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Research on Intelligent Transportation System based on Big Data

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Abstract

With the rapid development of social economy, science and technology, higher requirements are put forward for travel: fast, convenient, intelligent and comfortable. There are more and more transportation tools. For example, bus, subway, private car Didi taxi, T3 taxi and Caocao taxi comes into being. But with the increasing demand of people, it will cause excessive waste of resources. Vicious competition will lead to a waste of resources. We want to research an intelligent Transportation platform based on big data. It can provide an entrance for passengers. They can Publish their requirements in real time in the intelligent transportation platform. And the intelligent Transportation platform can collect various traffic system information. Then, we will provide three optimal schemes for passengers to choose based on the requirements of passengers and the various traffic system information resources. When passenger choose one of the optimal schemes, others resources will be release to other passengers. Passengers can get a comfortable travel plan based on the scheme design. It can create a health competitive environment which dominated by the passengers' market. Through this platform data, it can reduce the waste of resources. At the same time, the needs of passengers can be met. With the accumulation of passenger' data and the enrichment of vehicle resources, the system will be optimized. It can reduce the waste of resources and forming a green traffic environment.

Keywords

Big Data; Green Traffic; Intelligent Transportation.

1. Introduction

Based on China's existing technical development level, the main system is intelligent transportation system, which is the most effective system to solve the problems faced by cities at present, but there are still some limitations [16]~[18]. How to provide users with more direct and convenient menus can facilitate passengers to publish relevant driving demand routes. Different groups of passengers have different demand for transportation, and at the same time of optimization, it is necessary to ensure passengers' demand to the greatest extent, such as comfort, economy and speed. According to different routes and demands, at present, different urban taxi systems seem to solve this problem, but in fact, due to the competition, resources are wasted to some extent [19]~[21]. It is the biggest conflict that we are facing at present that we need to start from customer demand and provide different types of services in combination with the existing traffic network and services [22]. At present, our technology has been preliminarily verified in some commercial softwares, but there are few choices for passengers, and the capacity provided. Some softwares don't have orders, and some softwares are full of orders, for example. How can passengers quickly and safely release their bus demand? Then, this paper will focus on how to integrate the current resources to meet people's needs to the greatest extent by using the technological power of big data [23]. At present, the city's biggest advantage is the subway line, but the cost of building the subway line is relatively high, and the number of platforms is limited, which can only meet the needs of passengers on the relevant base. However, how to combine the subway with the existing public transportation system and

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taxi software platform to quickly and efficiently divert traffic reasonably, and provide matching services to passengers, will be the key direction to solve the problem[24]~[26]. When the passenger demand collection system is provided with multiple options, the data problems and vehicle resource problems are taken as input conditions, this paper introduces the use of metro contact logic and the advantages of big data platform to solve this problem. The application of interlocking in China's railway and rail transit system is relatively mature. Therefore, this proposal should combine the advantages of big data platform with interlocking technology to solve the intelligent transportation problem, rationally optimize vehicle resources and public resources, reduce the waste of resources, and establish a more systematic intelligent transportation system. Based on China's existing technical development level, the main system is intelligent transportation system, which is the most effective system to solve the problems faced by cities at present, but there are still some limitations[27]. How to provide users with more direct and convenient menus can facilitate passengers to publish relevant driving demand routes. Different groups of passengers have different demand for transportation, and at the same time of optimization, it is necessary to ensure passengers' demand to the greatest extent, such as comfort, economy and speed[28]. According to different routes and demands, at present, different urban taxi systems seem to solve this problem, but in fact, due to the competition, resources are wasted to some extent[29]. It is the biggest conflict that we are facing at present that we need to start from customer demand and provide different types of services in combination with the existing traffic network and services. At present, our technology has been preliminarily verified in some commercial softwares, but there are few choices for passengers, and the capacity provided. Some softwares don't have orders, and some softwares are full of orders, for example. How can passengers quickly and safely release their bus demand? Then, this paper will focus on how to integrate the current resources to meet people's needs to the greatest extent by using the technological power of big data. At present, the city's biggest advantage is the subway line, but the cost of building the subway line is relatively high, and the number of platforms is limited, which can only meet the needs of passengers on the relevant base. However, how to combine the subway with the existing public transportation system and taxi software platform to quickly and efficiently divert traffic reasonably, and provide matching services to passengers, will be the key direction to solve the problem. When the passenger demand collection system is provided with multiple options, the data problems and vehicle resource problems are taken as input conditions, this paper introduces the use of metro contact logic and the advantages of big data platform to solve this problem. The application of interlocking in China's railway and rail transit system is relatively mature[30]~[34]. Therefore, this proposal should combine the advantages of big data platform with interlocking technology to solve the intelligent transportation problem, rationally optimize vehicle resources and public resources, reduce the waste of resources, and establish a more systematic intelligent transportation system.

2. System Architecture

First, the passenger demand and priority are confirmed based on the passenger platform setting and passenger problem investigation. Then, according to the passenger registration information and the demand of passenger platform statistics, the characteristic information of passengers is analyzed, which is used as a backup and the input source of the subsequent big data platform management vehicle platform information.

Secondly, according to the current map route situation, public transportation system, and other personal or taxi system platforms, self-selection is used as a resource pool, and as a screening condition of big data, the best option is selected for passengers to choose.

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Finally, passengers are not satisfied with the options related to the car or the recommendations for the system. Then, they can be guided to choose new demands. According to passengers' needs, personal information, and traffic system information resources. It will recommend optimal transportation options. According to the passengers' choice, integrate related resources in advance for the next passenger trip, and quickly give the optimal solution. Integrate all passenger system requirements, based on the existing traffic resources, and provide the best integration on the premise of meeting passenger needs, so as to avoid the waste of resources.

3. Comparative Analysis of Data

Through the above-mentioned environmental optimization, data survey and theoretical calculation in a fixed area and a small area. Under the same circumstances, the existing mode can only transport 200 people, but through the feedback of passengers and the resource selection provided by this platform. It is theoretically estimated that the transport capacity of 300 people can be provided under the big data statistics. Moreover, in the morning rush hour, the vehicle investment can be increased, but to reduce the transportation investment for a long period of time, such as public transportation, it is possible to predict the existing capacity according to the passenger's advance notice, and to reduce the network car investment in the non-morning rush hour. The bus line can be analyzed according to the passenger demand and the platform video data analysis, or buttons can be set on the bus stop of the platform to let passengers enter the starting point and the ending point while waiting for the bus. Adjust the running capacity of real-time distribution. According to the analysis, the electronic information of related lines is displayed to different stations.

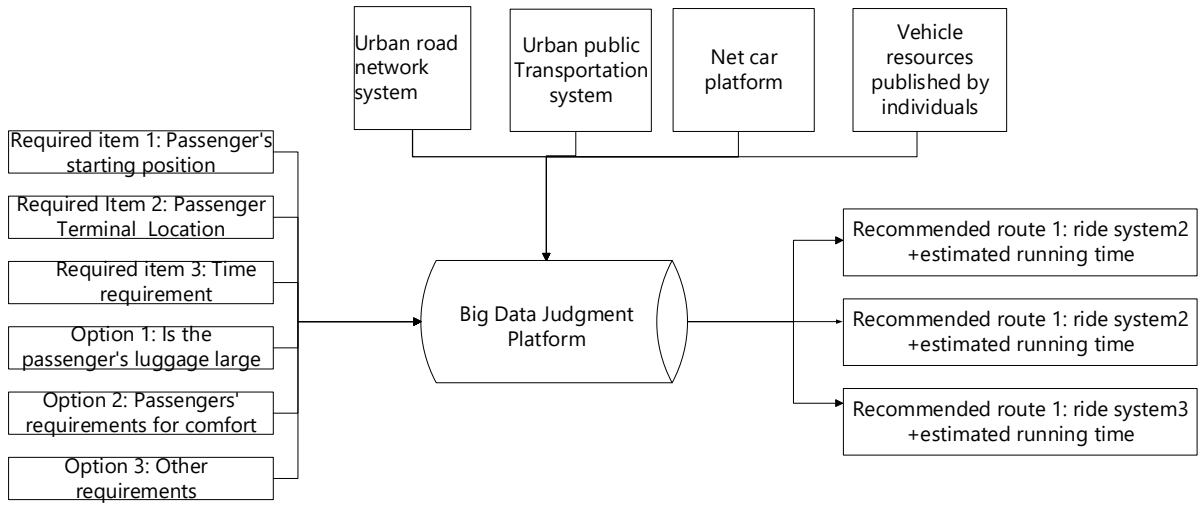

Fig. 1 System architecture

Combined on the existing mode and intelligent transportation system. It is assumed that there are the same vehicle and passengers' demands. In the morning rush an hour, it can transport 200 people. However, due to the concentration of resources, the passenger demand is clear and published, so it is unnecessary for drivers to waste time for picking up passengers and the nearest car can be booked directly according to the passenger demand. By the new mode , it can make more and more passengers. And the experience feeling of passengers will be improved.

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Table 1. Comparative analysis of data

Category	Operational capability comparison (1 hour on average)	Comparison of actual vehicle input demand	Operation experience improvement comparison
Existing mode	Transport 200 people	Morning and evening: 40 buses+2,000 network buses. Other non-working days: 30 buses +2000 network buses	Passengers' comfort and time requirements cannot be predicted and selected
Intelligent transportation system	According to the existing resources, it can transport 300 people	Morning and evening: 60 buses+3,000 network buses. Other non-working days: 30 buses +1,500 network buses	According to passengers' demand for early release and the resources released to passengers, passengers can choose, constantly optimize different passengers' needs and save the investment of various vehicle resources

4. Actual case

In real life, passengers have different time and vehicle source requirements, and this function is like the line that the train. The vehicle resources are like basic equipment such as turnouts and signals in the subway; Each device has its basic attributes. According to the actual needs of the train, it is necessary to select different vehicle resources, release more resources to other passengers' needs, provide passengers with their own resources in real time according to the data of passengers' trips, and evaluate the vehicle resources actually needed to be invested according to the traffic flow of real-time trips, so as to achieve an efficient and more environmentally-friendly traffic organization scheme. Specific implementation cases are shown in Table 2 below.

For example, three passengers want to go to the destination B from starting point A. They want to reach for the destination B in 10 minutes. And traveled with large luggage, hoping for comfort and less transfer, and the time is urgent. The system offers four modes for the passenger.

The mode 1: 1 bus; Expenses 2 yuan; It takes about 30 minutes.

Travel mode 2: No. 1 subway passes No. 1 subway passes through A and B, but there will actually be a deviation that requires walking 300 meters; Expenses 4 yuan; It takes about 30 minutes.

Travel mode 3: 1 (network car) comfort; level 1; Estimated that the cost of 20 yuan and will take about 10 minutes.

Travel mode 4: 8 vehicles (network car); comfort level 2; Estimated cost 15 yuan; It takes about 10 minutes.

The last, the system recommended plan is mode 4, three passengers were chose the travel mode 4. Others resources had be released.

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Table 2. Actual case

Number of personnel	Basic demand (the actual running route of the train)	The vehicle resources (the interlocking basic equipment of the subway)	Recommended plan	Final plan
3	starting point: A destination: B Estimated time: 10min Other requirements: Travel with large luggage, hoping for comfort and less transfer, and the time is urgent.	Travel mode1: 1 bus; Expenses 2 yuan; It takes about 30 minutes. Travel mode2: No.1 subway passes through A, B, but there will actually be a deviation that requires walking 300 meters; Expenses 4 yuan; It takes about 30 minutes. Travel mode 3: 1 (network car) comfort; level 1; Estimated that the cost of 20 yuan and will take about 10 minutes. mode4: 8 vehicles (network car) ;comfort level 2; Estimated cost 15 yuan; It takes about 10 minutes.	Travel mode4	Travel mode4
2	starting point: C destination: D Estimated time: 1hour Other requirements: I want to travel economically, and the time requirement is relatively low, so I don't have big luggage.	Travel mode1: 1 bus; Expenses 2 yuan; It takes about 30 minutes. Travel mode2: No.1 subway passes through A, B, but there will actually be a deviation that requires walking 300 meters; Expenses 4 yuan; It takes about 30 minutes. Travel mode3: 1 (network car) comfort; level 1; It is estimated that the cost of 20 yuan will take about 10 minutes.	Travel mode1	Travel mode1
3	starting point: D destination: F Estimated time: 1hour Other requirements: Travel with large luggage, hoping for comfort and less transfer, and the time is urgent.	Travel mode1: 1 bus; Expenses 2 yuan; It takes about 30 minutes. Travel mode2: 1 (network car) comfort; level 1; It is estimated that the cost of 20 yuan will take about 10 minutes. Travel mode3: 8 vehicles (network car) ;comfort level 2; Estimated cost 15 yuan; It takes about 10 minutes.	Travel mode3	Travel mode3

5. Conclusion

Through analyzing the theoretical comparison results in Table 1, and combined with offline actual verification in Table 2. The design of intelligent transportation based on big data will meet passenger' requirement and reduce the waste of resources and set up a green traffic environment.

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