OPTIMIZED ROUTE OPTIONS BASED ON WEATHER CONDITIONS

Dina Betser
ABSTRACT

A weather based routing system is used to provide a routing and navigation option based on specific weather conditions and time parameters. The system receives a request to generate a route between a start point and an end point based on a weather condition for a specified time. These weather conditions can indicate picking the shadiest route, or the sunniest route, or the route which would be least windy between the start and the end point. The system can access a database of stored photographic maps data to get information about the two points and the different routes between them. The system also analyzes the time information associated with the request and generates the route based on the specific weather condition.

PROBLEM STATEMENT

Navigation and routing systems consider a fixed set of parameters to generate a route between a start point and an end point. For example, navigation systems may provide route options based on the amount of traffic between the start point and the end point, estimated time of travel between the start point and the end point, or the distance between the two points. However, none of the present navigation or routing systems generate routes between two points or locations based on specific weather conditions, such as, the most shady route, the most sunny route, or the least windy route. A system that provides route options based on specific weather conditions is described below.
WEATHER BASED ROUTING SYSTEM

The systems and techniques described in this disclosure relate to a weather based routing system. The system can be implemented for use in an Internet, an intranet, or another client and server environment. The system can be implemented as program instructions locally on a client device or implemented across a client device and server environment. The client device can be any electronic device such as a mobile device, a smartphone, a tablet, a handheld electronic device, a wearable device, a laptop, etc.

Fig. 1 illustrates an example method 100 which provides routing options based on a weather condition. Method 100 can be performed by the weather based routing system.

The system receives a request to generate a route between a start point and an end point based on a weather condition at a specified time (110). The system provides a user with a user interface to input various parameters associated with the routing request, for example, a start point, end point, weather condition, and time. The start point can be the current location of the user or the location from where the user wants directions to the end point. The end point can be the destination where the user wants to travel to from the start point. The weather condition can be a characteristic defining weather such as the sunniest route, least windy route, route with most shade, a route which would have the least effect of rain if it’s raining, etc. The user may use a keyboard, a touch screen, keypad, etc., to enter the input to the user interface. The user interface may provide editable fields to the user to enter specific values pertaining to the request. For example, the user may provide his office location as the start point and a restaurant as the end point. Further, the user may enter “sunniest route” as a weather condition and “4 pm” for the
time. In this example, the system receives the request from the user to generate a sunniest route between his office building and restaurant at 4 pm.

Alternatively, or additionally, the system may provide a list of pre-stored values for the various parameters from which the user can provide a selection. For example, the interface provides various weather condition options for the desired route, e.g., shadiest, sunniest, least windy, most windy. Similarly, the interface provides various predefined time slots, e.g., hourly slots such as 9 am to 10 am. The system can also provide default start and end points based on the user’s location history. For example, the system can provide a default start location that is the user’s current location, as determined from GPS coordinates of the user’s client device. The user may select values for each of the parameters based on the user’s preferences.

After receiving the request for generating the route, the system accesses a database of stored photographic maps data (120). The database can include photographs tagged with the respective geolocations the photographs were captured. The database can be compiled from publicly available photographs, photographs taken by private individuals that provided the photos to the database, or third party services that capture photographs of streets. Furthermore, the database can include multiple photographs of the same geolocation taken at different times of the day or from different vantage points. The system can access photographic data of roads, paths, streets, walkways, and the routes that connect the start point and the end point. The stored photographic maps data identify data about existing buildings, trees, and other shade-emitting items along different possible routes between the startpoint and endpoint. This data can also identify how the buildings, trees, structures, etc., affect the weather conditions between the startpoint and endpoint at different times of the day. The photographic maps data can also
include past and present image data between the two different points. Alternatively or additionally, the system may store mapping of different routes with various weather conditions, such as shady route, sunny route, windy route between points X and Y.

The system then generates the route that satisfies the specified weather condition and time based on the photographic maps data (130). When the system receives the start and end points, the system can identify multiple route options between the two locations. From the multiple routes, the system determines the route that best matches the specified weather condition and time. The system can score the different route options based on how well the respective routes satisfy the weather condition based on the photographic maps data. The system analyzes the photographic data for the different routes taken at or around the time specified by the route request. The system can apply geometric algorithms to the photographic data to determine the weather conditions for the respective routes at the specified time. For example, the system determines the most shady route at 4 pm between the startpoint and endpoint. This may be based on photographic maps data which includes different images to indicate the height of buildings, trees, tower, etc., in multiple routes between points A and B. The system may use predefined algorithms to calculate the shadiest route at the specified time. The system may take into account the current date and time to determine the position of the sun and resulting intensity of the sun on the routes. Additionally, the system can use a dedicated algorithm which can calculate the shade caused by an object such as a building, or a tree by using trigonometry based on the angle of the sun on the horizon vs the height of the building, etc.
The photographic maps data can be updated for future requests. As more photographic data is collected between two points, they can be continuously processed to provide more training data for the weather based routing system.

Fig. 2 is a block diagram of an exemplary environment that shows components of a system for implementing the techniques described in this disclosure. The environment includes client devices 210, servers 230, and network 240. Network 240 connects client devices 210 to servers 230. Client device 210 is an electronic device. Client device 210 may be capable of requesting and receiving data/communications over network 240. Example client devices 210 are personal computers (e.g., laptops), mobile communication devices, (e.g. smartphones, tablet computing devices), set-top boxes, game-consoles, embedded systems, and other devices 210’ that can send and receive data/communications over network 240. Client device 210 may execute an application, such as a web browser 212 or 214 or a native application 216. Web applications 213 and 215 may be displayed via a web browser 212 or 214. Server 230 may be a web server capable of sending, receiving and storing web pages 232. Web page(s) 232 may be stored on or accessible via server 230. Web page(s) 232 may be associated with web application 213 or 215 and accessed using a web browser, e.g., 212. When accessed, webpage(s) 232 may be transmitted and displayed on a client device, e.g., 210 or 210’. Resources 218 and 218’ are resources available to the client device 210 and/or applications thereon, or server(s) 230 and/or web page(s) accessible therefrom, respectively. Resources 218’ may be, for example, memory or storage resources; a text, image, video, audio, JavaScript, CSS, or other file or object; or other relevant resources. Network 240 may be any network or combination of networks that can carry data communication.
The subject matter described in this disclosure can be implemented in software and/or hardware (for example, computers, circuits, or processors). The subject matter can be implemented on a single device or across multiple devices (for example, a client device and a server device). Devices implementing the subject matter can be connected through a wired and/or wireless network. Such devices can receive inputs from a user (for example, from a mouse, keyboard, or touchscreen) and produce an output to a user (for example, through a display). Specific examples disclosed are provided for illustrative purposes and do not limit the scope of the disclosure.

DRAWINGS
Receive a request to generate a route between a start point and an end point based on a weather condition at a specified time

Access a database of photographic maps data

Generate the route by combining information from the photographic maps data with the weather condition and the specified time

Fig. 1