

Complete Route Computing for Non-drivers Based on Public Transport Network and Pedestrian Network

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Abstract:

To develop public transport is the common trend throughout the world so that bus route computing and navigation for non-drivers will be more and more important in the future. However, in some extra large cities (such as Beijing), the bus ride is not a very easy matter. May be moving longer distances, people need to transfer when they take bus. On while transferring, people may have to walk a few minutes and even across the pedestrian bridge and tunnels. It is even more troublesome that people may be lost when they are not familiar with the local transfer. Therefore, it is very important to provide complete route computing and navigation for non-drivers. Complete route computing includes Bus Routes computing from origin to destination and navigation in Stop Areas.

At present, route computing for non-drivers is often just right for Bus Routes planning and computing, but lacks of effective navigation of transfer. And traveling time computing is only based on the bus traveling time without considering the necessary walking time on transferring. So there is a phenomenon that computing travel time is not accurate. Complete route computing for non-drivers makes not only bus travel more easily but also computing travel time more accurate.

This article proposes a solution of complete route computing for non-drivers which establishes the models of double-level public transport network and pedestrian network separately, then combines the two models organically, finally forms a unified transport network which is the foundation of complete route computing.

(1) Double-Level Public Transport Network Model

Double-Level public transport network model divides public transport network into two levels according to the level of abstraction of public transport network. In the upper level (Level2), public transport network comprises Bus Lines and Stop Areas. Its main function is to achieve long-distance, large-scale travel routes computing. In the lower level (Level1), public transport network comprises Bus Routes and Bus Stops. Its main function is to connect with pedestrian network and to achieve transfer computing. The two levels are linked by relational tables.

(2) Pedestrian Network Model

Pedestrian network includes sidewalks, street over bridge, tunnels across the street, zebra crossings, road signs for pedestrian, walking areas and other geographic elements. There are

definitions of geographic elements, property of geographic elements and relations in geographic elements in pedestrian network model. Its main function is to achieve pedestrian navigation in Stop Areas.

(3) Unified Mix Transport Network

To achieve complete route computing, we must organically connect public transport network with pedestrian network to form unified mix transport network. Taking Bus Stops of public transport network as a kind of node of pedestrian network, this paper realizes the connection of the two kinds of networks.

(4) Complete Route Computing

Carrying on complete route computing, we firstly compute bus routes in the upper transport network (Level2) to achieve route planning and improve computational efficiency. Secondly, make use of the lower transport network (Level1) to achieve transfer computing. Finally, make use of pedestrian network to achieve pedestrian navigation in Stop Areas. So we can realize complete route computing for non-drivers.

Key words: pedestrian network, public transport network, double-level public transport network model, non-driver, route computing