented by additional text and/or graphics to make for improved readability. For example, rather than simply providing the name of a landmark such as "Opera building", a sentence such as "You'll see the Opera building at the end of the street" can be constructed and provided with the directions. The view information may be formatted so that image information relating to the view for each step is provided beneath text information, as shown in step 3 of Figure 1. The user may be provided with the option to show or hide the images by selecting "hide" or "show" options on the eventual webpage. In embodiments, the user may be provided with the option to vote on the usefulness of the view information, and user's votes may be stored and used by the directions system when deciding whether or not to show particular view information in the future. Alternatively, or in addition, the user's show/close action may be interpreted by the directions system as an implicit vote.

In some embodiments, the directions may be supplemented or modified to include directions based on the determined vista locations and the calculated route. For example, referring to Figure 1, additional directions could also be provided to tell the user to "turn left when you reach the Opera building".

Calculating more than one vista location for each decision point

Although in some embodiments, the line of sight module 10 may only attempt to determine one vista location per decision point, alternatively the line of sight module 10 may attempt to find a more than one vista location per decision point. For example, after determining a first vista location, the line of sight module 10 may continue to iterate along the path to try to determine a further vista location. That is, the line of sight module 10 may iterate through the path starting from a first vista location to identify a point where the line of sight from the first vista location breaks, thereby to determine a second vista location.

If the line of sight module 10 finds a second vista location within a predetermined distance (e.g: within 500 meters) along the path from a first vista location, the view information module 8 may determine that additional view information should be provided for that step. The additional information may be provided to inform the user that on arrival at the first vista, the second vista will be seen at the end of the road.

Figure 5 shows an example in which two vista locations, V3 and V4 are determined for the decision point D3. Thus, in some implementations, view information may be provided to relay to the user that at D3, they will see V3 at the end of the road, and that after reaching V3, they will see V4 at the end of the road.

Those skilled in the art cognizant of the present disclosure will appreciate that in some implementations, multiple vista locations, e.g three or more vista locations, could be calculated per decision point, with view information provided to the user to confirm that they will see multiple vistas as they carry out a particular step in the directions.

Calculating vista locations using 3D data

Although vista locations may be calculated by determining deviations from a straight line path as described above, in an alternative implementation vista locations may be calculated by identifying 502 where a line of sight breaks using 3D data. In this example, the line of sight module 10 accesses a 3D database including stored 3D data describing objects/structures such as buildings. At each decision point, the line of sight module 10 uses a line of sight algorithm, oriented in the same direction as the path data, to "look" down the road and detect where a line of sight is broken. For example, a vista location may be determined as the point of intersection between a

virtual straight line starting from a decision point and 3D data describing a building or structure.

Following identification of a vista location in this way, the method then continues as described above. That is, if the line of sight module 10 finds a vista location within a predetermined distance of a decision point, the view information module 8 may determine that view information should be provided for that step. View information is then obtained by the view information module 8 e.g: by looking up a "places" database, or an image database using the vista location and/or by obtaining an image from the Google StreetView API. The view information is sent to the interface module 6 together with the directions.

Obtaining view information

In embodiments, the view information module 8 attempts to obtain view information for a vista location by consulting a number of databases in turn. Figure 7 shows an exemplary implementation of the step of attempting to obtain view information 607. In this example, the view information module 8 first queries 701 a database to try to obtain view information for a landmark within a predetermined radius (e.g: 20 meters) of the vista location. If a landmark is found, the landmark name is included as view information for the step. If no landmark is found, the view information module 8 queries 702 a database to try to obtain view information for a business name within a predetermined radius of the vista location. If a business name is found, the business name is included as a view information for the step. If no such business is found, the view information module queries 703 the Google Street View Image API to provide a photograph of what can be seen from the decision point looking along the direction of the route. If no image is available, the view information module determines that view information should not be provided for the step (606).

In some embodiments, only one of a landmark name, a business name or a streetview image is provided as view information for a vista location. However, in other embodiments, more than one type of view information may be provided for a step, e.g: a landmark name may be provided together with a streetview image as shown in step 3 of Figure 1.

Many modifications and variations of the embodiments of the invention described herein are possible within the scope of the claims hereinafter.

Furthermore the particular naming of the components, capitalization of terms, the attributes, data structures, or any other programming or structural aspect is not mandatory or significant, and the mechanisms that implement the invention or its features may have different names, formats, or protocols. Further, the system may be implemented via a combination of hardware and software, as described, or entirely in hardware elements. Also, the particular division of functionality between the various system components described herein is merely exemplary, and not mandatory; functions performed by a single system component may instead be performed by multiple components, and functions performed by multiple components may instead performed by a single component.

For example, although Figures 2 and 4 show a system comprising a client 1 and a directions system 4 having a number of modules, in alternative implementations the functions of one or more of these modules could be performed by the client, e.g: by a native application stored on the client.

Some portions of above description present the features of the present invention in terms of algorithms and symbolic representations of operations on information. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. These operations, while described functionally or logically, are understood to be implemented by computer programs. Furthermore, the reference to these arrangements of operations in terms of modules should not be considered to imply a structural limitation and references to functional names is by way of illustration and does not infer a loss of generality.

Unless specifically stated otherwise as apparent from the description above, it is appreciated that throughout the description, discussions utilising terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical

(electronic) quantities within the computer system memories or registers or other such information storage, transmission or display devices.

Certain aspects of the present invention include process steps and instructions described herein in the form of an algorithm. It should be understood that the process steps, instructions, of the present invention as described and claimed, are executed by computer hardware operating under program control, and not mental steps performed by a human. Similarly, all of the types of data described and claimed are stored in a computer readable storage medium operated by a computer system, and are not simply disembodied abstract ideas.

The present invention also relates to an apparatus for performing the operations herein. This apparatus may be specially constructed for the required purposes, or it may comprise a general-purpose computer selectively activated or reconfigured by a computer program stored on a computer readable medium that can be executed by the computer. Such a computer program are stored in a computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, application specific integrated circuits (ASICs), or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus. Furthermore, the computers referred to in the specification may include a single processor or may be architectures employing multiple processor designs for increased computing capability.

The algorithms and operations presented herein can be executed by any type or brand computer or other apparatus. Various general-purpose systems may also be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these systems will be apparent to those of skill in the art, along with equivalent variations. In addition, the present invention is not described with reference to any particular programming language. It is appreciated that a variety of programming languages may be used to implement the teachings of the present invention as described herein.

Claims

1. A computer-implemented method of providing view information with directions, comprising:

generating route information for a route to a target destination, wherein the route information comprises path data for the route, and directions to the target destination;

calculating one or more line of sight breaks using the path data;

obtaining view information responsive to one or more of said line of sight breaks; and

providing the view information with the directions.

2. A computer-implemented method as claimed in claim 1, wherein the route comprises a route along one or more roads, and wherein the view information comprises information relating to the vista at the end of one or more of said roads.

3. A computer-implemented method according to claim 1, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein view information is obtained for a step if a line of sight break is located within a predetermined distance along the route from the decision point for that step.

4. A computer-implemented method according to claim 1, wherein calculating one or more line of sight breaks comprises identifying one or more changes in direction or altitude along the route using the path data.

5. A computer-implemented method according to claim 1, wherein calculating one or more line of sight breaks using the path data comprises:

obtaining 3D data from a 3D database;

executing a line of sight algorithm, oriented in the direction of the path data to detect a point of intersection with the 3D data.

6 A computer-implemented method according to claim 1, wherein obtaining view information comprises querying one or more databases using location data for one or more of said line of sight breaks.

7. A computer-implemented method according to claim 1, wherein obtaining view information comprises obtaining place data from one or more databases, wherein the place data relates to one or more places within a predetermined region of a line of sight break.

8. A computer-implemented method according to claim 1, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein obtaining view information comprises querying one or more image databases to obtain an image of a view from a decision point.

9. A computer-implemented method of providing view information with directions, comprising:

generating route information for a route to a target destination, wherein the route information comprises directions to the target destination;

identifying one or more changes in direction or altitude along the route;

obtaining view information responsive to one or more of said changes; and

providing the view information together with the directions.

10. A computer-implemented method as claimed in claim 9, wherein the route comprises a route along one or more roads, and wherein the view information comprises information relating to the vista at the end of one or more of said roads.

11 A computer-implemented method according to claim 9, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein view information is obtained for a step if a change in direction or altitude is identified within a predetermined distance along the route from the decision point for that step.

12 A computer-implemented method according to claim 9, wherein obtaining view information comprises querying one or more databases using one or more points where a change in direction or altitude along the route is identified.

13. A computer-implemented method according to claim 9, wherein obtaining view information comprises obtaining place data from one or more databases, wherein the place data relates to one or more places within a predetermined region of one or more points where a change in direction or altitude along the route is identified

14. A computer-implemented method according to claim 9, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein obtaining view information comprises querying one or more image databases to obtain an image of a view from a decision point.

15. A system for providing view information with directions, comprising:

a directions generating module to generate directions to a target destination, wherein the directions generating module comprises:

a path generating module to calculate path data for a route to the target destination;

a line of sight module to calculate one or more line of sight breaks, using the path data; and

a view information module to obtain view information responsive to one or more of said line of sight breaks;

further comprising an interface module to provide the view information together with directions.

16. A system as claimed in claim 15, wherein the line of sight module comprises a route processing module configured to identify one or more changes in direction or altitude along the route using the path data.

17. A system as claimed in claim 15, wherein the line of sight module is configured to obtain 3D data from a 3D database, and to execute a line of sight algorithm oriented in the direction of the path data to detect a point of intersection with the 3D data.

18. A system as claimed in claim 15, wherein the view information module is configured to query one or more databases using location data for one or more of said line of sight breaks.

19. A system as claimed in claim 15, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, and wherein the view information module is configured to query one or more image databases to obtain an image of a view from a decision point.

20. A computer program product for providing view information with directions, comprising a computer readable storage medium storing computer executable code operable to:

generate route information for a route to a target destination, wherein the route information comprises path data for the route, and directions to the target destination;

calculate one or more line of sight breaks using the path data;

obtain view information responsive to one or more of said line of sight breaks; and

provide the view information with the directions.

21. A computer program product according to claim 20, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein view information is obtained for a step if a line of sight break is located within a predetermined distance along the route from the decision point for that step.

22. A computer program product according to claim 20, wherein calculating one or more line of sight breaks comprises identifying one or more changes in direction or altitude along the route using the path data.

23. A computer program product according to claim 20, wherein calculating one or more line of sight breaks using the path data comprises:

obtaining 3D data from a 3D database;

executing a line of sight algorithm, oriented in the direction of the path data to detect a point of intersection with the 3D data.

24 A computer program product according to claim 20, wherein obtaining view information comprises querying one or more databases using location data for one or more of said line of sight breaks.

25. A computer program product according to claim 20, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein obtaining view information comprises querying one or more image databases to obtain an image of a view from a decision point.

26. A computer program product for providing view information with directions, comprising a computer readable storage medium storing computer executable code operable to:

generate route information for a route to a target destination, wherein the route information comprises directions to the target destination;

identify one or more changes in direction or altitude along the route;

obtain view information responsive to one or more of said changes; and

provide the view information together with the directions.

27 A computer program product according to claim 26, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein view information is obtained for a step if a change in direction or altitude is identified within a predetermined distance along the route from the decision point for that step

28 A computer program product according to claim 26, wherein obtaining view information comprises querying one or more databases using one or more points where a change in direction or altitude along the route is identified.

29. A computer program product according to claim 26, wherein obtaining view information comprises obtaining place data from one or more databases, wherein the place data relates to one or more places within a predetermined region of one or more points where a change in direction or altitude along the route is identified.

30. A computer program product according to claim 26, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein obtaining view information comprises querying one or more image databases to obtain an image of a view from a decision point.

31. A computer-implemented method of providing view information with directions, comprising:

generating route information for a route to a target destination, wherein the route information comprises path data for the route, and directions to the target destination;

calculating one or more line of sight breaks using the path data;

obtaining view information responsive to one or more of said line of sight breaks; and

providing the view information with the directions.

32. A computer-implemented method as claimed in claim 31, wherein the route comprises a route along one or more roads, and wherein the view information comprises information relating to the vista at the end of one or more of said roads.

33. A computer-implemented method according to claim 31 or claim 32, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein view information is obtained for a step if a line of sight break is located within a predetermined distance along the route from the decision point for that step.

34. A computer-implemented method according to any of claims 31 to 33, wherein calculating one or more line of sight breaks comprises identifying one or more changes in direction or altitude along the route using the path data.

35. A computer-implemented method according to any of claims 31 to 33, wherein calculating one or more line of sight breaks using the path data comprises:

obtaining 3D data from a 3D database;

executing a line of sight algorithm, oriented in the direction of the path data to detect a point of intersection with the 3D data.

36 A computer-implemented method according to any of claims 31 to 35, wherein obtaining view information comprises querying one or more databases using location data for one or more of said line of sight breaks.

37. A computer-implemented method according to any of claims 31 to 36, wherein obtaining view information comprises obtaining place data from one or more databases, wherein the place data relates to one or more places within a predetermined region of a line of sight break.

38. A computer-implemented method according to any of claims 31 to 37, wherein the directions comprise a series of steps, each step comprising an instruction to be followed at a decision point along the route, wherein obtaining view information

comprises querying one or more image databases to obtain an image of a view from a decision point.

39. A computer program product for providing view information with directions, comprising a computer readable storage medium storing computer executable code operable to perform the method of any of claims 31 to 38.

40. An apparatus comprising at least one processor and at least one memory storing instructions which when executed by the at least one processor cause the at least one processor to perform the method of any of claims 31 to 38.

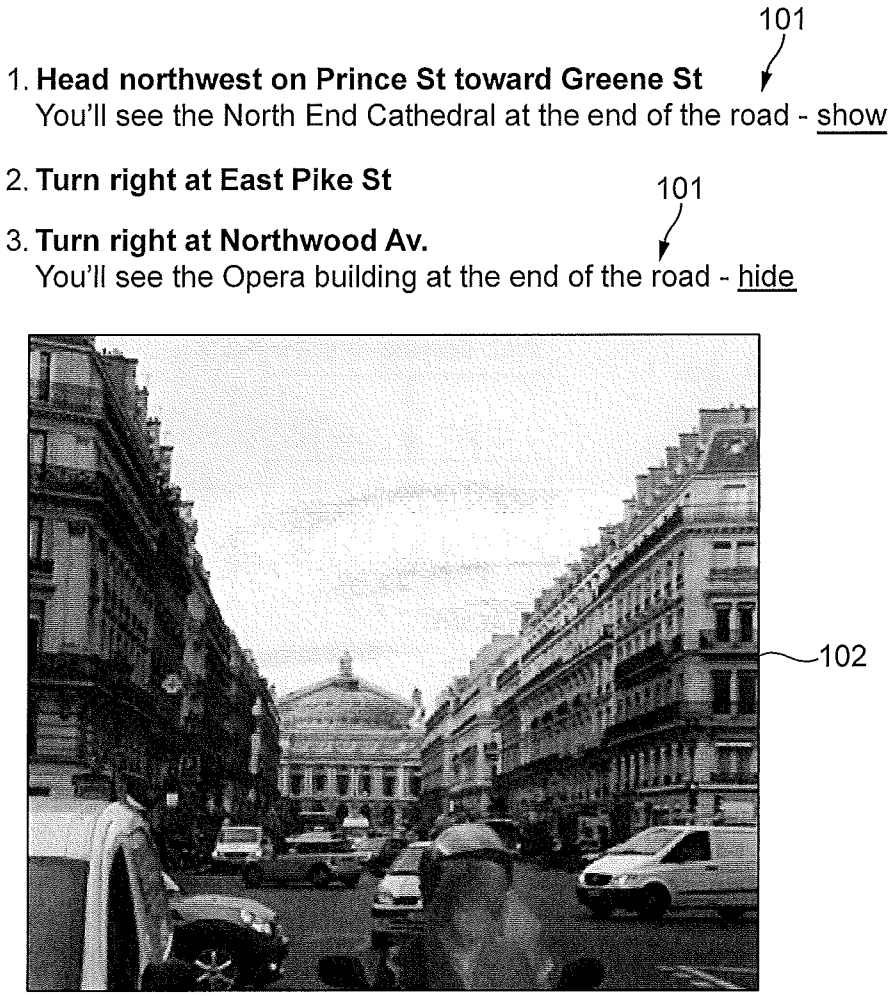
101
1. Head northwest on Prince St toward Greene St
You'll see the North End Cathedral at the end of the road - show
2. Turn right at East Pike St
101
3. Turn right at Northwood Av.
You'll see the Opera building at the end of the road - hide
102

FIG. 1

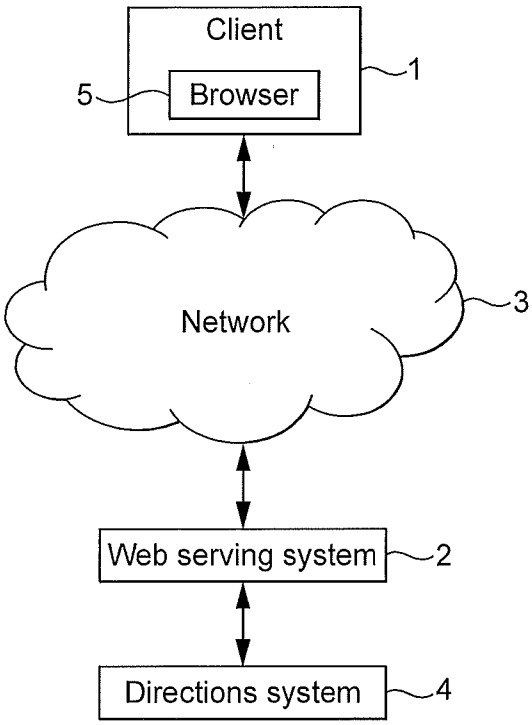
Client
Browser
5
1
Network
3
Web serving system
2
Directions system
4

FIG. 2

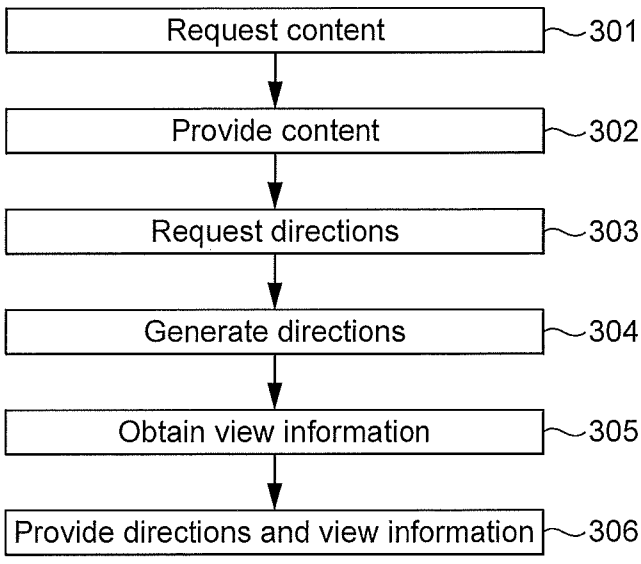
Request content
301
Provide content
302
Request directions
303
Generate directions
304
Obtain view information
305
Provide directions and view information
306

FIG. 3

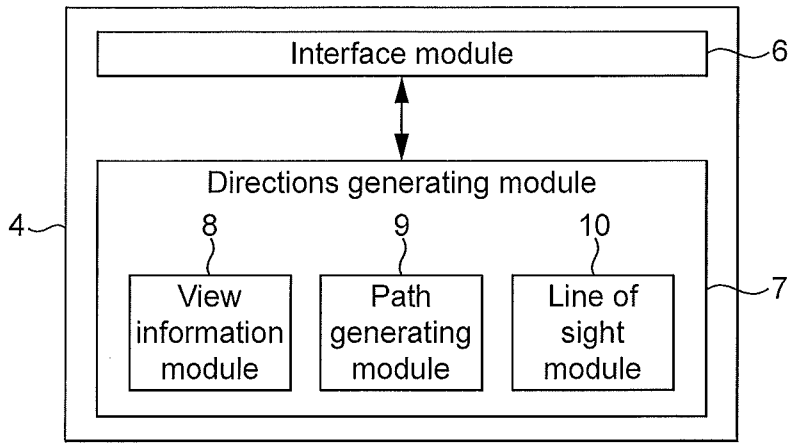
Interface module
6
Directions generating module
4
8
9
10
View information module
Path generating module
Line of sight module
7

FIG. 4

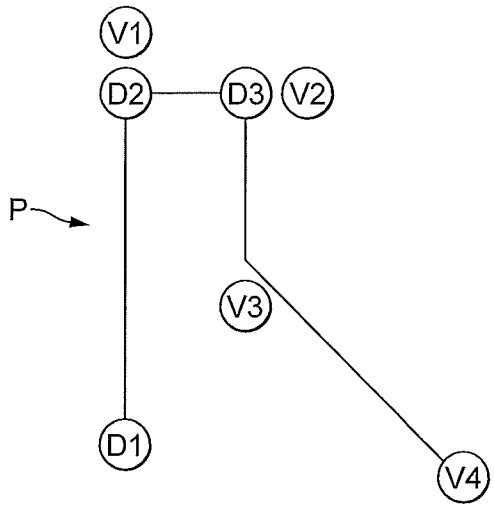
V1
D2
D3
V2
P
V3
D1
V4

FIG. 5

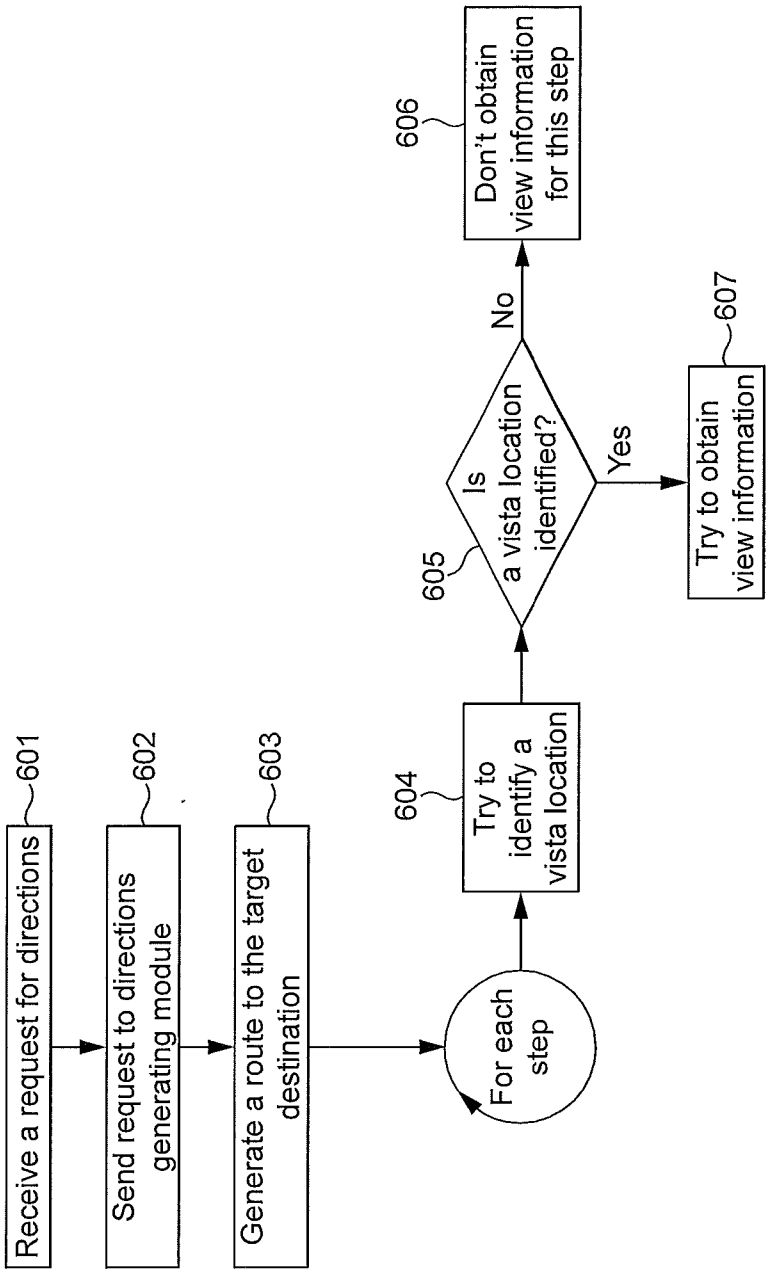
Receive a request for directions
601
Send request to directions generating module
602
Generate a route to the target destination
603
For each step
604
Try to identify a vista location
Is a vista location identified?
605
No
Don't obtain view information for this step
606
Yes
Try to obtain view information
607

FIG. 6

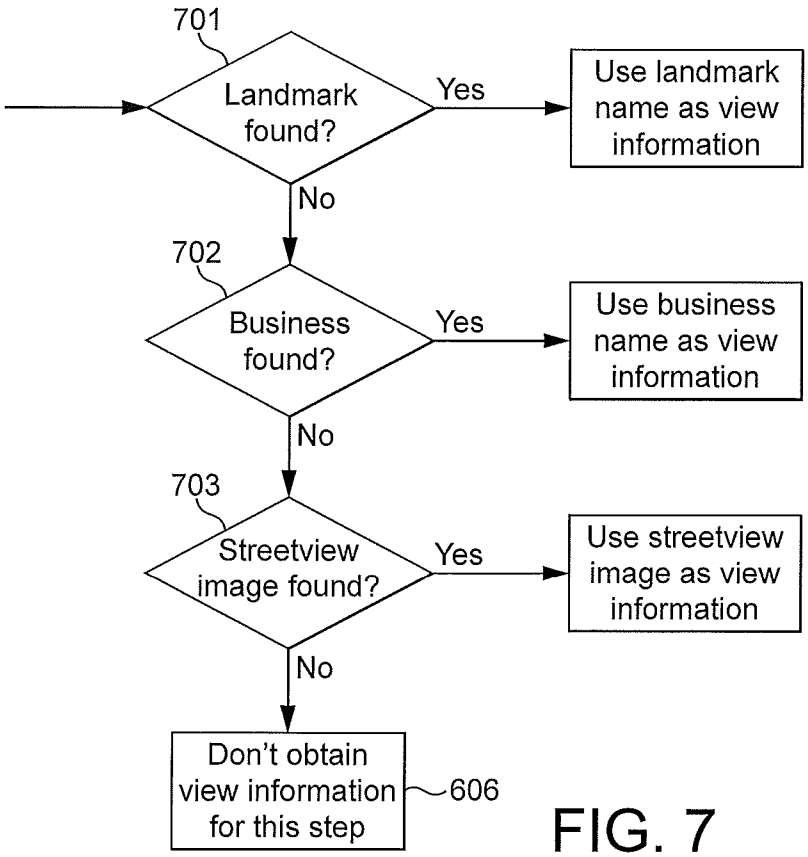
701
Landmark found?
Yes
Use landmark name as view information
No
702
Business found?
Yes
Use business name as view information
No
703
Streetview image found?
Yes
Use streetview image as view information
No
Don't obtain view information for this step
606

FIG. 7