

SYSTEM FOR ASSESSING CARBON EMISSIONS IN TRANSPORTATION AND METHOD FOR ASSESSING CARBON EMISSIONS IN TRANSPORTATION

FIELD OF THE INVENTION

[0001] The present invention relates to carbon assessment, in particular to a system for assessing carbon emissions in transportation and a method for assessing carbon emissions in transportation.

BACKGROUND OF THE INVENTION

[0002] Carbon emissions have become one of the major factors behind global climate change. For sustainability and environmental protection purposes, enterprises need to know how much carbon they are emitting. Therefore, carbon assessment has become a crucial task that many enterprises are required to perform.

[0003] Employees' commuting, employees' business trips, goods delivery, product distribution, and other transportation activities are also a significant contribution to the carbon emissions of enterprises. When performing carbon assessment, enterprises need to assess the carbon emissions in transportation of various targets (such as employees, goods and products) so as to determine the contribution to corporate carbon emissions.

[0004] Take the transportation of employee commuting as an example: assessment personnel need to assess the commuting mode and commuting distance of each employee so as to determine the contribution of employee commuting to corporate carbon emissions. However, existing methods require assessment personnel to survey the residence of each

employee and calculate the commuting distance manually, which is complicated and prone to errors. This not only wastes time spent on performing carbon assessment, but also affects the accuracy of carbon assessment. Additionally, assessment personnel will encounter the same problems when assessing the carbon emissions of business trips of employees and delivery of goods or products.

SUMMARY OF THE INVENTION

[0005] In view of this, an objective of the present invention is to provide a system for assessing carbon emissions in transportation and a method for assessing carbon emissions in transportation, which can automatically obtain a transportation distance of a target, and generate a corresponding emission quantity of greenhouse gases.

[0006] To achieve the above objective, the method for assessing carbon emissions in transportation provided by the present invention includes the following steps:

- A. connecting an electronic device to a server;
- B. establishing a plurality of transportation data corresponding to a plurality of targets in the server through the electronic device, each of the transportation data including a place of departure, a place of destination, and a transport type;
- C. transmitting, by the server, the place of departure and the place of destination of each of the transportation data to a geographic information system, and obtaining a transportation distance of each of the targets through the geographic information system;
- D. calculating, by the server, a total transportation distance of these targets during a period of assessment according to these transportation

distances of these targets; and

E. calculating, by the server, an emission quantity of greenhouse gases of these targets during the period of assessment according to an emission factor corresponding to the transport type and the total transportation distance.

[0007] The system for assessing carbon emissions in transportation provided by the present invention is configured to connect an electronic device and a geographic information system, including a server connecting the electronic device and the geographic information system. The server obtains a plurality of transportation data of a plurality of targets from the electronic device, and each of the transportation data includes a place of departure, a place of destination, and a transport type. The server transmits the place of departure and the place of destination of each of the transportation data to the geographic information system, and obtains a transportation distance of each of the targets through the geographic information system. The server calculates a total transportation distance of these targets during a period of assessment according to these transportation distances of these targets, and the server calculates an emission quantity of greenhouse gases of these targets during the period of assessment according to the total transportation distance and an emission factor of the transport type.

[0008] The beneficial effect of the present invention is: the transportation distance of a target can be automatically calculated, and the emission quantity of greenhouse gases of these targets can be calculated during a period of assessment, which effectively improves the work efficiency of carbon assessment, saves time and cost spent on work, and ensures the accuracy of carbon emissions assessment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1 is an architecture diagram of a system for assessing carbon emissions in transportation according to a first preferred embodiment of the present invention;

FIG. 2 is a flowchart of a method for assessing carbon emissions in transportation according to a first preferred embodiment of the present invention;

FIG. 3 is a schematic diagram of a transportation map according to a first preferred embodiment of the present invention; and

FIG. 4 is an architecture diagram of a system for assessing carbon emissions in transportation according to a second preferred embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0010] To describe the present invention more clearly, the following is a detailed description with reference to preferred embodiments and in conjunction with the drawings. Referring to FIG. 1, a system for assessing carbon emissions in transportation 1 according to a first preferred embodiment of the present invention is configured to connect an electronic device 30 with a geographic information system 40 through, for example, a network 50. The network 50 may be, for example, the Internet or a local area network. For example, the electronic device 30 may be a computer, a cellphone, a tablet computer, or other devices that can be connected to the network 50. The electronic device is controlled by a user of an enterprise. The geographic information system 40 is configured to provide a map

datum, plan a route, and calculate the distance of the route. For example, the geographic information system (GIS) 40 may be Google Map, Bing Maps, OpenStreetMap, or other on-line geographic information systems, but is not limited thereto. The geographic information system may also be an off-line geographic information system.

[0011] The system for assessing carbon emissions in transportation 1 includes a server 10. The server 10 is configured to execute a carbon assessment program, and can connect the electronic device 30 and the geographic information system 40 through, for example, the network 50. The system for assessing carbon emissions in transportation 1 may further include a database 20, and the database 20 is connected to the server 10. In this embodiment, the server 10 and the database 20 may be located on the same host, or may be located on different hosts respectively and connected to each other through the network 50.

[0012] Then, with the above structure, a method for assessing carbon emissions in transportation of this embodiment can be performed. The method includes the following steps shown in FIG. 2.

[0013] Step S11: the electronic device 30 is connected to the server 10. In this embodiment, the electronic device 30 is connected to the server 10 through the network 50 under the operation of the enterprise personnel.

[0014] Step S12: a plurality of transportation data corresponding to a plurality of targets are established in the server 10 through the electronic device 30, each of the transportation data including a place of departure, a place of destination, and a transport type.

[0015] In this embodiment, each of the targets is, for example, an enterprise employee, and each of the transportation data is, for example, a commuting datum of the employee, but the present invention is not limited

thereto. Each of the transportation data may further include the name and/or employee number of each of the employees.

[0016] After the electronic device 30 and the server 10 are connected, a person types in these transportation data of these targets (such as employees) in an interface of the carbon assessment program provided by the server 10 using the electronic device 30. For example, these transportation data may be typed in by a person, or may be imported from a file. For example, the place of departure of each of the transportation data may be a residence of an employee, the place of destination may be a place of work of the employee, and the transport type may be a transport type for commuting chosen by the employee, for example, an automobile or a motor vehicle that uses fuel oil. The fuel oil, for example, may be gasoline, but is not limited thereto. The fuel oil may also be diesel oil. Preferably, these transportation data are transportation data of the same transport type (for example, a gasoline-powered automobile), and transportation data of other transport types additionally serve as a plurality of transportation data and are additionally assessed later using the method for assessing carbon emissions in transportation.

[0017] In one embodiment, each of the targets is an employee on business trip, the place of departure of each of the transportation data, for example, may be a place of departure of the employee on business trip, the place of destination, for example, may be a place of destination of the employee on business trip, and the transport type, for example, may be a transport type chosen by the employee on business trip. In one embodiment, each of the targets is a good or product to be delivered, the place of departure of each of the transportation data, for example, may be a place of departure of the delivery, the place of destination, for example,

may be a place of destination of the delivery, and the transport type, for example, may be a transport type of the good or product delivery.

[0018] Step S13: the server 10 transmits the place of departure and the place of destination of each of the transportation data to the geographic information system 40, and obtains a transportation distance of each of the targets through the geographic information system 40.

[0019] In this embodiment, the server 10 is connected to the geographic information system 40 through an application programming interface (API). The server 10 transmits the place of departure and the place of destination of these transportation data to the geographic information system 40 in order. After receiving the place of departure and the place of destination of each of the transportation data, the geographic information system 40 calculates a distance between the place of departure and the place of destination, and transmits the distance back to the server 10 after calculation is completed, thereby generating the transportation distance. The transportation distance of each of the targets in this example is a single trip (unit: kilometer), but is not limited thereto. The transportation distance may also be a two-way trip. In this embodiment, the server 10 transmits a set of transportation data at a time, and the geographic information system replies with a set of transportation distances at a time.

[0020] Optionally, the server 10 obtains a transportation map 100 (referring to FIG. 3) of each of the targets through the geographic information system 40. The transportation map 100 is marked with a transportation route 101, and a distance of the transportation route 101 is the transportation distance. Preferably, the distance, the place of departure, and the place of destination are all marked on the transportation map 100.

The server 10 stores the transportation map 100 as an image file in the database 20, and establishes a corresponding relationship between the transport datum of each of the targets and each of the image files. After the server 10 obtains a transportation distance and a transportation map 100 of these targets, the server establishes a transportation inventory of these targets. The transportation inventory includes these transportation data, and these transportation maps 100 that correspond to these transportation data. The server 10 stores the transportation inventory in the database 20. In this way, the transportation inventory may serve as corroborative data of the transportation distance of these targets.

[0021] Step S14: the server 10 calculates a total transportation distance of these targets during a period of assessment according to these transportation distances of these targets.

[0022] In this embodiment, Step S14 includes: the electronic device 30 sets the period of assessment and the number of on-the-move days or the number of on-the-move times on the server 10. For example, the number of on-the-move days may be the number of went-to-work days or went-to-work times of the employee. For example, the enterprise personnel uses the electronic device 30 to type in the period of assessment and the number of on-the-move days of each of the targets in the interface provided by the server 10, which allows the server 10 to receive and obtain the period of assessment as well as the number of on-the-move days or the number of on-the-move times that are typed in by the electronic device 30. For example, the period of assessment may be a year, half a year, a season, or a month, and the start date and end date of the period of assessment may be typed in by the person. In other embodiments, the server 10 may also preset the period of assessment to be the previous year

of the current date.

[0023] In one embodiment, when a target is an employee on business trip, the number of on-the-move days is the number of days that the employee is on business trip during a period of assessment, and the number of on-the-move times is the number of times that the employee is on business trip during the period of assessment. In one embodiment, in a case where a target is a good or product to be delivered, the number of on-the-move days is the number of days that the target is delivered during a period of assessment, and the number of on-the-move times is the number of times that the target is delivered during the period of assessment.

[0024] The server 10 calculates an individual total transportation distance of each of the targets according to the number of on-the-move days or the number of on-the-move times of each of the targets during the period of assessment and the transportation distance of each of the targets. For example, in a case where the transportation distance is the distance of a single trip, an expression of the individual total transportation distance is: the number of on-the-move days $\times$ the transportation distance $\times$ 2, or the number of on-the-move times $\times$ the transportation distance $\times$ 2. In a case where the transportation distance is the distance of a two-way trip, an expression is: the number of on-the-move days $\times$ the transportation distance, or the number of on-the-move times $\times$ the transportation distance.

[0025] The server 10 can obtain the total transportation distance by adding up these individual total transportation distances of these employees. The total transportation distance is used to assess the Passenger-Kilometer (PKm) of carbon emissions.

[0026] In an embodiment, the target is an employee on business trip, and an expression of the individual total transportation distance is as described above. In one embodiment, in a case where the target is a good or product to be delivered, the expression of the individual total transportation distance depends on whether a return trip is involved. In a case where there is a return trip, the expression of the individual total transport is: the number of on-the-move days $\times$ the transportation distance $\times$ 2, or the number of on-the-move times $\times$ the transportation distance $\times$ 2, where the transportation distance is the distance of a single trip. In a case where there is no return trip, the expression of the individual total transportation distance is: the number of on-the-move days $\times$ the transportation distance $\times$ 1, or the number of on-the-move times $\times$ the transportation distance $\times$ 1, where the transportation distance is the distance of a single trip.

[0027] Step S15: the server 10 calculates an emission quantity of greenhouse gases of these targets during the period of assessment according to an emission factor corresponding to a transport type and the total transportation distance.

[0028] In this embodiment, the server 10 can preset different emission factors that correspond to different transport types. The server 10 obtains a corresponding emission factor according to a transport type (a gasoline-powered automobile). The emission factor is an emission quantity of CO₂ per kilometer. The server 10 can obtain an emission quantity of greenhouse gases of these targets that use one type of transport during the period of assessment by multiplying the total transportation distance and the emission factor, that is, the emission quantity of greenhouse gases of the commuting of these employees. In one

embodiment, in a case where the target is an employee on business trip, an emission quantity of greenhouse gases of these employees on business trip using one type of transport during the period of assessment can be obtained. In one embodiment, in a case where the target is a good or product to be delivered, an emission quantity of greenhouse gases of the goods or products to be delivered using one type of transport during the period of assessment can be obtained.

[0029] In this embodiment, the server 10 stores the calculated emission quantity of greenhouse gases in the database 20 to establish an emission source datum. The emission source datum further includes the transport type, the total transportation distance, and the emission quantity of greenhouse gases. This allows the emission source datum to be an activity datum used for carbon assessment of the enterprise.

[0030] FIG. 4 is a system for assessing carbon emissions in transportation 2 according to a second preferred embodiment of the present invention, which has an architecture approximately identical with that of the first embodiment, but differs in that: each of the targets in this embodiment is an employee. The server 10 can be connected to an attendance system 60 through the network 50. The attendance system 60 stores an attendance status of each of the employees every day. For example, the attendance status may be at work or on vacation. The method for assessing carbon emissions in transportation of this embodiment is approximately identical with that of the first embodiment, but differs in that: in Step S14, the server 10 is connected to the attendance system 60 and transmits the period of assessment as well as the name and/or employee number of each of the employees in each of the transportation data to the attendance system 60; according to the period of assessment as

well as the name and/or employee number of each of the employees transmitted by the server 10, the attendance system 60 searches an attendance status of each of the employees during the period of assessment, and transmits the number of went-to-work days of each of the employees during the period of assessment back to the server 10, where the number of went-to-work days constitutes the number of on-the-move days; or the server 10 transmits the number of went-to-work times of each of the employees during the period of assessment back to the server 10, where the number of went-to-work times constitutes the number of on-the-move times. In this way, the server 10 can automatically obtain the number of on-the-move days or the number of on-the-move times of each of the employees during the period of assessment, thereby improving the work efficiency.

[0031] As described above, according to the system for assessing carbon emissions in transportation and the method for assessing carbon emissions in transportation of the present invention, the transportation distance of the target can be automatically obtained, and the emission quantity of greenhouse gases of these targets during a period of assessment can be calculated, which effectively improves the work efficiency of carbon assessment, saves time and cost spent on work, and ensures the assessment accuracy of carbon emissions.

[0032] The above are only the preferred and feasible embodiments of the present invention, and all equivalent changes made by applying the specification of the present invention and the claims should be included in the patent scope of the present invention.

WHAT IS CLAIMED IS:

1. A method for assessing carbon emissions in transportation, comprising the following steps:

A. connecting an electronic device to a server;

B. establishing a plurality of transportation data corresponding to a plurality of targets in the server through the electronic device, each of the transportation data comprising a place of departure, a place of destination, and a transport type;

C. transmitting, by the server, the place of departure and the place of destination of each of the transportation data to a geographic information system, and obtaining a transportation distance of each of the targets through the geographic information system;

D. calculating, by the server, a total transportation distance of these targets during a period of assessment according to these transportation distances of these targets; and

E. calculating, by the server, an emission quantity of greenhouse gases of these targets during the period of assessment according to an emission factor corresponding to the transport type and the total transportation distance.

2. The method for assessing carbon emissions in transportation according to claim 1, wherein Step C comprises: obtaining a transportation map of each of the targets through the geographic information system, the transportation map being marked with a transportation route, and a distance of the transportation route being the transportation distance; and Step C further comprises: establishing a transportation inventory, the transportation inventory comprising these transportation data and these transportation maps that correspond to these transportation data, and storing, by the

server, the transportation inventory in a database.

3. The method for assessing carbon emissions in transportation according to claim 1, wherein in Step D, the server calculates an individual total transportation distance of each of the targets according to the number of on-the-move days or the number of on-the-move times of each of the targets during the period of assessment and the transportation distance of each of the targets; and the individual total transportation distances of these targets are summarized to obtain the total transportation distance.

4. The method for assessing carbon emissions in transportation according to claim 3, wherein Step D comprises: setting, by the electronic device, the period of assessment, and the number of on-the-move days or the number of on-the-move times of each of the targets during the period of assessment in the server.

5. The method for assessing carbon emissions in transportation according to claim 3, wherein each of the targets is an employee; and in Step D, the server is connected to an attendance system, and obtains the number of went-to-work days or the number of went-to-work times of each of the employees during the period of assessment from the attendance system, the number of went-to-work days constituting the number of on-the-move days, and the number of went-to-work times constituting the number of on-the-move times.

6. The method for assessing carbon emissions in transportation according to claim 1, wherein the server is connected to a database, and stores the emission quantity of greenhouse gases in the database to generate an emission source datum.

7. A system for assessing carbon emissions in transportation, configured to connect an electronic device and a geographic information system, and

comprising

a server connecting the electronic device and the geographic information system, wherein the server obtains a plurality of transportation data of a plurality of targets from the electronic device, and each of the transportation data comprises a place of departure, a place of destination, and a transport type; the server transmits the place of departure and the place of destination of each of the transportation data to the geographic information system, and obtains a transportation distance of each of the targets through the geographic information system; and The server calculates a total transportation distance of these targets during a period of assessment according to these transportation distances of these targets, and the server calculates an emission quantity of greenhouse gases of these targets during the period of assessment according to the total transportation distance and an emission factor of the transport type.

8. The system for assessing carbon emissions in transportation according to claim 7, comprising a database connected to the server, wherein the server obtains a transportation map of each of the targets through the geographic information system, the transportation map is marked with a transportation route, and a distance of the transportation route is the transportation distance; the server establishes a transportation inventory, the transportation inventory comprises these transportation data and these transportation maps that correspond to these transportation data; and the server stores the transportation inventory in the database.

9. The system for assessing carbon emissions in transportation according to claim 7, wherein the server calculates an individual total transportation distance of each of the targets according to the number of on-the-move days or the number of on-the-move times of each of the targets during the

period of assessment and the transportation distance of each of the targets, and adds up these individual total transportation distances of these targets to obtain the total transportation distance.

10. The system for assessing carbon emissions in transportation according to claim 9, wherein the server obtains the period of assessment and the number of on-the-move days or the number of on-the-move times of each of the employees during the period of assessment from the electronic device.

11. The system for assessing carbon emissions in transportation according to claim 9, wherein each of the targets is an employee; and the server is connected to an attendance system, and obtains the number of went-to-work days or the number of went-to-work times of each of the employees during the period of assessment from the attendance system, the number of went-to-work days constituting the number of on-the-move days, and the number of went-to-work times constituting the number of on-the-move times.

12. The system for assessing carbon emissions in transportation according to claim 7, comprising a database connected to the server, wherein the server stores the emission quantity of greenhouse gases in the database to generate an emission source datum.