Application of the LBS and GIS Integration in tourism - a case study with Chinese perspectives

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Abstract

The Shenzhen OCT East, a well-known scenic and resort in China, has built a SuperMap GIS platform covering the whole region in 2011, but too few application instance run in this system. So the authors, guided by the software engineering and laboratory experiments method, want to design the new LBS application module embedded in it. For this aim, two main subsystem including Shuttle Bus Monitoring Scheduling and Tourists Positioning Monitoring have been integrated in SuperMap GIS platform through the mobile terminal software SuperMap SNE. Therefore, these two functions about LBS service cover the whole OCT East, and the field experiment of their performance and function also are tested and shows that the modules are stable. This study shows that the LBS application in tourism is beneficial to the publicity and promotion of the resort, also it can improve the resort service quality and visitor's satisfaction.

Keywords: LBS in tourism; scenic areas; GIS; integration

1 Introduction

With the development of tourism, the integration of network, tourism information and the eCommerce will be critical in promoting the informatization of tourism. LBS is considered as one of the most promising businesses after short message service (SMS). It has a tremendous market and good profitable prospect (Wu, 2007).

Now more researches focus on the LBS and GIS integration, we want to find out the new knowledge that can be used for the management of scenic areas, such as visitor's scenic diversion and navigation, emergency and evacuation, visitors' dynamic capacity in scenic spots, the transport path optimization and so on.

2 Literature Review

Charis and Dimitrois (2010) have offered some foresight views about the application of LBS in some specific sectors. They creatively proposed the Location Aware Auction based on LBS to be applied in tourism. More Chinese scholars also gradually pay more attention from the development of LBS technology to the realization and perfection of its application. Yang Peiling (2009) proposed the category of LBS application, and Shuchih Ernest Chang et al (2006) have done an in-depth research on the tourists' attitude toward and need for the LBS, and come to the conclusion that the tourists' contentment has a positive correlation with the application of LBS and the provision of the added-value services. In addition to that, Hu et al (2010) provided the reference model based on the similarities in use between the design idea of indoor and outdoor positioning of campus LBS platform and its application in scenic spots.

Now more new idea are used in tourism management, such as the "the management-oriented" in the past are changed into "the tourists-oriented". The tourist contentment is now taken seriously and receives a lot of attention (Wang et al, 2010).

Modern service in scenic and resort has now included the application of information technology, and most of the application such as the LBS in tourism aims at promoting tourist contentment. The more services the scenic spots can provide for tourists, the higher degrees of the contentment may be (Bian, 2005).

3 Application of LBS in tourism -a case of OCT East in China

3.1 Introduction of the Study Area

The Shenzhen OCT East is the first national eco-tourism demonstration park in China. It occupies near 9 square kilometres and mainly includes six parts: the Knight Valley Eco Park, the Tea Brook Valley Leisure Park, the Sea-Cloud Valley Sports Park, Huaxing Temple, Theme Hotel Community, Tianlu Manor. In 2011, a geographic information spatial database covering the whole OCT East has been built up based on field survey. This means there is a GIS platform on which it is conducive to develop and apply of new technologies.

There exists uneven distribution of flow of tourists in the tourist peak in the scenic spot, though they occupy a large area. For example, the problem of transit time is too long caused by the long distances between the three valleys (the Knight Valley, the Tea Brook Valley and the Sea-Cloud Valley), especially in the Knight Valley, the problem of long queues is very serious. It's very difficult for the tourists to tour the whole scenic spot within very short time, so the tourists' complaints often occur, and the tourists' contentment is down greatly. As a result, the side effect has damaged greatly the brand image of OCT East. Besides, because of the large space, the tourists have to take shuttle bus to where they want to. However, limited by the landform, the traffic has become the bottleneck for the efficiency of tourists' sightseeing. So the Shuttle Monitoring Scheduling have now become the main problems that hindering the promotion of services and the tourists' contentment.

3.2 The Integration of LBS Services in the SuperMap GIS platform

3.2.1 General Design

The LBS application in OCT East consists mainly of mobile terminal, positioning centre, LBS interface module, GIS module (see Fig. 1 for the general structure).

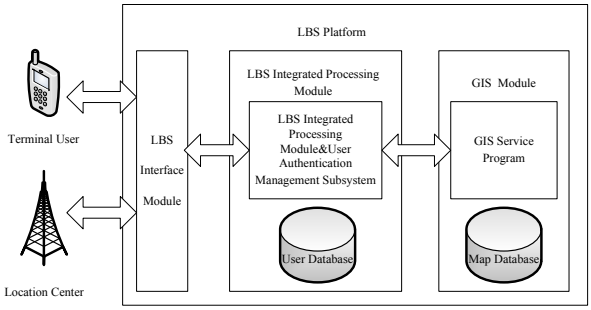

Fig. 1 The Overall Structure of LBS in OCT East

The work flow of this LBS platform is: the mobile terminal sends request information to LBS platform, and the operational server of the LBS platform receives the request information and communicates with the positioning centre to locate the cell phone user's position, and then uses the GIS server to obtain the relevant map information and send it to the user according to the returned key geographic information from the mobile positioning center.

3.3 The Implementation of Shuttle Bus Monitoring Scheduling Module

This module can be divided into: the system of shuttle control center, the sub-system of the control terminal, and the sub-system of onboard terminal (see Fig. 2).

The Monitoring control center consists of GPS, Web, map and database server, which is distributed computer system and implements such operational functions as shuttle positioning track-following, control alarm, control order.

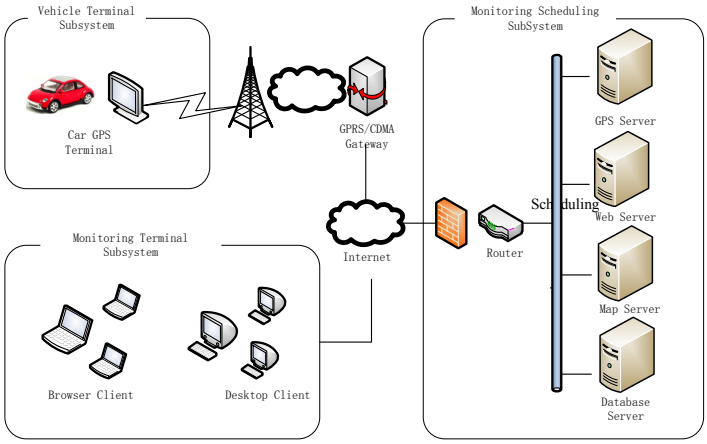

Fig. 2 Physical Structure of Shuttle Bus Monitoring Scheduling Subsystem

In this sub-system, the onboard terminal obtains the current location data of the shuttle through GPS satellite positioning system, and uploads the data to the GPS server of the shuttle monitoring control center through such mobile telecom network data channel such as GRPS/CDMA. Then the shuttle monitoring center can also send control, dispatching order to the onboard terminal through mobile telecom network. The Shuttle bus location is displayed in the park on the electronic map, it can help monitoring center schedule the bus so as to meet the transport needs of tourists.

3.4 Implementation of the Tourists Positioning Monitoring Module

In the OCT East, there often appear thick flows of tourists in somewhere at the peak of tourism, which poses security threat and reduces the quality of sightseeing. Therefore, monitoring and diverting the flow of tourists in the park is one of the key solutions to promoting the quality of service of OCT East.

The module makes use of SuperMap GIS platform and combines the present wireless telecom network technology, implementing the location monitoring of the people in the scenic spot and the source of danger, record tracking back, intelligent broadcasting of order reports, etc. (see Fig. 3).

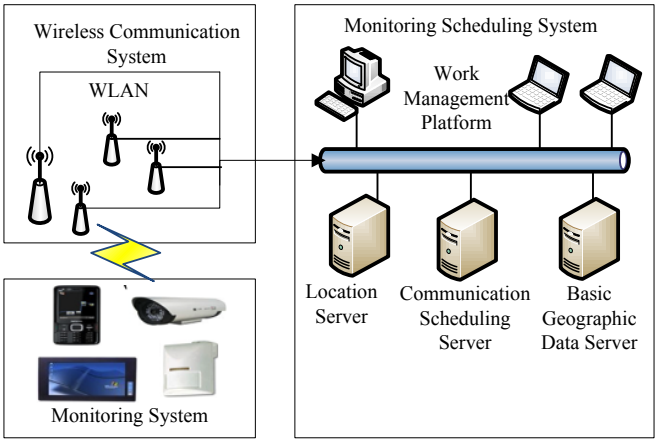

Fig. 3 Tourists Positioning Monitoring Subsystem Network Architecture

In many scenic areas and resorts in China, there are lacks of the technology support to improve their management efficiency. In this case study of Shenzhen OCT East, because it covers wide area from up and down of the mountain, so the tourists uphill and downhill transportation links is relatively difficult. After a complete GIS data platform has been established, LBS services can be equipped with it easier. In some urgent point such as the shuttle scheduling and monitoring, tourists stream positioning and navigation have been greatly improved, the spatial distribution of the tourists in the whole OCT East have be optimized. This is an innovative attempt of LBS application in the Chinese scenic areas. The venue experiment and function test have been completed, and this LBS system also has been used in the management by OCT East.

4 The function and performance test of the Module

The author's main experimental parts consist of two tests: the test of the function of the platform and performance test. The test of the function can also be called usable test, mainly testing whether the system has implemented the aims of the function design. The performance test includes such aspects as the stability, response rate, share of resources, packets loss rate of the operation of the LBS service platform.

The experimental results show: (1) the choice of telecom system, GPRS network is the data transmit plan for this article, which is very efficient. (2) the choice of telecom protocol, choosing user datagram protocol UDP as transit protocol can meet the needs of large quantities of data transmission, which will not affect the reliability of the system with so low packet lose rate for the location service system; (3) Before data transmission, data compression technology is used, which is good for real-time promotion, reducing effectively the response time of the system and the average

packets lose rate in transmission. The test has proved the reliability and usability of the application of the whole LBS platform in the services of OCT East.

5 Conclusion

For a long time there have been many problems something like too much the number of visitors, too large of the scenic areas, poor traffic conditions, scenic capacity overload etc in China. Through the case study about OCT East, it could be found: (1) The mobile positioning terminal and the computer network of the commanding center are integrated, then it form a LBS service web in OCT East, which is applied in two main fields including the shuttle bus monitoring Scheduling and Tourists Positioning Monitoring. (2) The LBS in tourism embed in GIS platform has been confirmed as an efficient management utility. (3) The function and performance of the LBS in tourism service has been tested, the result shows that the LBS module integrated into GIS platform fits the objective reality, and it is feasible for use in the other tourism application. This is useful for providing a reference case for other scenic spots and resorts in China.

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