**Intelligent travel decision aid system and early warning scheme based on traffic big data and personal behavior habits**

1. **Research Background**

In today's society, with the increase in the number of population and the development of urbanization, the increasingly blocked population gathers in large cities, such as Tokyo, Shanghai , new York. causing great traffic pressure to many large cities in the world. At the same time, the development of society provides people with more Travel tools, and the urban population is equipped with more transportation, such as cars, bicycles, motorcycles and so on. And people's travel needs are also more abundant. There is no doubt that subways and buses are still the first choice for people's work and life needs. However, if you face the peak hours of work or important activities, the huge traffic pressure is not small. It is foreseeable that during the 2020 Tokyo Olympics, traffic congestion and subway usage must be very large. Most importantly, both now and in the future, the speed of population aggregation in large cities is far greater than the speed of update of urban transportation equipment. so personalized travel decision-making programs are particularly important today. If you can predict the congestion of a specific traffic/metro based on past data and artificial intelligence, and then make reasonable travel decisions based on your personal travel needs and living habits. It can not only ease the congestion of important traffic, but also make reasonable travel arrangements for individual needs. At the same time, it can provide reasonable reference for personal travel/work learning, automatic car navigation, distribution company and transportation system.

1. **Previous Research**

There are many studies on travel decision systems. The widely used method prototypes are knowledge of operations research. By setting impact factors (such as weather, road conditions, dates, travel tools, etc.), set weight to each impact factor (Mean method , Analytic hierarchy process and other various weighting methods), to establish a mathematical model, through the least squares method, relevant knowledge in graph theory (such as traveling salesman problem), etc., to calculate the optimal travel plan in time space.

With the development of computers and industry, such as GIS, the provision of major enterprise service software, such as: googleMap, 乗り換え, AMAP ,etc., and data sharing between vendors, provides a large number of modern travel arrangements Real-time traffic data and utilization tools.

In computer algorithms, the use and optimization of Dijkstra’s algorithm, ant colony algorithm, genetic algorithm and other algorithms provide a powerful and reliable tool for realizing the solution and turning the theory into reality. There is no doubt that the information age has provided great convenience for people to travel. Nowadays, with the continuous development of artificial intelligence, mechanical learning, lifelog, big data and other technologies, we can enjoy more precise and more humane travel decisions. If you are using Google Maps or software 乗り換え, you will always be delayed due to mistakes in walking or driving time. Or in a crowded subway for less eager travel plans (such as concerts, large events, etc.), maybe we can consider a smart travel plan that is more personal and behavior-oriented.

1. Research Purpose
   1. Learn about lifelog related technologies. The user's walking habit is recorded by the log data of the mobile phone, and the user's vehicle (in combination with the GPS and the mobile phone sensor device) is judged according to the travel speed, and the average speed of the user corresponding vehicle is calculated and recorded. As an impact factor. (At the same time, if you are targeting users who have the flexibility of driving habits just like the Distribution company workers, you may be able to divide the population and add mathematical models to each other), giving a time prediction that is more accurate than the current software to meet individual needs.
   2. Deep learning of various algorithms. Traffic warnings such as peak hours during work, large events, etc. If your are living in 国分寺 and your place to work is near Keio University's 三田, you may have a variety of transportation subway interchange routes. For example, the nearest station is 赤羽橋, you can also use the subway to 田町 and then walk over, maybe you can also First arrive at 神谷町. For example, the shortest path problem in the Floyd algorithm calculates the shortest path by assigning weights to the directed graph or undirected graph. In the process of constructing a new mathematical model, based on the path in the starting point and the destination, the weight is set by the road/metro congestion rate (possible people numbers/ traffic capacity), (in combination with the date, travel status, etc.). At the same time, the pre-feedback congestion information is given, which provides a more relaxed reference option for people to travel. By comparing various mathematical models and algorithms, we find the algorithm that best meets the needs, and at the same time, assign weights (such as least squares method, analytic hierarchy process) through a large amount of data acquisition, and establish or optimize the optimal mathematical model.
   3. Learn to master mathematical knowledge and machine learning related knowledge. In the operation research method, the user population (corresponding to different vehicles and user habits), congestion status, risk index, etc., combined with artificial intelligence, establish a mathematical model, and give recommendations for travel plans.
   4. Data collection and code implementation. Component database, writing applications.
   5. In terms of service, the satisfaction of the questionnaire is compared with the previous related navigation. In terms of the accuracy of the algorithm, the investigation of the tester is carried out in time with the previous data. In the model, it can be compared with the previous mathematical model (the comparison method is to be determined)
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