Innovative Research on Smart Service System of Self-Driving Tour Based on 5G Technology

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Abstract: With the advent of 5G commercial era, self-driving tours are supposed to greet new developing opportunities as a new-coming sightseeing method. Via combing the composition and existing problems of self-driving tour service system, to transform the traditional self-driving tour service system under the support of 5G technology is put forward. Regarding the self-driving information service as the core, the 5G technology is applied in order to build an information service cloud platform linking self-driving tour service system and self-driving tourists, as well as VR, AI, unmanned driving, intelligent search, intelligent positioning and other science and technology are utilized to the self-driving tour service system, which jointly structure self-driving tour smart service system, so as to satisfy the service needs of self-driving tourists and initiate the new chapter of self-driving development.

1. Introduction

From the wireless communication technology in the 1980s, mobile information technology ushers in a new technological reform every ten years. From 1G to 4G, and from voice communication to live online video, the developing speed of mobile information technology is exclaiming. China has opened 5G commercial mode since November of 2019, which indicates the official arrival of 5G Internet of things era [1]. Other than the 4G network technology, 5G network takes "high speed, large broadband and low delay" as the main characteristics, which is increased from 20Mbp/s upload speed and 100Mbp/s download speed in 4G era to 10Gpb/s. In the application of Internet of things, 5G technology not only supports large capacity online at the same time, but also offers guarantee to the transmission of high-definition video in the broadband, which will be widely used in the intelligent tourism industry. With the strategic implementation of Internet +, tourism +, smart tourism and so on, as well as the application of VR intelligent interpretation and AI technology in tourism industry, the self-driving will face new developing opportunity as a new-coming sightseeing method.

2. Self-Driving Tour and Self-Driving Tour Service System

Self-driving tour originated in the United States in the 20th century, which takes advantages of weekends to go sightseeing, called “Sunday Drive”. Later it gradually developed to a “Self-drive Travel”, which is popular in European and American countries. The self-driving tour in China originated in the 1990s, and with the enhancing of people's income level and the increasing of leisure time, it has become a fashionable way of life. As for the researches on self-driving tour, the foreign countries are earlier than at home, mainly reflect in the fields of the concepts, categories, travel characteristics, impacts, service supplies and other aspects of self-driving tour [2-6]. Other than the
abroad researches, the researches of self-driving at home is based on the national conditions, which is more contribute to the development of guiding local self-driving development.

Self-driving tour service system is a united concept, referring to the cooperation among tourism industry with other industries and government departments, jointly provide a combination of a series of products and services which meets the needs for the tourists who choose “self-driving” as the main trip mode, covering six elements of tourism services and finance, insurance, road rescue, information services and so on [7-8]. An integrated self-driving tour activity not only needs the service provided by the tourism itself, but also involves the supports from traffic, finance, insurance, vehicle fault maintenance and related industries, so that the related researches on self-driving tour service system will be the become the focus of Chinese scholars. After synthesizing the current research results and combining the characteristics of self-driving tour, such as large travel flexibility, strong information dependence, personalized demand and so on, the self-driving tour service system is supposed to be composed of four parts: self-driving camp service system, self-driving traffic rescue system, self-driving information service system, self-driving support guarantee system and tourist rights protection system [9-11].

The self-driving camp service system regard the tourist destination such as scenic spots, resorts, car camps and so on as the scopes, providing services to meet the basic elements of self-driving tour, such as food, accommodation, transportation, tourism, shopping, entertainment and other tourism needs. The self-driving traffic rescue system provides the service demand of vehicle fault maintenance and fuel filling during the whole process from the source to the destination and then back to the source. The self-driving information service system provides the needed information services during the whole self-driving process, including real-time access to destination information, online booking information, smooth road and other relevant contents. The self-driving support system provides the financial, insurance, communication and other related service needs during the self-driving process. The tourist rights protection system provides protection safety tips, potential early warning, tourists' complaints, tourists' evaluation feedback and other related service needs. The whole service system covers the service integration needed by tourists in the whole journey from departure to return to the source place.

3. Construction of Intelligent Service System Platform for Self-Driving Tour Under 5G Technology

3.1. Transformation of Self-Driving Tour Service System Under 5G Technology

With 5G commerce opening up the era of Internet of everything, the self-driving tour is facing new opportunities and challenges so that integrating the functions and effects of the self-driving tour service system will provide more comprehensive and effective self-driving services for tourists. We found that the self-driving information service system is in the center and hub position in the whole self-driving tour service system via analyzing the relevance of the five service systems. The information service is running through every systems, linking the service systems and tourists. By contrast, the sole self-driving information service system not only compresses its function, but also restricts its service content. Therefore, under the technical condition of 5G, break the independence of the traditional self-driving service system, build a service system with information service as the core,
so as to construct a bridge between service enterprises and tourists (as shown in Figure 2).

**Figure 2.** Self-driving tour service system with self-driving information service platform as the core

Self-driving tour service system with self-driving information service platform as the core has three advantages. Advantage 1, perfecting the disadvantages in original service system such as information dispersion, independence and repeating, the integrated informative resource is more comprehensive and specific. Advantage 2, changing the information transmission mode with the service system as the main, and to establish the interactive information flow among tourists, information platform and service system. Advantage 3, increasing the information feedback channels for tourists (dotted line direction), which contributes to establish a self-driving tour service system dominated by tourists' needs. The advantages of building a self-driving travel service system with self-driving information service platform as the core are obvious, and the key to building a self-driving information service platform is how to make full use of 5G technology.

### 3.2. Construction of Self-Driving Tour Service Cloud Platform under 5G Technology

The 5G technology with “large broadband, high speed and low delay” as characteristics is the key and core to realize the information platform of self-driving service system. Taking 5G technology as the support to establish a cloud platform of self-driving tour service system [12], in order to achieve the cloud interaction mode of 5G network cloud, self-driving service system data cloud and self-driving tourists mobile terminal. Among them, the dotted line represents the virtual interaction of information services realized through 5G network cloud, and the solid line represents the actual interaction in the actual service provision process (as shown in Figure 3).
3.2.1. 5G network cloud
5G network is the production of the combination of 5G technology and cloud computing, under the support of 5G high-efficiency network signal to establish a stable cloud platform, so as to provide strong technical support for the self-driving tour service system. The realization of 5G network cloud regards the construction of 5G base station as the core, and 5G base station is added in the core area of self-driving camp. At the same time, it integrates 5G network of self-driving tour line, uses servers, wireless LAN and other devices to form a decentralized cloud computing center, thus forming a huge 5G cloud computing big data platform, providing network technical support for data interaction.

3.2.2. Self-driving service data cloud
Self-driving service data cloud is a data cloud platform composed of service information provided by enterprises. On the one hand, collect the relevant information of each system of self-driving service system, transmit it to tourists through 5G network cloud, and feedback the needs evaluation of tourists to the enterprise data platform, which is helpful for enterprises to provide effective information. On the other hand, service quality improvement and service project improvement are carried out for the actual interactive information between the enterprise end and the tourist mobile end.

3.2.3. Self-driving tourist mobile terminal
Self-driving tourist mobile end is the researcher of information as well as the user of information, which transmits the demand and feedback to all systems of the service system through 5G network cloud, and at the same time uses the virtual client of cloud platform to access the comprehensive resources provided by all enterprises of data cloud.

4. Smart service Design of Self-Driving Tour Under "5G + Cloud" Platform

4.1. VR Technology and Self-Driving Smart Service
VR, Virtual Reality Technology [13], immerse tourists' vision, hearing and touch in the process of virtual interactive experience, so as to bring more real experience. Depending on 5g cloud technology, provide VR intelligent interpretation and intelligent guide services for scenic spots, car camps, resorts and so on in the self-driving camp service system; In the self-driving traffic rescue system, VR intelligent GPS service is provided. In the process of camp and driving, VR guide is provided for...
accommodation, catering and other places that can be booked, providing reference for tourists to book.

4.2. **AI Technology and Self-Driving Intelligent Service**

AI, Artificial Intelligence Technology, can provide tourists with services to meet their personalized needs, and to some extent replace artificial labor. In the self-driving camp service system, can provide AI ticket checking service, AI security inspection service, AI refueling service and so on. In the self-driving traffic rescue system and self-driving support system, make utilize of the function of 5G Technology Center object interconnection to set up AI intelligent customer service system, and send the request to the corresponding service system according to the customer demand, so as to provide accurate service.

4.3. **Internet of Vehicles Technology and Self-Driving Intelligent Service**

The Internet of vehicles is called the rigid demand of 5G era. The realization of driverless technology will more likely promote the development of self-driving tour industry, expand the travel scope of self-driving travel, and provide more convenient services for the traffic rescue system.

4.4. **Intelligent Search Service**

Under the support of 5G network, give full play to the interaction of self-driving information service cloud platform, and provide customized personalized services for self-driving tourists according to their behavior characteristics and specific environment of obtaining information. 5G technology gives supports the collection of background information and network track of self-driving tourists, integrates the database information according to the needs of self-driving tourists through cloud computing, data mining and so on, and pushes the valuable information chain to self-driving tourists.

4.5. **Intelligent GPS Service**

Depending on 5G network technology, provide intelligent GPS Service. Intelligent GPS service includes two aspects. On the one hand, it provides self-driving tourists with the positioning of all objects from source to destination, including scenic spots, resorts, hotels, ticket offices, parking lots and so on. On the other hand, it offers GPS service to the self-driving tourists, which is convenient to effectively track and provide services in the process of self-driving due to special needs.

5. **Insufficiency and Expectation**

The intelligent service system of self-driving tour will bring new experience and various services to self-driving tourists, which not only improves the satisfaction degree of self-driving tourists, but also simplifies the management of tourism enterprises and reduces the operation cost. Self-driving intelligent service is not confined to VR, AI, intelligent search, intelligent positioning and other technology applications. With the arrival of 5G Internet of things era, intelligent service system will be more diversified and intelligent with the development of science and technology.

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