

DESCRIPTION

Title of the Invention: Method for Generating Dispatch Plan

TECHNICAL FIELD

[1] The present disclosure relates to a method for a server to generate a dispatch plan for delivery orders. Specifically, the present disclosure relates to a method for generating a plan such that delivery may be performed most efficiently by using order information and vehicle information when a server generates a dispatch plan for a plurality of delivery orders.

BACKGROUND ART

[2] In general, purchasing of goods by a consumer refers to a case where the consumer checks goods directly or online and then pays the price of the goods to own the goods. Such purchasing of goods includes a case where the consumer visually checks and receives the goods on site, and a case where the consumer pays for the goods checked online and receives the goods later. Among the ways to receive goods later, there is a method of using parcel delivery.

[3] A method of using parcel delivery refers to directly delivering mail, packages, goods, and the like to a requested location, and for delivery, goods are collected at a collection hub, and the operation of delivering each to a destination is carried out.

[4] At this time, the delivery destinations of goods are different from each other, and the requirements for delivery are also different. Accordingly, delivery must be made using an appropriate vehicle while observing the targeted delivery time.

[5] In addition, due to a recent infectious disease situation, the number of consumers using parcel delivery to receive goods at home has increased, and accordingly, it has become an important issue for parcel logistics systems to ensure that delivery is performed using the minimum time and optimized routes.

[6] Accordingly, research on methods for dispatching vehicles such that smooth delivery and observance of delivery time are possible while minimizing the manpower of dispatch companies has been ongoing.

DETAILED DESCRIPTION OF THE INVENTION

Technical Problem

[7] An object of the present invention is to provide a method for separating deliverable zones and non-deliverable zones for each vehicle using zone information and operation time information of dispatch vehicles when a delivery company establishes a dispatch plan, thereby enabling delivery accordingly.

Solution to Problem

[8] In an embodiment of the present disclosure for solving the above-described problem, a method for generating a dispatch plan performed by a server may comprise: a step of acquiring first zone information including a zone designation of a plurality of zones for a dispatch vehicle; a step of generating second zone information associated with the designated plurality of zones; a step of registering the first zone information and the second zone information for the dispatch vehicle; and a step of generating a dispatch plan using the registered first zone information and the second zone information.

[9] The first zone information may be a deliverable zone of the dispatch vehicle, and the second zone information may be an overlapping zone among the first zone information.

[10] The step of generating the dispatch plan may generate a primary zone dispatch plan using a minimum travel route within the first zone information possessed by each of the dispatch vehicles.

[11] The step of generating the dispatch plan may generate, for a vehicle having an operation time equal to or greater than a first threshold value in the primary zone dispatch plan, a secondary zone dispatch plan in which delivery corresponding to the second zone information is excluded from the primary zone dispatch plan.

[12] A first zone including a vehicle having an operation time equal to or greater than the first threshold value in the secondary zone dispatch plan may allow dispatch of an external vehicle.

[13] The step of generating the dispatch plan may generate, for a vehicle having an operation time less than the first threshold value in the primary zone dispatch plan, a tertiary zone dispatch plan by additionally dispatching the order information of the second zone.

[14] The first zone information and the second zone information may include a preferred zone or an avoided zone, the preferred zone and the avoided zone may include cost information, and the third step may adjust the cost based on the cost information.

[15] The third step may assign a weight to the cost within the avoided zone.

[16] The third step may, when the avoided zone and the preferred zone overlap, deduct a predetermined amount from the cost for the overlapping zone.

[17] The fourth step may generate a dispatch plan such that the cost is minimized, and when the costs are identical, may generate the dispatch plan by selecting a priority for an optimal route.

Advantageous Effects of Invention

[18] According to an embodiment of the present disclosure, there is an effect of forming a delivery route that meets the conditions of each vehicle in the process of accumulating goods in a warehouse according to goods orders and delivering the goods to consumers, thereby enabling customized delivery for each vehicle.

[19] In addition, there is an effect of preventing a phenomenon of workload imbalance per vehicle, where excessive workload or insufficient workload is assigned during delivery.

Brief Description of Drawings

[20] FIG. 1 is a diagram schematically illustrating a conceptual view in which automatic dispatch is performed by a server according to an embodiment of the present disclosure.

[21] FIG. 2 is a diagram schematically illustrating each step of a method for optimizing operation time of a dispatch vehicle according to a first embodiment of the present disclosure.

[22] FIG. 3 is a diagram schematically illustrating a process of the method for optimizing operation time of a dispatch vehicle according to the first embodiment of the present disclosure.

[23] FIG. 4 is a diagram schematically illustrating a process of a method for generating a dispatch plan according to a second embodiment of the present disclosure.

[24] FIG. 5 is a diagram schematically illustrating an example of the method for generating a dispatch plan according to the second embodiment of the present disclosure.

[25] FIG. 6 is a diagram schematically illustrating an example of a method for generating a dispatch plan according to a third embodiment of the present disclosure.

[26] FIG. 7 is a diagram schematically illustrating an example of a process of a method for generating a dispatch plan using a clustering method according to a fourth embodiment of the present disclosure.

[27] FIG. 8 is a diagram schematically illustrating another example of the method for generating a dispatch plan using a clustering method according to the fourth embodiment of the present disclosure.

[28] FIG. 9 is a diagram for describing a server according to an embodiment of the present disclosure.

[29] FIG. 10 is a general schematic diagram of an exemplary server environment in which embodiments of the present disclosure may be implemented.

MODE FOR CARRYING OUT THE INVENTION

[30] Various embodiments will now be described with reference to the drawings. In this specification, various descriptions are presented to provide an understanding of the present disclosure. However, it is apparent that such embodiments may be practiced without such specific descriptions.

[31] The terms "component," "module," and "system" and the like used in this specification refer to a computer-related entity, hardware, firmware, software, a combination of software and hardware, or execution of software. For example, a component may be, but is not limited to, a procedure running on a processor, a processor, an object, an execution thread, a program, and/or a computer. For example, both an application running on a server and the server may be components. One or more components may reside within a processor and/or an execution thread. One component may be localized within one computer. One component may be distributed between two or more computers. In addition, such components may execute from various computer-readable media having various data structures stored therein. Components may communicate via local and/or remote processes according to a signal having one or more data packets (e.g., data from one component interacting with another component in a local system, a distributed system, and/or data transmitted to other systems over a network such as the Internet).

[32] Further, the term "or" is intended to mean an inclusive "or" rather than an exclusive "or." That is, unless otherwise specified or clear from the context, "X uses A or B" is intended to mean any of the natural inclusive substitutions. That is, "X uses A or B" may

be applied to any of the following cases: X uses A; X uses B; or X uses both A and B. In addition, the term "and/or" as used in this specification should be understood to refer to and include all possible combinations of one or more of the associated listed items.

[33] In addition, the terms "comprises" and/or "comprising" should be understood to mean that the corresponding features and/or components are present. However, the terms "comprises" and/or "comprising" should be understood as not excluding the presence or addition of one or more other features, components, and/or groups thereof. In addition, unless otherwise specified or where the context does not clearly indicate a singular form, the singular in this specification and claims should generally be construed to mean "one or more."

[34] Further, the term "at least one of A or B" should be construed to mean "a case of including only A," "a case of including only B," and "a case of a combination of A and B."

[35] Those skilled in the art will additionally recognize that various exemplary logical blocks, configurations, modules, circuits, means, logics, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software, or combinations of both. To clearly illustrate the interchangeability of hardware and software, various exemplary components, blocks, configurations, means, logics, modules, circuits, and steps have been described above generally in terms of their functionality. Whether such functionality is implemented as hardware or as software depends on the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application. However, such implementation decisions should not be construed as departing from the scope of the present disclosure.

[36] The description of the presented embodiments is provided so that a person having ordinary knowledge in the technical field of the present disclosure may use or practice the present invention. Various modifications to these embodiments will be apparent to a person having ordinary knowledge in the technical field of the present disclosure. General principles defined herein may be applied to other embodiments without departing from the scope of the present disclosure. Accordingly, the present invention is not limited to the embodiments presented herein. The present invention should be construed in the broadest scope consistent with the principles and novel features presented herein.

[38] Hereinafter, the present disclosure will be described with reference to the drawings.

[40] FIG. 1 is a diagram schematically illustrating a conceptual view in which automatic dispatch is performed by a server according to an embodiment of the present disclosure, FIG. 2 is a diagram schematically illustrating each step of the method for optimizing operation time of a dispatch vehicle according to the first embodiment of the present disclosure, FIG. 3 is a diagram schematically illustrating a process of the method for optimizing operation time of a dispatch vehicle according to the first embodiment of the present disclosure, FIG. 4 is a diagram schematically illustrating a process of the method for generating a dispatch plan according to the second embodiment of the present disclosure, FIG. 5 is a diagram schematically illustrating an example of the method for generating a dispatch plan according to the second embodiment of the present disclosure, FIG. 6 is a diagram schematically illustrating an example of the method for generating a dispatch plan according to the third embodiment of the present disclosure, FIG. 7 is a diagram schematically illustrating an example of a process of the method for generating a dispatch plan using a clustering method according to the fourth embodiment of the present disclosure, FIG. 8 is a diagram schematically illustrating another example of the method for generating a dispatch plan using a clustering method according to the fourth embodiment of the present disclosure, FIG. 9 is a diagram for describing a server according to an embodiment of the present disclosure, and FIG. 10 is a general schematic diagram of an exemplary server environment in which embodiments of the present disclosure may be implemented.

[42] Referring to FIG. 1, the present disclosure relates to a method for optimizing dispatch of delivery vehicles performed by a server (100), wherein the server (100) acquires order information from a consumer (terminal), acquires information on each delivery vehicle for delivery, and automatically calculates an efficient dispatch for each vehicle and may recommend dispatch result information to the delivery vehicles. Hereinafter, a detailed description will be given through various embodiments.

[44] According to the first embodiment of the present disclosure with reference to FIG. 2, as a method for optimizing operation time of a dispatch vehicle performed by the server (100), when an order for goods purchase is received, the server (100) may automatically calculate and recommend dispatch for delivering each goods through delivery destination information for each order information. In more detail, the method may comprise: a first step (S210) of setting a maximum operation time of a dispatch vehicle; a second step

(S220) of generating a dispatch plan (here, the dispatch plan includes an operation time according to an operation route) in consideration of the maximum operation time; a third step (S230) of performing verification on the dispatch plan using the order information; and a fourth step (S240) of searching for a value at which the maximum operation time is minimized by changing the maximum operation time and repeatedly performing the second step (S220) and the third step (S230) for the changed maximum operation time.

[45] Here, the maximum operation time of a dispatch vehicle may be a sum of all the maximum operation times that each of the plurality of dispatch vehicles may have as a maximum operation time for the plurality of dispatch vehicles. In addition, it may be a maximum operation time per vehicle.

[46] In addition, the order information may be information on goods purchases by consumers. Specifically, the order information may be information such as delivery goods, a collection hub (origin) of the goods, a delivery destination (destination) of the goods, and the like, and may be information acquired through a consumer terminal. In addition, the dispatch plan may be a plan for delivering goods to a delivery destination based on the order information.

[47] In addition, the first step (S210) may be that the server (100) designates the maximum operation time for each of the dispatch vehicles. Here, the maximum operation time may mean that a maximum operation time for each individual vehicle is designated, and may be a sum of all the individual maximum operation times.

[48] In addition, the second step (S220) may generate a route operable within the maximum operation time per vehicle. That is, the second step may generate a dispatch plan using the shortest distance route that may be traveled within the maximum operation time.

[49] In addition, the third step (S230) may perform verification on the dispatch plan generated in the second step (S220). That is, the third step may verify whether delivery according to the dispatch plan is performed via the shortest distance and the shortest time.

[50] In addition, the fourth step may search for maximum efficiency through change of the maximum operation time for the dispatch plan verified through the third step (S230). Specifically, the maximum operation time may be changed so that the dispatch plan may be achieved in the shortest time using the shortest distance.

[52] According to the first embodiment of the present disclosure, in the first step (S210), the maximum operation time may be arbitrarily set by the server (100) for each of the dispatch vehicles.

[53] That is, the server (100) may arbitrarily designate the maximum operation time and calculate a travel route and a travel time according to the designated maximum operation time. The arbitrarily designated maximum operation time may be designated as 12 hours or less based on one day. This may be because when one vehicle operates, manpower is deployed, and the maximum operation time is designated within an environment in which the manpower may work.

[55] According to the first embodiment of the present disclosure, the second step (S220) may generate a dispatch plan having a maximum operation route that is operable during the maximum operation time for each of the dispatch vehicles.

[56] Here, the operable operation route is formed of roads that are travelable and roads that are non-travelable according to characteristics of each vehicle, and may be a route that travels on travelable roads. Such a route may be a route that travels to the next delivery destination via the shortest distance on travelable roads. In addition, the dispatch plan may be a plan that calculates travel routes for the maximum operation time per vehicle and collects all the calculated travel routes. The travel route may be a travel route of a delivery vehicle with each delivery destination as a waypoint.

[58] According to the first embodiment of the present disclosure, the order information in the third step (S230) is delivery information including an origin and a destination, and may classify the dispatch plan as a feasible dispatch plan when the dispatch plan enables delivery for all of the order information.

[59] Here, the feasible dispatch plan refers to a case in which an operation route is calculated within the maximum operation time per vehicle, and all deliveries in the order information are fulfilled for all the calculated operation routes. That is, when classified as a feasible dispatch plan, it means that all orders that should be delivered according to the order information are deliverable.

[60] However, when the feasible dispatch plan is completed, there may be cases where the entire maximum operation time is used, and the dispatch plan may be completed within the maximum operation time. That is, it means that delivery is performed within the maximum operation time.

[62] According to the first embodiment of the present disclosure, the third step (S230) may classify the dispatch plan as an infeasible dispatch plan when delivery for all of the order information is not possible according to the dispatch plan.

[63] Here, the infeasible dispatch plan means a case where all deliveries of the order information cannot be fulfilled within the maximum operation time per vehicle. That is, it means that although the travel route using all of the maximum operation time per vehicle was established as the dispatch plan, surplus deliveries remain. When classified as the infeasible dispatch plan, additional dispatch is required for the surplus deliveries, and a description thereof will be given below.

[65] According to the first embodiment of the present disclosure with reference to FIG. 3, the fourth step (S240), when the dispatch plan is classified as the feasible dispatch plan, may reduce the maximum operation time and repeatedly perform the second step (S220) and the third step (S230), and when the changed maximum operation time is classified as the infeasible dispatch plan, may determine the dispatch plan for the maximum operation time before the change as a first modified dispatch plan.

[66] Here, the first modified dispatch plan may be a dispatch plan having the minimum value of the maximum operation time by going through the first step (S210) to the fourth step. That is, it may be a dispatch plan in which dispatch for each delivery is completed and the dispatch is recommended.

[67] In addition, the feasible dispatch plan is a dispatch plan in which delivery of the order information is all possible among the dispatch plans according to the arbitrary maximum operation time designated by the server (100), but conversely, it means that there are fewer delivery orders relative to the vehicles. That is, when there are too few deliveries, there may be vehicles that do not proceed with transportation at all. This may lead to waste of manpower and vehicles.

[68] Accordingly, the server (100) adjusts the maximum operation time and goes through additional steps. In more detail, since delivery is completed within the maximum operation time, the dispatch plan may be recalculated by reducing the maximum operation time. That is, this may be for finding the maximum operation time at which maximum efficiency may be achieved while using the minimum vehicles and operation time.

[69] As described above, when the maximum operation time is reduced, the second step (S220) and the third step (S230) are performed again, whereby the dispatch plan

according to the changed maximum operation time is classified as feasible or infeasible. Here, when classified as the feasible dispatch plan again, the maximum operation time is further reduced, and the second step (S220) and the third step (S230) are performed using the further reduced maximum operation time. As a result, when the generated dispatch plan is classified as the infeasible dispatch plan, the dispatch plan is not usable, and the feasible dispatch plan using the maximum operation time before the immediately preceding change may be classified as the first modified dispatch plan.

[70] For example, when dispatching for 4 vehicles, if the dispatch plan is established by designating the arbitrary maximum operation time as 8, 8, 8, 8, and the result is classified as the feasible dispatch plan, the arbitrary maximum operation time may be changed to 7, 7, 7, 7 to re-establish the dispatch plan. Thereafter, if the dispatch plan according to the changed maximum operation time is classified as the feasible dispatch plan, the arbitrary maximum operation time may be changed to 6, 6, 6, 6 to re-establish the dispatch plan. Then, if the dispatch plan according to the changed maximum operation time is classified as the infeasible dispatch plan, the dispatch plan using the maximum operation time 7, 7, 7, 7 before the previous change may be determined as the first modified dispatch plan. Accordingly, it is possible to search for a value at which the maximum operation time is minimized, and the operation efficiency per vehicle may be maximized.

[72] According to the first embodiment of the present disclosure, the fourth step (S240), when the dispatch plan is classified as the infeasible dispatch plan, may expand the maximum operation time and repeatedly perform the second step (S220) and the third step (S230), and may determine the dispatch plan for the changed maximum operation time as a second modified dispatch plan.

[73] Here, since the infeasible dispatch plan means that the dispatch plan according to the arbitrary maximum operation time designated by the server (100) is infeasible, measures are taken to enable dispatch. That is, the server (100) expands and changes the maximum operation time and additionally performs the second step (S220) and the third step (S230). Accordingly, when the generated dispatch plan is classified as the feasible dispatch plan, the feasible dispatch plan may be determined as the second modified dispatch plan.

[74] For example, if the server (100) designates the initial arbitrary maximum operation time as 7, 7, 7, 7 for 4 vehicles and generates the dispatch plan through the second step (S220) and the third step (S230), but the dispatch plan is classified as the infeasible

dispatch plan, the maximum operation time is changed to 8, 8, 8, 8 and the second step (S220) and the third step (S230) are additionally performed. Thereafter, if the generated dispatch plan is classified as the infeasible dispatch plan, the maximum operation time is additionally changed to 9, 9, 9, 9 and the second step and the third step (S230) are performed. Then, if the generated dispatch plan is classified as the feasible dispatch plan, the dispatch plan may be determined as the second modified dispatch plan. That is, the dispatch plan generated by designating the maximum operation time as 9, 9, 9, 9 may be determined as the second modified dispatch plan. Accordingly, there is an effect of enabling delivery with maximum efficiency from a dispatch where delivery was not possible with 4 vehicles.

[76] According to the first embodiment of the present disclosure, when the maximum operation time for each of the dispatch vehicles of the modified dispatch plan exceeds 10 hours per day, an additional vehicle may be assigned, and when the maximum operation time for each of the dispatch vehicles of the modified dispatch plan is less than 4 hours per day, the number of vehicles may be reduced.

[77] Here, the modified dispatch plan may include both the first modified dispatch plan and the second modified dispatch plan.

[78] In addition, the additional vehicle may increase the number of vehicles used in the same region. That is, when delivery is not possible, it may enable delivery through the additional vehicle. In addition, conversely, when the number of vehicles used in the same region is excessive, the number of vehicles may be reduced.

[79] For example, when one or more vehicles among the maximum operation times per vehicle according to the modified dispatch plan require operation exceeding 10 hours per day, the server (100) may assign an additional vehicle and regenerate when designating the initial arbitrary maximum operation time. In addition, when one or more vehicles among the maximum operation times per vehicle according to the modified dispatch plan operate for less than 4 hours per day, the server (100) may reduce the number of vehicles and regenerate when designating the initial arbitrary maximum operation time. As described above, the server (100) may establish a dispatch plan using the number of vehicles and the maximum operation time per vehicle, thereby enabling delivery to be performed with the minimum vehicles and minimum operation time for delivery in the same region.

[81] The method for generating a dispatch plan according to the second embodiment of the present disclosure, performed by the server (100) with reference to FIGS. 4 and 5, may

comprise: a first step of acquiring first zone information (510) including a zone designation of a plurality of zones for a dispatch vehicle; a second step of generating second zone information (520) associated with the designated plurality of zones; a third step of registering the first zone information (510) and the second zone information (520) for the dispatch vehicle; and a fourth step of generating a dispatch plan using the registered first zone information (510) and the second zone information (520).

[82] Here, the method for generating a dispatch plan may designate a vehicle for each zone, register the designated information for each zone, and generate a dispatch plan based on the registered zone information.

[84] According to the second embodiment of the present disclosure, the first zone information (510) may be a deliverable zone of the dispatch vehicle, and the second zone information (520) may be an overlapping zone among the first zone information (510).

[85] Specifically, the zone information is information acquired by the server (100), and may be information input by each vehicle, information stored in the server (100), or information acquired from the web. In addition, the first zone information (510) may be information on the deliverable zone for each vehicle, and may be a zone for a plurality of vehicles. In addition, the second zone information (520) may separately manage information on portions where a region according to the first zone information (510) overlaps with a region according to another first zone information (510). The server (100) may maximize efficiency of goods delivery by separately managing the first zone information (510) and the second zone information (520).

[86] As described above, the second zone information (520) is generated based on the acquired first zone information (510) and managed separately, and the management efficiency may be maximized by registering the first zone information (510) and the second zone information (520) for each of the dispatch vehicles.

[88] According to the second embodiment of the present disclosure, the step of generating the dispatch plan may generate a primary zone dispatch plan using a minimum travel route within the first zone information (510) possessed by each of the dispatch vehicles.

[89] Here, each of the dispatch vehicles may have the first zone information (510). The first zone information (510) is information on the zone in which the dispatch vehicle performs delivery, and when generating a plan for delivery in the zone, it may search for a

minimum route through which delivery within the zone may be performed. That is, it may enable delivery to be performed using the shortest time and the shortest distance. However, the primary zone dispatch plan is not a plan using the shortest time and the shortest distance, and the shortest time and shortest distance delivery may be enabled through additional steps.

[91] According to the second embodiment of the present disclosure, the step of generating the dispatch plan may generate, for a vehicle having an operation time of 8 hours or more in the primary zone dispatch plan, a secondary zone dispatch plan in which delivery corresponding to the second zone information (520) is excluded.

[92] Here, the primary zone dispatch plan may relate to routes for delivery via the shortest distance within the zone per vehicle, and accordingly, the operation time per vehicle may differ. Among them, for vehicles having an operation time exceeding 8 hours, dispatch for delivery corresponding to the second zone information (520) from the primary zone dispatch plan may be excluded and the dispatch plan may be regenerated.

[93] For example, when the operation time of the first vehicle in FIG. 5 is 8 hours or more, the existing route had a path of a-1 -> a-2 -> b-1 -> b-2 for delivering a and b, but delivery of a and b corresponding to the second zone information (520) may be excluded, and delivery may be performed through a-3 and b-3, and the dispatch plan generated accordingly may be the secondary zone dispatch plan. The secondary zone dispatch plan accordingly has fewer delivery destinations for the first vehicle, thereby reducing delivery time. A detailed description of the excluded a and b will be given below.

[95] According to the second embodiment of the present disclosure, a first zone including a vehicle having an operation time of 8 hours or more in the secondary zone dispatch plan may allow dispatch of an external vehicle.

[96] Here, even though the secondary zone dispatch plan is a state in which delivery corresponding to the second zone information (520) is excluded, a case where the operation time of the first vehicle exceeds 8 hours may occur, and accordingly, surplus delivery points (P) that are canceled or excluded from delivery within the first zone may occur. A detailed description will be given below.

[98] According to the second embodiment of the present disclosure, the fourth step of generating the dispatch plan may generate, for a vehicle having an operation time of less than 8 hours in the primary zone dispatch plan, a tertiary zone dispatch plan by additionally dispatching the order information of the second zone.

[99] Here, the second vehicle has an operation time of less than 8 hours according to the primary zone dispatch plan, and when no additional delivery exists within the first zone of the second vehicle, the second vehicle may additionally deliver for delivery outside the first zone.

[100] For example, delivery of a and b has been excluded from the first vehicle, and additional dispatch for a and b is needed. The additional dispatch may be performed by the second vehicle. When the dispatch plan for the second vehicle is generated through c-1 but the operation time therefor is less than 8 hours, additional dispatch for a and b may be performed. That is, the c-1 route may be excluded, and a tertiary zone dispatch plan may be generated as a dispatch plan that enables delivery of a and b through the travel route of c-2 -> c-3 -> c-4. According to the tertiary zone dispatch plan, delivery may be performed without any gap for delivery destinations within the second zone information (520).

[102] According to the second embodiment of the present disclosure, a vehicle having an operation time of less than 4 hours in the tertiary zone dispatch plan may additionally dispatch to the first zone of another vehicle.

[103] Here, a vehicle having an operation time of less than 4 hours according to the tertiary zone dispatch plan may lead to waste of vehicles and operation time. Accordingly, additional dispatch may be enabled.

[104] Specifically, in the secondary zone dispatch plan, which is operation within the first zone per vehicle, when the maximum operation time is exceeded, delivery destinations where delivery is not performed may occur. Accordingly, delivery for the corresponding delivery destinations may be dispatched to an external vehicle.

[105] For example, when surplus delivery points (P) occur because the operation time of the first vehicle is exceeded, the operation of the surplus delivery points may be performed by the third vehicle having an operation time of less than 4 hours. That is, the operation of the first vehicle having excessive delivery and operation time may be distributed to the third vehicle having insufficient delivery and operation time, thereby maximizing delivery efficiency per vehicle.

[106] According to the second embodiment of the present disclosure, a first zone including a vehicle having an operation time of less than 4 hours in the tertiary zone dispatch plan may restrict dispatch of an external vehicle.

[107] Specifically, when a vehicle having an operation time of less than 4 hours is included even after the dispatch plan generation within the first zone per vehicle is completed, an external vehicle entering the first zone may be restricted.

[108] For example, entry of an external vehicle (E) into the first zone including the second vehicle and the third vehicle may be restricted. In addition, entry from the first zone including the second vehicle and the third vehicle to the outside may be possible.

[109] As described above, when dispatch plans for each situation of the primary through tertiary zone dispatch plans are generated, the dispatch plan may be generated as a final dispatch plan. The generated final dispatch plan may be recommended to each vehicle.

[111] The method for generating a dispatch plan according to the third embodiment of the present disclosure, performed by the server (100) with reference to FIG. 6, may comprise: a first step of registering zone information (here, the zone information includes information on a preferred zone (610) or an avoided zone (620)) for a dispatch vehicle; a second step of generating a cost matrix using the zone information; a third step of adjusting the cost of the cost matrix using the zone information on the preferred zone (610) or the avoided zone (620); and a fourth step of generating a dispatch plan using the adjusted cost matrix.

[112] Here, the preferred zone may be information on a zone preferred by each vehicle, and the avoided zone (620) may be information on a zone avoided by each vehicle. For example, when generating a dispatch plan for the Gangnam-gu district, the first vehicle may form Gaepo-dong, Irwon-dong, and Segok-dong as the avoided zone (620), and may set Daechi-dong, Yeoksam-dong, Nonhyeon-dong, and Cheongdam-dong as the preferred zone (610).

[113] In addition, the server (100) on which the zone information is registered may designate a cost according to movement per delivery destination and may generate a dispatch plan based on the respective costs.

[115] According to the third embodiment of the present disclosure, the zone information may be designated per vehicle, and the cost matrix may designate a cost proportional to the travel distance from an arbitrary delivery destination to an adjacent delivery destination.

[116] Here, the zone information, namely the preferred zone (610) and the avoided zone (620), designates the content registered per vehicle. In addition, the cost matrix has a shape formed by routes (H) connecting a plurality of delivery destinations (M) as illustrated

in FIG. 6, and each line has a cost value. The cost may be formed in proportion to the travel distance on the route from a first delivery destination to a second delivery destination.

[118] According to the third embodiment of the present disclosure, the third step of adjusting the cost may assign a weight to the cost within the avoided zone (620).

[119] Here, the cost is assigned per delivery destination of the preferred zone (610) and the avoided zone (620), and a weight may be assigned for differentiation of the avoided zone (620) per vehicle.

[120] Here, the weight may be assigned to all routes (H) connected to delivery destinations located in the avoided zone (620) among the entire cost matrix. As illustrated in FIG. 6, for example, if a cost of 5 per 1 km is assigned to routes within the preferred zone (610), a cost of 25 per 1 km may be assigned to routes within the avoided zone (620). That is, a cost of 5 times may be assigned. Accordingly, when the server (100) generates a dispatch plan based on the cost, the preferred zone (610) and the avoided zone (620) per vehicle may be distinguished such that delivery destinations of the preferred zone (610) are preferentially selected.

[122] According to the third embodiment of the present disclosure, the third step of adjusting the cost may deduct 50% from the cost for the overlapping zone when the preferred zone (610) and the avoided zone (620) overlap.

[123] Here, the overlapping zone matrix (b1) of the preferred zone (610) and the avoided zone (620) is a matrix formed separately from the preferred zone matrix (a1) and the avoided zone matrix (c1). Specifically, the overlapping zone (b1) is the avoided zone (620) but, because it is adjacent to the preferred zone (610), may be a zone where delivery is flexibly possible, unlike the avoided zone matrix (c1).

[124] Accordingly, by having a lower cost compared to the matrix of the avoided zone (620), partial delivery may be enabled. For example, when the avoided zone cost is 25 per 1 km, the cost of the overlapping zone (b1) may be 12.5, which is 50% deducted from the avoided zone cost.

[126] According to the third embodiment of the present disclosure, the third step of adjusting the cost may designate, when a plurality of delivery destinations having a value equal to or less than the average of the costs are gathered, the group of delivery destinations as a low-cost delivery point.

[127] Specifically, the low-cost delivery point (d1) may be designated for each of the preferred zone matrix (a1), the overlapping zone matrix (b1), and the avoided zone matrix (c1). This may be because when calculating the average of the avoided zone matrix (c1) with assigned weights and the preferred zone matrix (a1) without assigned weights, the cost of the preferred zone matrix (a1) may be designated significantly low.

[128] For example, when a plurality of delivery destinations having a cost of 1 or less are generated within the preferred zone matrix (a1), the delivery destinations may be designated as a separate low-cost delivery point (d1), and a cost may be assigned from the low-cost delivery point (d1) to an adjacent node.

[130] According to the third embodiment of the present disclosure, the third step of adjusting the cost may, when the dispatch vehicle enters and delivers in the overlapping zone from the preferred zone (610) according to the dispatch plan, recover the cost weight for the overlapping zone.

[131] Specifically, in the step of generating a dispatch plan for a vehicle departing from the preferred zone (610), a case where the entry cost to the overlapping zone is lower than the entry cost to the preferred zone (610) may occur. In such a case, when calculating the cost for the next delivery destination of the vehicle that has entered the overlapping zone, the cost weight for the overlapping zone may be recovered such that the cost is the same as the cost of the preferred zone (610). For example, if a cost of 5 per 1 km is assigned in the preferred zone (610) and a cost of 12.5 per 1 km is assigned in the overlapping zone, when the dispatch vehicle enters the overlapping zone, the cost in the overlapping zone may be changed to 5 per 1 km to generate the dispatch plan. In such a case, delivery from a delivery destination within the preferred zone (610) to an extremely proximate delivery destination in the overlapping zone is possible, and as additional dispatch to an adjacent delivery destination is made, delivery efficiency in the overall dispatch plan may be maximized.

[133] According to the third embodiment of the present disclosure, the fourth step of generating the dispatch plan may generate a dispatch plan such that the cost is minimized, and when the costs are identical, may generate a dispatch plan by selecting a priority in order of shortest operation time.

[134] As described above, the method for generating a dispatch plan of the present disclosure generates a dispatch plan based on the cost. At this time, a plurality of dispatch plans may be generated, and the most efficient dispatch plan among the plurality of dispatch

plans must be selected. To this end, the server (100) may select dispatch plans having identical costs, and among the selected dispatch plans, may select the priority in order of shortest operation time of the vehicle. That is, having identical costs may mean that various variables such as travel distance or zone movement are applied. Among these, when the operation time is short, efficiency per vehicle may be maximized.

[135] For example, between z dispatch plan and x dispatch plan having the same cost, the z dispatch plan is formed so that delivery is performed only within the preferred zone (610), and when the x dispatch plan enters from the preferred zone (610) to the overlapping zone, the x dispatch plan having entered the overlapping zone with a higher cost compared to the preferred zone (610) may have a very short operation time compared to the z dispatch plan that moved only within the preferred zone (610). Specifically, when entering from the preferred zone (610) to the overlapping zone, the comparison cost is high, so the travel distance per delivery destination must be very close to enable entry. Accordingly, the operation time may become very short. Using such a method, it may be possible to generate a dispatch plan with short travel distances per delivery destination and short operation time.

[137] According to the third embodiment of the present disclosure, the third step of adjusting the cost may set an obstruction route (including a river, a construction site, and a road with severe traffic congestion) that impedes the movement of a vehicle within the zone, and the step of generating the dispatch plan may generate, as a final dispatch plan, a highest-priority dispatch plan among dispatch plans excluding the dispatch plan including the obstruction route from the dispatch plan having the priority.

[138] Here, the obstruction route includes a river, a construction site, a road with severe traffic congestion, and the like. That is, it may be any factor that impedes vehicle movement.

[139] In addition, the highest-priority dispatch plan may be the dispatch plan of the highest priority among the dispatch plans having the priority. That is, it may be a dispatch plan with the lowest cost, the shortest operation time, and from which the obstruction route is removed.

[140] That is, since the cost lacks information on the obstruction route, it may have an operation time that is not proportional to the delivery distance. To prevent this, the obstruction route may be separately set and used to minimize delivery time and delivery distance.

[141] Finally, the highest-priority dispatch plan from which the obstruction route is excluded is ultimately generated as the dispatch plan, and may be recommended to each vehicle.

[143] The method for generating a dispatch plan using a clustering method according to the fourth embodiment of the present disclosure with reference to FIGS. 7 and 8 may comprise: a first step of generating a cluster in which a plurality of pieces of order information are grouped; a second step of determining a priority among the clusters; a third step of generating a dispatch plan for each cluster; a fourth step of regenerating the dispatch plan based on the dispatch plan for each cluster and the priority; and a fifth step of adjusting the dispatch plan using zone information per dispatch vehicle.

[144] Here, a cluster may be formed by grouping delivery destinations that are related (nearby delivery destinations, delivery destinations in the same district, and the like). When there are excessively many delivery destinations, the server (100) may become overloaded as the number of computations increases. To prevent this, computation may be performed by forming clusters.

[145] In addition, the first step of generating a cluster groups a plurality of pieces of order information (including an origin and a destination) into clusters, and the clusters may be formed by region.

[146] In addition, the second step of determining the priority may select a priority for each of the generated clusters. Specifically, the priority of a cluster including an origin may be raised, and a cluster that is proximate thereafter may be formed as the next priority. That is, the priority of the clusters may be formed in order of closest distance, but this is not limited thereto.

[147] In addition, the third step of generating a dispatch plan may generate a dispatch plan according to delivery destinations within each of the preset clusters. That is, a plurality of clusters may each have a dispatch plan formed therein.

[148] In addition, the fourth step of regenerating the dispatch plan may regenerate the dispatch plan based on the priority among the clusters and the dispatch plan for each cluster. That is, it may be an overall delivery plan that includes both the intra-cluster plan and the priority among the clusters.

[149] In addition, the fifth step of adjusting the dispatch plan may generate a final delivery plan through additional adjustments based on the zone information per vehicle from

the overall delivery plan. The final delivery plan generated as described above may be recommended by the server (100) to each vehicle.

[151] According to the fourth embodiment of the present disclosure, the first step of generating the cluster may group delivery destinations having a closest straight-line distance among the delivery destinations of the order information into clusters, and may group the clusters by designating a maximum value of the weight or volume of goods delivered within the cluster.

[152] Here, the clusters are formed using the straight-line distance between delivery destinations, and may be formed such that the size of the maximum cluster is limited.

[153] In addition, the clusters may be grouped by limiting the maximum volume of the weight or volume of goods delivered within the cluster. By placing limits as described above, the size of the clusters may be prevented from expanding infinitely. In addition, it may be possible to control the clusters to have an appropriate size.

[155] According to the fourth embodiment of the present disclosure, the second step of determining the priority may determine a cluster having the closest straight-line distance from a warehouse from which the dispatch vehicle departs as the first priority, and may determine a cluster closest to the n-th priority cluster as the (n+1)-th priority.

[156] Here, a warehouse may be a place where parcel goods are gathered. That is, it may be a place where goods are collected with shipping labels attached to be distributed to parcel vehicles when parcel orders come in. That is, it may be a place that the dispatch vehicle must necessarily pass through to load goods.

[157] In addition, a cluster having the closest straight-line distance from the warehouse is determined as the first priority, and a cluster closest to the first-priority cluster is designated as the second-priority cluster. Referring to FIG. 7(b), for example, the a2 cluster closest to the warehouse becomes the first priority, and the b2 cluster closest to the a2 cluster may become the second priority. In this manner, priority is determined for the clusters. In addition, the priority may be assigned in consideration of the distance to the warehouse to which the parcel vehicle must return. For example, clusters more than 100 km away from the warehouse may be excluded from the priority.

[159] According to the fourth embodiment of the present disclosure, the third step of generating the dispatch plan may generate the dispatch plan in a direction from the n-th

priority cluster to the (n+1)-th priority cluster within the cluster, and may generate a route having the minimum travel distance within the cluster as the dispatch plan.

[160] Here, the third step of generating the dispatch plan may generate a dispatch plan for each delivery destination within the cluster. At this time, the dispatch plan may be generated in the direction of the next-priority cluster. Alternatively, the dispatch plan may be formed such that the last dispatch in the current-priority cluster ends in the direction of the next-priority cluster.

[161] As a specific example, as illustrated in FIG. 7(c), the dispatch plan within the first-priority cluster a2 proceeds in the direction of the second-priority cluster b2, and the last delivery destination may be formed at a location close to b2. In addition, the dispatch plan within the second-priority cluster b2 is generated in the direction of the third-priority cluster d2, and the last delivery destination may be formed at a location close to the fourth-priority cluster c2.

[163] According to the fourth embodiment of the present disclosure, the fourth step of regenerating the dispatch plan may generate the final dispatch plan by designating, as the departure point, a delivery destination of the (n+1)-th priority cluster having the shortest travel distance from the final destination of the n-th priority cluster.

[164] The method for generating a dispatch plan of the present disclosure may generate an optimized dispatch plan by minimizing delivery distance and delivery time. To this end, when generating a dispatch plan within the current-priority cluster, the dispatch plan is generated in a direction close to the next-priority cluster. In conjunction therewith, when heading from the last delivery destination of the current priority to the next-priority cluster, the closest delivery destination may be generated as the first delivery destination of the next-priority cluster. That is, when the dispatch vehicle moves between clusters, the entry to the next cluster may be optimized such that movement may be made in the minimum distance.

[166] According to the fourth embodiment of the present disclosure, in the fifth step of adjusting the dispatch plan, the zone information includes the preferred zone (610) and the avoided zone (620), and delivery destinations that deviate from the preferred zone (610) in the dispatch plan may be excluded.

[167] Here, the zone information may be zone information per vehicle. That is, the zone desired by the vehicle may be the preferred zone (610), and the zone avoided by the vehicle may be the avoided zone (620). According to the zone information, delivery

destinations for the preferred zone (610) are included in the dispatch plan, and conversely, the dispatch plan may be generated by excluding delivery destinations that deviate from the preferred zone (610).

[168] For example, referring to FIG. 8, the dispatch plan proceeds in the order of the first-priority cluster (a2), the second-priority cluster (b2), the third-priority cluster (d2), and the fourth-priority cluster (c2), and the dispatch plan may be generated from delivery destinations excluding S2, which is the avoided zone (620).

[170] According to the fourth embodiment of the present disclosure, in the fifth step of adjusting the dispatch plan, delivery destinations including the avoided zone (620) in the dispatch plan may be excluded.

[171] Here, the dispatch plan may be generated by excluding delivery destinations including the avoided zone (620).

[172] As a specific example, referring to FIG. 8, the dispatch plan may be established by excluding delivery (N2) to the delivery destination of the avoided zone (620), but this is not limited thereto.

[174] According to the fourth embodiment of the present disclosure, in the fifth step of adjusting the dispatch plan, when the dispatch plan passes through the delivery destination including the excluded avoided zone (620), the dispatch plan may include a delivery destination located on the travel route within the avoided zone (620).

[175] The method for generating a dispatch plan using the clustering method of the present disclosure may exclude dispatch for the avoided zone delivery destination (S2). However, in the overall dispatch plan, a case where the dispatch vehicle passes through the avoided zone (620) may occur. In such a case, the dispatch vehicle may additionally perform delivery of the delivery destination (S2) in the avoided zone (620).

[176] Referring to FIG. 8, for example, the overall dispatch plan performs delivery in the order of a2 -> b2 -> d2 -> c2, and when moving from b2 to the d2 cluster, the dispatch vehicle moves through the route (M2) to the shortest-distance delivery destination of the d2 cluster. At this time, delivery (N2) of the avoided zone delivery destination (S2) may be additionally performed. That is, delivery of the nearby delivery destination (N2) may be performed when traveling on the shortest route (M2). Delivery to such a delivery destination (N2) may minimize delivery time and delivery distance in the dispatch plan of another vehicle that should deliver to the delivery destination (N2).

[177] The dispatch plan optimized as described above may be determined as the final dispatch plan, and the determined final dispatch plan may be recommended to each vehicle.

[179] The above-described first to fourth embodiments may be implemented individually or in combination.

[181] FIG. 9 is a diagram for describing the server (100) according to an embodiment of the present disclosure.

[182] It is merely an example of a simplified representation of the configuration of the server (100) shown in FIG. 9. In the first to fourth embodiments of the present disclosure, the server (100) may include other components for performing a computing environment of the server (100), and only some of the disclosed components may constitute the server (100).

[183] The server (100) may include a processor (110), a memory (130), and a network unit (150).

[184] The processor (110) may be composed of one or more cores and may include a processor for data analysis and deep learning, such as a central processing unit (CPU) of the server, a general purpose graphics processing unit (GPGPU), and a tensor processing unit (TPU). The processor (110) may read a computer program stored in the memory (130) and perform data processing for machine learning according to an embodiment of the present disclosure. According to an embodiment of the present disclosure, the processor (110) may perform operations for learning of a neural network. The processor (110) may perform calculations for learning of a neural network, such as processing of input data for learning in deep learning (DL), feature extraction from input data, error calculation, and weight update of a neural network using backpropagation. At least one of the CPU, GPGPU, and TPU of the processor (110) may process learning of a network function. For example, the CPU and GPGPU may together process learning of a network function and data classification using a network function. In addition, in an embodiment of the present disclosure, processors of a plurality of servers may be used together to process learning of a network function and data classification using a network function. In addition, the computer program executed on the server according to an embodiment of the present disclosure may be a CPU, GPGPU, or TPU executable program.

[185] According to an embodiment of the present disclosure, the memory (130) may store information of any form generated or determined by the processor (110) and information of any form received by the network unit (150).

[186] According to an embodiment of the present disclosure, the memory (130) may include at least one type of storage medium among a flash memory type, a hard disk type, a multimedia card micro type, a card type memory (e.g., SD or XD memory, etc.), Random Access Memory (RAM), Static Random Access Memory (SRAM), Read-Only Memory (ROM), Electrically Erasable Programmable Read-Only Memory (EEPROM), Programmable Read-Only Memory (PROM), magnetic memory, a magnetic disk, and an optical disk. The server (100) may also operate in association with web storage that performs the storage function of the memory (130) on the Internet. The foregoing description of the memory is merely an example, and the present disclosure is not limited thereto.

[187] The network unit (150) according to an embodiment of the present disclosure may use various wired communication systems such as a Public Switched Telephone Network (PSTN), x Digital Subscriber Line (xDSL), Rate Adaptive DSL (RADSL), Multi Rate DSL (MDSL), Very High Speed DSL (VDSL), Universal Asymmetric DSL (UADSL), High Bit Rate DSL (HDSL), and a local area network (LAN).

[188] In addition, the network unit (150) presented in this specification may use various wireless communication systems such as Code Division Multi Access (CDMA), Time Division Multi Access (TDMA), Frequency Division Multi Access (FDMA), Orthogonal Frequency Division Multi Access (OFDMA), Single Carrier-FDMA (SC-FDMA), and other systems.

[189] In the present disclosure, the network unit (150) may be configured regardless of its communication mode such as wired and wireless, and may be composed of various communication networks such as a Personal Area Network (PAN), a Wide Area Network (WAN), and the like. In addition, the network may be the well-known World Wide Web (WWW), and wireless transmission technology used in short-range communication such as Infrared Data Association (IrDA) or Bluetooth may also be used.

[191] FIG. 10 is a general schematic diagram of an exemplary computing environment in which embodiments of the present disclosure may be implemented.

[192] Although the present disclosure has been described above as being generally implementable by a server, those skilled in the art will appreciate that the present disclosure may be implemented in combination with computer-executable instructions and/or other program modules executable on one or more computers and/or as a combination of hardware and software.

[193] Generally, program modules include routines, programs, components, data structures, and the like that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the methods of the present disclosure may be practiced in other computer system configurations, including single-processor or multiprocessor computer systems, minicomputers, mainframe computers, as well as personal computers, handheld servers, microprocessor-based or programmable consumer electronics, and the like, each of which may be operatively connected to one or more associated devices.

[194] The described embodiments of the present disclosure may also be practiced in distributed computing environments where certain tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

[195] A computer typically includes a variety of computer-readable media. Any media accessible by the computer may be computer-readable media, and such computer-readable media include volatile and nonvolatile media, transitory and non-transitory media, and removable and non-removable media. By way of example, and not limitation, computer-readable media may include computer-readable storage media and computer-readable transmission media. Computer-readable storage media include volatile and nonvolatile media, transitory and non-transitory media, and removable and non-removable media implemented in any method or technology for storage of information such as computer-readable instructions, data structures, program modules, or other data. Computer-readable storage media include, but are not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital video disk (DVD) or other optical disk storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be accessed by a computer and used to store desired information.

[196] Computer-readable transmission media typically embody computer-readable instructions, data structures, program modules, or other data in a modulated data signal such as a carrier wave or other transport mechanism and include all information delivery media. The term modulated data signal means a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, computer-readable transmission media include wired media such as a wired

network or direct-wired connection, and wireless media such as acoustic, RF, infrared, and other wireless media. Combinations of any of the above-mentioned media are also intended to be included within the scope of computer-readable transmission media.

[197] An exemplary environment (1100) for implementing various aspects of the present disclosure that includes a computer (1102) is illustrated, and the computer (1102) includes a processing unit (1104), a system memory (1106), and a system bus (1108). The system bus (1108) connects system components including, but not limited to, the system memory (1106) to the processing unit (1104). The processing unit (1104) may be any of various commercially available processors. Dual processors and other multiprocessor architectures may also be employed as the processing unit (1104).

[198] The system bus (1108) may be any of several types of bus structures that may additionally interconnect to a memory bus, a peripheral bus, and a local bus using any of a variety of commercially available bus architectures. The system memory (1106) includes read-only memory (ROM) (1110) and random access memory (RAM) (1112). A basic input/output system (BIOS) is stored in nonvolatile memory (1110) such as ROM, EPROM, EEPROM, and the like, the BIOS including basic routines that help to transfer information between components within the computer (1102), such as during startup. The RAM (1112) may also include high-speed RAM such as static RAM for caching data.

[199] The computer (1102) further includes an internal hard disk drive (HDD) (1114) (e.g., EIDE, SATA) - the internal hard disk drive (1114) may also be configured for external use in a suitable chassis (not shown) -, a magnetic floppy disk drive (FDD) (1116) (e.g., for reading from or writing to a removable diskette (1118)), and an optical disk drive (1120) (e.g., for reading a CD-ROM disk (1122) or for reading from or writing to other high-capacity optical media such as a DVD). The hard disk drive (1114), magnetic disk drive (1116), and optical disk drive (1120) may be connected to the system bus (1108) by a hard disk drive interface (1124), a magnetic disk drive interface (1126), and an optical drive interface (1128), respectively. The interface (1124) for external drive implementations includes at least one or both of Universal Serial Bus (USB) and IEEE 1394 interface technologies.

[200] These drives and their associated computer-readable media provide nonvolatile storage of data, data structures, computer-executable instructions, and the like. For the computer (1102), the drives and media correspond to storing any data in a suitable digital

format. Although the description of computer-readable media above refers to an HDD, a removable magnetic disk, and a removable optical medium such as a CD or DVD, those skilled in the art will appreciate that other types of media that are readable by a computer, such as zip drives, magnetic cassettes, flash memory cards, cartridges, and the like, may also be used in the exemplary operating environment and that any such media may contain computer-executable instructions for performing the methods of the present disclosure.

[201] A number of program modules, including an operating system (1130), one or more application programs (1132), other program modules (1134), and program data (1136), may be stored in the drives and RAM (1112). The operating system, applications, modules, and/or data may also be cached in the RAM (1112) in their entirety or in portions thereof. It will be appreciated that the present disclosure may be implemented in various commercially available operating systems or combinations of operating systems.

[202] A user may enter commands and information into the computer (1102) through one or more wired/wireless input devices, for example, a keyboard (1138) and a pointing device such as a mouse (1140). Other input devices (not shown) may include a microphone, an IR remote control, a joystick, a game pad, a stylus pen, a touch screen, and the like. These and other input devices are often connected to the processing unit (1104) through an input device interface (1142) that is coupled to the system bus (1108), but may be connected by other interfaces such as a parallel port, an IEEE 1394 serial port, a game port, a USB port, an IR interface, and the like.

[203] A monitor (1144) or other type of display device is also connected to the system bus (1108) via an interface such as a video adapter (1146). In addition to the monitor (1144), a computer typically includes other peripheral output devices (not shown) such as speakers, printers, and the like.

[204] The computer (1102) may operate in a networked environment using logical connections to one or more remote computers, such as remote computer(s) (1148), via wired and/or wireless communications. The remote computer(s) (1148) may be a workstation, a computing device computer, a router, a personal computer, a portable computer, a microprocessor-based entertainment device, a peer device, or other common network node, and generally includes many or all of the components described with respect to the computer (1102), but only a memory storage device (1150) is illustrated for brevity. The logical connections illustrated include wired/wireless connectivity to a local area network (LAN)

(1152) and/or larger networks, for example, a wide area network (WAN) (1154). Such LAN and WAN networking environments are commonplace in offices and companies, and facilitate enterprise-wide computer networks such as intranets, all of which may connect to a global computer network, for example, the Internet.

[205] When used in a LAN networking environment, the computer (1102) is connected to the local network (1152) through a wired and/or wireless communication network interface or adapter (1156). The adapter (1156) may facilitate wired or wireless communication to the LAN (1152), which also includes a wireless access point installed thereon for communicating with the wireless adapter (1156). When used in a WAN networking environment, the computer (1102) may include a modem (1158), or is connected to a communication computing device on the WAN (1154), or has other means for establishing communications via the WAN (1154), such as by way of the Internet. The modem (1158), which may be internal or external and a wired or wireless device, is connected to the system bus (1108) via the serial port interface (1142). In a networked environment, program modules described with respect to the computer (1102) or portions thereof may be stored in the remote memory/storage device (1150). It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers may be used.

[206] The computer (1102) is operable to communicate with any wireless devices or entities operatively disposed in wireless communication, for example, a printer, a scanner, a desktop and/or portable computer, a portable data assistant (PDA), a communications satellite, any piece of equipment or location associated with a wirelessly detectable tag, and a telephone. This includes at least Wi-Fi and Bluetooth wireless technology. Thus, the communication may be a predefined structure as with a conventional network or simply an ad hoc communication between at least two devices.

[207] Wi-Fi (Wireless Fidelity) allows connection to the Internet and the like without wires. Wi-Fi is a wireless technology like a cell phone that enables such devices, for example, computers, to send and receive data indoors and outdoors, that is, anywhere within the range of a base station. Wi-Fi networks use radio technology called IEEE 802.11 (a, b, g, etc.) to provide a secure, reliable, fast wireless connection. Wi-Fi may be used to connect computers to each other, to the Internet, and to wired networks (which use IEEE 802.3 or Ethernet). Wi-Fi networks operate in the unlicensed 2.4 and 5 GHz radio bands, at for example 11 Mbps

(802.11a) or 54 Mbps (802.11b) data rate, or with products that contain both bands (dual band).

[208] Those skilled in the art of the present disclosure will understand that information and signals may be represented using any of a variety of different technologies and techniques. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced in the above description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof.

[209] Those skilled in the art of the present disclosure will understand that the various exemplary logical blocks, modules, processors, means, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, various forms of program or design code (referred to herein as software for convenience), or a combination of all of these. To clearly describe this interchangeability of hardware and software, various exemplary components, blocks, modules, circuits, and steps have been described above generally in terms of their functionality. Whether such functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Those skilled in the art of the present disclosure may implement the described functionality in varying ways for each particular application, but such implementation decisions should not be interpreted as departing from the scope of the present disclosure.

[210] The various embodiments presented herein may be implemented as a method, apparatus, or article of manufacture using standard programming and/or engineering techniques. The term article of manufacture includes a computer program, carrier, or media accessible from any computer-readable storage device. For example, computer-readable storage media include, but are not limited to, magnetic storage devices (e.g., hard disk, floppy disk, magnetic strip, etc.), optical disks (e.g., CD, DVD, etc.), smart cards, and flash memory devices (e.g., EEPROM, card, stick, key drive, etc.). Also, various storage media presented herein include one or more devices and/or other machine-readable media for storing information.

[211] It is to be understood that a specific order or hierarchy of steps in the presented processes is an example of exemplary approaches. Based on design priorities, it is to be understood that a specific order or hierarchy of steps in the processes may be rearranged

within the scope of the present disclosure. The appended method claims present elements of the various steps in a sample order but are not meant to be limited to the specific order or hierarchy presented.

[212] The description of the presented embodiments is provided so that any person having ordinary knowledge in the art of the present disclosure may use or practice the present disclosure. Various modifications to these embodiments will be apparent to a person having ordinary knowledge in the art of the present disclosure, and the general principles defined herein may be applied to other embodiments without departing from the scope of the present disclosure. Thus, the present disclosure is not limited to the embodiments presented herein but is to be construed in the broadest scope consistent with the principles and novel features presented herein.

CLAIMS

[Claim 1] A method for generating a dispatch plan performed by a server, comprising:

- a first step of acquiring first zone information including a zone designation of a plurality of zones for a plurality of dispatch vehicles;

- a second step of generating second zone information associated with the designated plurality of zones;

- a third step of registering the first zone information and the second zone information for the dispatch vehicles; and

- a fourth step of generating a dispatch plan using the registered first zone information and the second zone information.

[Claim 2] The method for generating a dispatch plan according to claim 1, wherein

- the first zone information is a deliverable zone of the dispatch vehicle, and

- the second zone information is an overlapping zone among the first zone information.

[Claim 3] The method for generating a dispatch plan according to claim 2, wherein

- the step of generating the dispatch plan generates a primary zone dispatch plan using a minimum travel route within the first zone information possessed by each of the dispatch vehicles.

[Claim 4] The method for generating a dispatch plan according to claim 3, wherein

- the fourth step generates, for a vehicle having an operation time equal to or greater than a first threshold value in the primary zone dispatch plan, a secondary zone dispatch plan in which delivery corresponding to the second zone information is excluded from the primary zone dispatch plan.

[Claim 5] The method for generating a dispatch plan according to claim 4, wherein

- a first zone including a vehicle having an operation time equal to or greater than the first threshold value in the secondary zone dispatch plan allows dispatch of an external vehicle.

[Claim 6] The method for generating a dispatch plan according to claim 4, wherein

- the fourth step generates, for a vehicle having an operation time less than the first threshold value in the primary zone dispatch plan, a tertiary zone dispatch plan by additionally dispatching the order information of the second zone.

[Claim 7] The method for generating a dispatch plan according to claim 1, wherein the first zone information and the second zone information include a preferred zone or an avoided zone, and the preferred zone and the avoided zone include cost information, and the third step adjusts the cost based on the cost information.

[Claim 8] The method for generating a dispatch plan according to claim 7, wherein the third step assigns a weight to the cost within the avoided zone.

[Claim 9] The method for generating a dispatch plan according to claim 8, wherein the third step, when the avoided zone and the preferred zone overlap, deducts a predetermined amount from the cost for the overlapping zone.

[Claim 10] The method for generating a dispatch plan according to claim 9, wherein the fourth step generates a dispatch plan such that the cost is minimized, and when the costs are identical, generates the dispatch plan by selecting a priority for an optimal route.