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Retraction

Retracted: Research on Big Data Traffic Operation Based on Intelligent Holographic 3D Image Vision

Scientific Programming

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] Y. Fang, "Research on Big Data Traffic Operation Based on Intelligent Holographic 3D Image Vision," *Scientific Programming*, vol. 2022, Article ID 7280880, 8 pages, 2022.

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Research Article

Research on Big Data Traffic Operation Based on Intelligent Holographic 3D Image Vision

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Aiming at the needs of refined and visualized management of transportation infrastructure, the 3D hologram acquisition technology integrating 3D laser scanning, tilt photogrammetry, and other technologies are used to acquire and integrate the 3D scene data of transportation infrastructure through indoor and outdoor and air and ground integration and build a 3D hologram spatial model that comprehensively reflects the three-dimensional information of transportation infrastructure. The technical solution for the acquisition, integration, and management of transport infrastructure data is formed. Through research and practice, it can be proved that the integrated indoor and outdoor 3D hologram data technology of transportation infrastructure can explore the technical basis for the comprehensive construction of 3D hologram data of transportation infrastructure and can effectively expand the data content of the transportation geographic information service platform and provide stronger technical support for the province's transportation industry management, operation monitoring, emergency disposal, and public services.

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1. Introduction

Transport systems are an essential and vital foundation for human activity, with estimates suggesting that more than 40% of the human population commute for more than 1 h per day [1]. As people rely more and more on transport systems, they are also facing many challenges. For example, traffic congestion has become a worldwide problem as the number of vehicles has increased dramatically. As a result, intelligent transport systems have been proposed to alleviate traffic congestion, reduce traffic accidents, and improve traffic safety [2].

In recent years, with the development of sensor technology and the popularity of sensing devices, traffic data of increasing volume and richness has been collected and stored. The huge amount of traffic data has brought changes to the ITS, making it move from a technology-driven era to a data-driven era, becoming a system based on multiple sources of data, using learning algorithms for performance optimisation and focusing on visualisation. Big data driven ITS has not only shown excellent performance in solving various traffic problems but also further shown potential to guide work in areas such as city management and urban planning [3].

The 3D holographic image data of transport infrastructure is an innovative attempt to respond to the demand for refined and visualized management of transport infrastructure, which can present various spatial data and attributes of transport infrastructure from land to waterways and from indoor to outdoor perspectives and can further improve the level of transport information construction and refined management of infrastructure in the province compared with traditional vector and image electronic maps. The technical route for the construction of 3D hologram data of transport infrastructure and the engineering application practice proposed by the research can not only explore the technical basis for the construction of 3D hologram of transport infrastructure in a comprehensive manner but also effectively expand the data content of the transport geographic information service platform, providing stronger technical support for transport industry management, operation monitoring, emergency disposal, and public services [4].

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Based on 3D hologram data, it can be used for the collection of information on thematic elements of new traffic facilities or altered traffic facilities. The collection of the 3D hologram platform eliminates the need to wear stereoscopes, is more efficient, and can significantly shorten the construction period. In the traffic planning business, planning data for roads, railways, bridges, and tunnels can be overlaid with 3D hologram data to visually display the planning 3D effect [3]. The use of tilt photography by UAV can quickly generate DSM, TDOM, and other results of the planning area, providing real 3D background data for highway alignment planning, more intuitive display of the spatial relationship between the planned route and nearby existing features, more reliable cost calculation, and more accurate judgement of the rationality and feasibility of planning [5, 6].

The system provides a GPS interface to access the real-time GPS signal from the vehicle and dynamically display the actual position of the vehicle in the 3D scene in real-time [7]. The system features the development of a 2D-3D linkage function, providing two side-by-side windows, enabling users to simultaneously browse and edit the same area from both a 2D GIS viewpoint and a 3D viewpoint. Intelligent transportation systems have developed rapidly in the environment of big data, resulting in new system architecture, the emergence of many new research methods, and many new intelligent transportation applications, but at the same time this posed various problems and challenges [8]. This paper introduces the status of the development of big data-driven intelligent transportation systems, analyses the key issues and challenges that need to be addressed in the development of big data-driven intelligent transportation systems, and summarises the trends and directions of their development.

2. Related Work

Due to the limitations of existing data fusion technology capabilities, most existing intelligent transportation systems are based on a single data source. While a single data source contains limited information, fusing multiple sources of data can help one to uncover richer latent information [9]: reducing user travel trajectories based on IC card swipe records, detecting abnormal trajectories from them, and further combining information from social networks to achieve the identification of pickpockets in public transport systems.

Traffic data can be used not only for monitoring and predicting traffic, mining human movement patterns, and optimizing the allocation of traffic resources, but also in more scenarios, for example [10], combining intelligent transportation with urban computing to predict urban carbon emissions. Reference [11] proposed planning the location of urban ambulance stations and [12] using it for crowd monitoring during large urban events. The combination of traffic data and urban computing is another direction for the development of transportation big data applications [13]. Reference [1] applied deep residual neural networks to a city-wide pedestrian flow prediction problem as recently as 2017. The model is considered the temporal proximity, periodicity, and trend of pedestrian flow and further incorporated various external factors such as weather and whether it was a working day into the model, obtaining very good prediction accuracy.

3. Three-Dimensional Hologram Data Acquisition Technology

People's willingness to restore their surroundings has always been in pursuit of realistic results, and 3D modelling is arguably one of the best means of doing so. The first applications of 3D modelling technology were in the field of simulation modelling of underground projects such as minerals and geology, and after continuous promotion and development, it is now widely used in various fields such as transportation, game, and medicine [14]. However, the difficulty and complexity of 3D modelling are much greater than that of 2D graphics, so there has been a lot of research into how fast batch and automated modelling can be done.

3.1. Tilt Photogrammetry Techniques. Tilt photographic modelling technology is a high technology developed in recent years, reducing modelling costs and significantly increasing model production efficiency in a fully automated production method [15]. Before the emergence of tilt photogrammetry technology, digital photogrammetry, which consists of three stages, the analogue photogrammetry stage, the analytical photogrammetry stage, and the digital photogrammetry stage, has been developed for a long time.

3.2. 3D Laser Scanning Measurement Technology. The point cloud data obtained by the 3D laser scanner is subject to many factors, so it needs to be processed on multiple levels before it can be used and then imported into 3D modelling software such as 3Dmax in an appropriate format to build a model that can be restored with high accuracy to the object being measured. After decades of professional research, experts and scholars at home and abroad have achieved fruitful results in the processing of point cloud data and the creation of 3D models [16]. The 3D laser scanners that have been widely used are divided into the following four categories according to the platform on which they operate.

4. New Collaborative Transport Information Service System

The ATIS (Advanced Traveler Information System) [17] is a system that uses various advanced communication, network, and computer technologies to provide travellers with all the information they need to travel.

4.1. Traffic Information Service Systems and Their Application Requirements. The traffic information system uses various information systems to provide travel-related information to the traveller in real time, so that the traveller can obtain information on road traffic conditions, travel time, interchanges, travel costs, and so on at any time during the entire travel process from pretravel, en route to destination, guiding the traveller to choose the appropriate transport mode, and travel route to complete the travel process in the most efficient and scientific manner.

According to the time of obtaining information, traffic information service system can be divided into pretravel information service system and midtravel information service system. According to the type of information acquired, traffic information service systems can be divided into personalised information service systems, route guidance and navigation systems, traffic flow information guidance systems, and parking information guidance systems [18]. The pretravel information service enables travellers to obtain information on travel routes, travel modes, travel time, current road traffic conditions, and public transport conditions before travelling, providing information services for planning the best trip. The information service provides precise information on travel options and vehicle status, road traffic conditions, and route navigation for those who are not familiar with the terrain and information on bus stops and en route transfers for those using public transport.

The personalised information system provides information on socially integrated services and facilities related to travel. The traveller is informed of this information and can then plan his or her journey and choose a route. Route guidance and navigation services provide drivers with information to guide them on the best routes. Traffic flow guidance systems are used to guide traffic flow in a timely manner by collecting and sending traffic information in real-time. Parking information guidance system provides real-time information on the parking status of all car parks in an area, providing parkers with information on the location of car parks and available parking spaces [19]. Traffic information service system mainly consists of three functional modules, namely, the traffic information centre, the communication network, and the user information terminal, as shown in Figure 1.

User information terminals mainly refer to vehicle terminals, such as personal computer terminals and handhelds, and road traffic information distribution equipment, such as public information kiosks [20].

4.2. Traffic Information Service System. Telematics traffic information service consists of a series of data items with a single basic business and management object as the main body, for example, the status of road infrastructure in a certain road section, the vehicle operation status at a certain moment, road congestion, the status of available parking spaces, and the vehicle operation status at interchange stations. Multiple traffic information atomic services can be combined in a certain way to form various traffic information services [21].

After the atomic traffic information services are calculated, intelligent and personalised traffic information services are provided to the end user by means of service collaboration. In this way, a new traffic information service system is finally established to adapt to large-scale

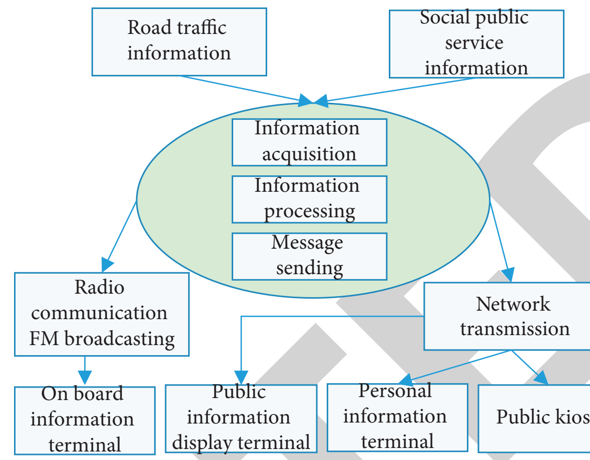

Figure 1: Composition of the traffic information service system.

information sharing in the vehicle network. Based on distributed mobile traffic information atomic service computing platform, this paper focuses on the new traffic information service collaboration technology under the big data environment of telematics [22].

4.3. Collaborative Traffic Information Service System. The process of traffic information service collaboration is illustrated in Figure 2. Users submit service requests before travel or during on-the-road travel, and the parser transforms the service requests into specific sets of tasks and interlogical relationships based on pregenerated service combination templates. All candidate atomic services are discovered based on the current vehicle and driving environment information, and suitable in-vehicle service nodes are selected to participate in service matching, mapping the generated service combination solution to the car-linked network under a limited area [23]. During the collaborative processing, the execution plan of the atomic services is arranged, and the operation results are monitored comprehensively. When service resources or the telematics environmental change dynamically, if the utility of the current service combination solution decreases significantly, or if the generated result letter does not meet the user's need, the dynamic replacement process of the services is initiated.

Traffic information services in the telematics environment are distributed, dynamic, and diverse and often require coordination and control between various departments, such as transport management, infrastructure services (e.g., car parks and petrol stations) [24]. In order to achieve better service optimisation. In order to avoid the formation of "service silos", how to effectively abstract service data, provide a common description framework, and realise the sharing and integration of service data between different. In order to avoid the formation of independent data, it is necessary to effectively abstract the service data and realize the service data sharing of different departments, which is the basis of building a new type of traffic information service cooperation.

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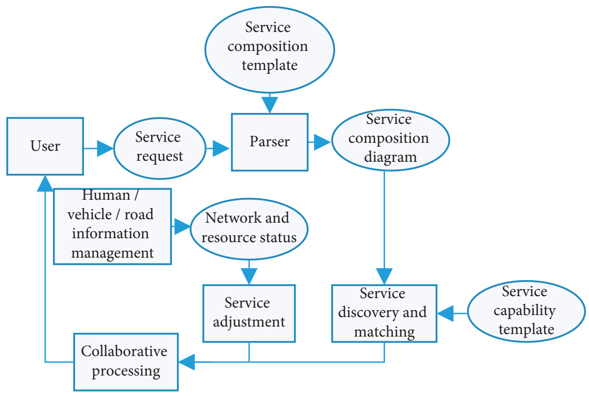

Figure 2: Collaborative process of traffic information services.

The establishment of a service model and the formal description of services is a prerequisite and basis for the realization of collaborative transport information services. Service description includes two aspects: syntax and semantics. The syntactic description of a service is a specification used to organise the public information that a service provides to the outside world, such as a human name, which can be used to communicate in human society. The service is described as a collection of access points that enable the exchange of messages. The semantic description of a service is used to describe the function of the service, mainly using the input (input), output (output), precondition, and effect of the service as measurement parameters [25], including both the basic function of the input and output of the service (I, O) and taking into account the behavioural characteristics of the service (P, E), that is, the precondition and effect of the service, due to the diversity of traffic information services and needs and the complexity of the connected car environment.

As an important attribute of QoS, service availability directly affects user satisfaction. With the continuous development and popularity of the Internet and mobile Internet, a large amount of historical user evaluation data exists on various online media, and such data has the characteristics of large sample size and easy automation in data collection and statistics. As the availability data of traffic information services in the connected car environment is highly implicit, ambiguous, and nonformal, it is necessary to study the automatic collection and screening mechanism of historical data of various service providers in the connected car environment, as well as establishing a quantitative evaluation model of the availability of typed traffic information services through regression analysis of historical data [26].

At the same time, the combination of traffic information services is constrained by contextual information such as vehicles and the driving environment, and the mobility and instability of the service providers create an urgent need for the study of dynamic service combinations. In addition, various anomalies in the telematics environment can lead to temporary unresponsiveness or even interruption of the service business process at any time, all of which will greatly affect the reliability of the service [10]. Figure 3 shows an example of a process combination for the in-transit

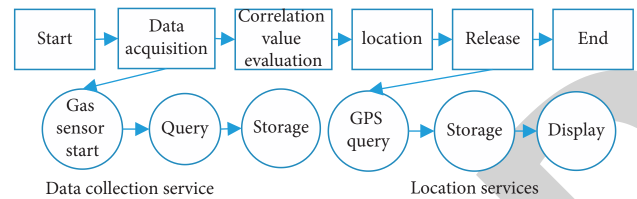

Figure 3: Example of a process combination for a dangerous goods in-transit supervision service.

supervision of dangerous goods, where the traffic information service transactions in the business process are implemented across single or multiple service operations. When a service operation is half-executed, such as a failure of a read operation in a data collection service, the failed service needs to be replaced to ensure that the entire process is not interrupted. However, replacing only the failed service operation would break the atomicity of the transaction data. Therefore, the transactional properties of traffic information services need to be investigated to support transaction-level service replacement, thereby improving the transaction-level service exception handling capability and maintaining the reliability and stability of the dynamic and adaptive operation of the combined services.

5. Application Practice

Relying on the integration and mining of traffic data, we have built an integrated multilevel traffic model system, a road traffic operation index system covering the city, a traffic emission monitoring platform, and an urban traffic simulation system (key corridors, hubs and rail stations, etc.) to improve technical support for traffic planning, enhance traffic decision-making and management methods, and improve traffic information services, which has strongly supported the development of urban traffic in Shenzhen in recent years.

5.1. Improved Technical Support for Transport Planning. The existing modelling system is inadequate in supporting regional strategic analysis and area refinement. There is a need to focus on the development of regional and macromodels based on macromodels of the city region. The regional model focuses on the technical analysis of metropolitan areas, regional transport development policies, and planning of major cross-border facilities (see Figure 4). The mesomodel focuses on traffic improvement measures at the district level, analysis of planning schemes, and detailed traffic analysis for the design of transport facilities. The establishment of the regional model and the mesh model has improved the multilevel traffic modelling system and formed a complete technical support system for traffic planning, meeting the technical support requirements for traffic planning at different spatial levels.

5.2. Enhanced Approach to Traffic Decision Management. By establishing a road traffic operation index system, the overall traffic operation level of the city is comprehensively

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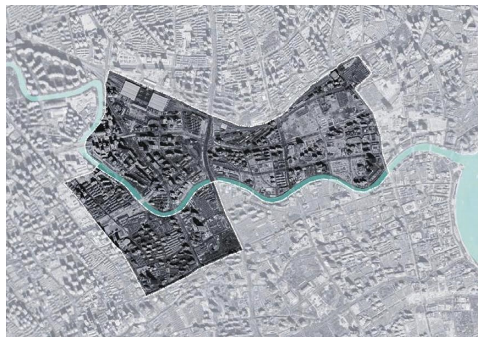

Figure 4: Passenger flow corridor analysis based on regional traffic model.

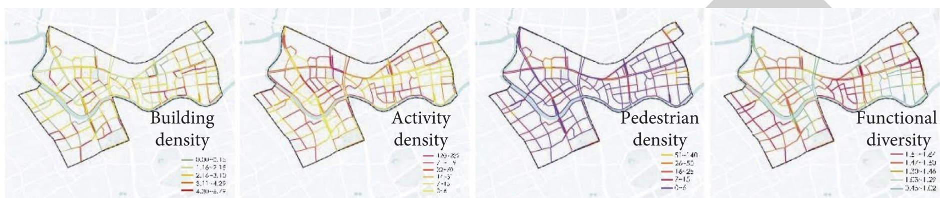

Figure 5: Illustration of the traffic emissions monitoring platform.

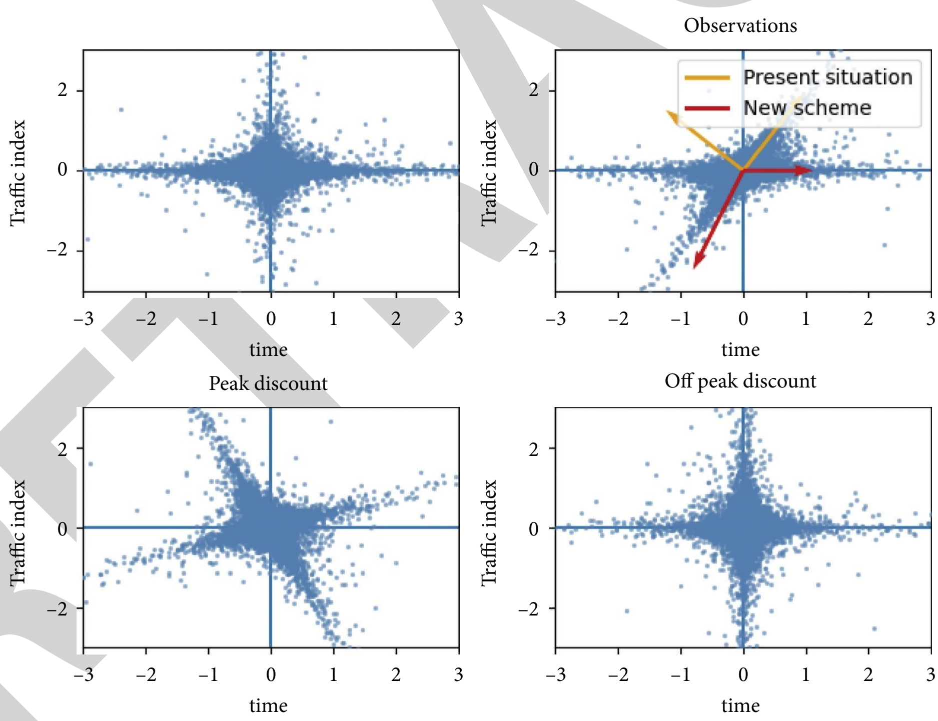

Figure 6: Comparison of parking policy options.

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monitored, the traffic conditions of each district, section, and road are evaluated and analysed, and the change patterns of the daily traffic operation indexes are established. As an important basis for traffic environmental assessment work, it realises dynamic monitoring of road traffic emission indicators and levels in different areas of the city (see Figure 5). Real-time dynamic traffic monitoring provides an important basis for government departments to select traffic improvement zones, make decisions such as parking fee policies, and demand management policies and traffic emergency command.

Relying on multidimensional traffic modelling systems and traffic assessment techniques, the project will conduct a comprehensive assessment and analysis of multiple perspectives and factors to change the current situation where project decisions rely mainly on traffic assessment and lack environmental, cost, operational, and safety assessments, making the assessment decisions more scientific and reasonable. In the assessment of

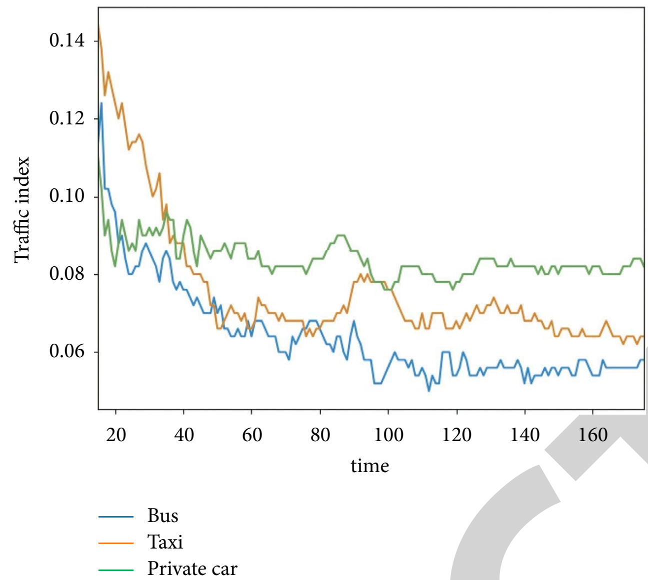

Figure 7: Weekly variation of the peak hour traffic index in the central city with special case analysis.

major policies such as parking charges and price adjustment mechanisms, in addition to analysing the traffic impact factors of the policy, a comprehensive and integrated assessment of the economic and environmental impacts of the policy is also carried out. For example, comprehensive urban traffic assessment techniques strongly support the whole process of on-street and off-street parking policy formulation and explore the establishment of a dynamic adjustment mechanism between parking charges and road traffic indices. The current parking charges are based on the length of the hour and do not consider the specificity of peak hours. To achieve the effect of peak shaving and valley filling, a staggered peak discount scheme is proposed. The test scheme for staggered parking charges is 60% discount for entering before 7 : 00; 30% discount for entering between 7 : 00 and 7 : 30; 30% discount for exiting between 19 : 30 and 20 : 00; 60% discount for exiting after 20 : 00; 50% discount for continuous parking between entering before 7 : 30 and exiting after 19 : 30. The test results show that the "levy + staggered peak" scheme has the most obvious effect of cutting the peak and filling the valley (see Figure 6).

5.3. Upgrading the Level of Transport Information Services. The traffic operation index system has been released to the public through various channels such as TV, website, Weibo, and MMS for real-time traffic conditions, while the continuous accumulation of historical data allows for the display of macroindices on a timeline in relation to major historical events (see Figure 7). On the other hand, the traffic emission monitoring platform is published through a thematic website and establishes a secondary development interface, which allows third-party organisations to capture the traffic emissions of each area in real time through an API (Air Pollution Index) with HTTP protocol.

Travel route planning includes pretravel route planning and dynamic route guidance during travelling. The former means that the user can select a travel route through the traffic

Figure 8: Virtual variable information screen for targeted induction of information from multiple sources.

operation index system before the trip, and the system will recommend a reasonable travel route for the user according to the traveler's choice of starting and ending points. The latter is used for long-distance and long-duration trips to respond to significant changes in traffic conditions that may occur in the pretravel planning of the travel path and to provide new travel paths for travellers. By using the big data platform to build a Variable Message System (VMS) based on the integration of multiple sources of data, the system will dynamically adjust the user's travel path according to the changes in road traffic conditions during the user's travel, so that the user can avoid congestion throughout the entire travel process and always maintain the optimal travel path (see Figure 8).

6. Conclusions

This paper provides an in-depth analysis of the connotation and technical characteristics of telematics and big data. In response to the demand of traffic information service system, a new traffic information service collaboration system is proposed, which consists of four parts, including service model and its description, service discovery, service

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matching, and service combination. From the operational results of the prototype system, the service collaboration system has well improved the intelligence and personalisation of traffic information services [27].

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Disclosure

This work was not supported by any funding.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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