

# Development of Zaozhuang Tourism Information System Based on WebGIS

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## Abstract

As a resource-exhausted city, Tourism as a pillar industry of economic transformation in Zaozhuang is fostered as a key point. The development of tourism industry is closely related to the information technology. In the paper, after analyzing the tourism situation of Zaozhuang, WebGIS and Virtual Reality technology are applied to the tourism industry, and Tourism Information System in Zaozhuang is developed. The successful development of this system will be a great breakthrough in the tourism industry of Zaozhuang and make up the blank of no tourism information system in Zaozhuang.

**Keywords:** *Tourism, WebGIS, Optimal Path Analysis, Tourism Information System*

## 1. Introduction

In March 5th, 2009, the National Development and Reform Commission announced that the State Council lists 32 cities including Zaozhuang into the second batch of resource-exhausted cities. Zaozhuang, which emerged because of coal, now has to confront new choices and badly need to transform. Zaozhuang municipal Party committee and government consider the situation and make strategic plan. Tourism as a pillar industry of economic transformation in Zaozhuang and a new economic increasing point is fostered as a key point. The attention paid by all levels of party and government creates upbeat opportunities for the development of tourism in Zaozhuang.

The development of tourism industry is closely related to the information technology. The information system has greatly enhanced the efficiency of tourism operations and improve productivity and performance of the industry, but also intensifies the fierce competition among tourism enterprises. Particularly the Internet is offering visitors a mount of information and changing the means that people access to travel information. Nevertheless, the rise of e-commerce accelerated the change of management model, marketing and organizational structure. Wethner and Klein (1999) took tourism as a business based on networking and information. And many travel suppliers and intermediaries

formed a complex supply chain network whose value rise depending on information [1,2].

WebGIS and Virtual Reality technology are applied to the tourism industry, and Tourism Information System in Zaozhuang is developed. The development of this system has crucial meaning to improve the visibility of Zaozhuang and promote the development of tourism in Zaozhuang. The development of tourism will promote the rise and boom of other related industries. Therefore, the success of this project has good social and economic benefits. The successful development of this system may be a great breakthrough in the tourism industry of Zaozhuang and make up the blank of no tourism information system in Zaozhuang.

## 2. Theoretical Introduction

### 2.1 WebGIS

Geographic Information System (GIS), based on geospatial databases, under the support of computer software and hardware, is a computer technology system set up for geographical research and policy services, which collect, input, manage, edit, query, analysis, simulate and display space-related data, and adopt space model analysis way to apply a variety of spatial and dynamic information. Due to its efficient data management capabilities presently it is an effective information management and decision-making tool, and an emerging science centering on computer science, surveying and mapping, geography, space science, mathematics, statistics and management. It is widely used in urban land management, urban planning, environmental monitoring, disaster prevention and mitigation, military and other fields [3].

Web Geographic Information System (WebGIS) refers to a geographic information system which is based on Internet and client applications, uses WWW protocols and runs on the World Wide Web. Compared with the traditional GIS of desktop-based or LAN-based, WebGIS opens up a vast

space for GIS data and information accession, publication, sharing and operations, so GIS technology can be applied widely to resources and environmental management and planning, and many other industries though Internet technology[4].

## 2.2 Virtual Reality

Virtual Reality, referred to VR, is new information technology rising in 1920s which make use of computer visualization virtualizes the real world. It makes people enter "into" the multimedia virtual world through establishing internet virtual space to achieve human-computer interaction and mutual operation and immersive experience. As a result, people become "human landscape", namely, the integration of people and condition. The virtual reality technology makes up Web GIS's lack of expression in the space scenes, and makes geospatial data express in three-dimensional and show more realistic.

## 3. Requirement Analysis of Zaozhuang Tourism Information System

According to the survey, at present some domestic metropolises such as Beijing, Xi'an and so on, have already started the research of tourism information system, and developed the corresponding products. But on the whole, the function of these systems is still not perfect or complete, and remains to be further complement. However, Zaozhuang, in the period of transformation, its tourism industry has just started and has not its own tourism information system, and the propaganda of tourist attractions in Zaozhuang is not enough, which makes the tourists, especially foreign tourists, know little about Zaozhuang, and leads to Zaozhuang's tourism develop slowly and seriously affects the pace of economic development in Zaozhuang.

Zaozhuang Tourism Information System primarily provides the tourist attractions information and tourism-related transportation, shopping, accommodation and catering and other ancillary travel information to facilitate tourists in which to plan out their travel plans, travel arrangements for specific lines.

## 4. The Overall Design of System

The construction technique route of the tourism information system based on WebGIS is as follows: adopting a service-oriented design thought and multi-tier architecture, and the system achieve spatial data organization of spatial entities and its relations, and efficient storage and indexing of the mass data, which can support distributed computing under LAN and WAN

circumstances, support dissemination and sharing of distributed spatial information and network spatial information service, and support that can support large, distributed spatially basic information construction and services. The overall structure of the system is as follows in Fig. 1.

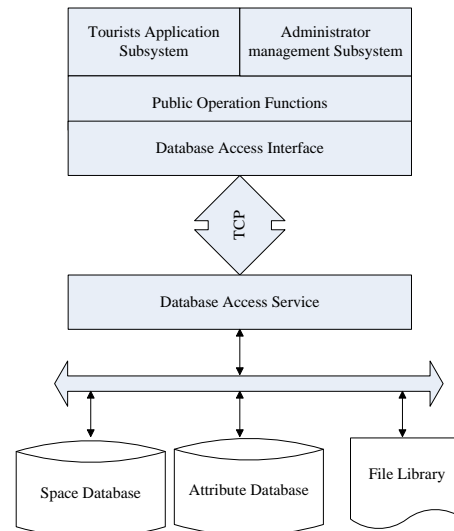


Fig. 1 The overall structure of the system

Concretely it can be divided into the following layers[5]:

- (1)The data Layer: it includes spatial data, attribute data, multimedia data etc involved by the system, and user management and system settings and other system management data.
- (2)The service layer: As a communicative bridge between the business applications and the underlying data resources and other business systems, it mainly provides resource accessions and application integration functions to ensure that the business components can be interacted with related resources transparently, and to ensure extensibility, and easy extensibility of the system.
- (3)The basic function layer: It includes operation of spatial data processing component, query component, statistical analysis component, and management and control component.
- (4)The application layer: It interacts with the users and realizes the functions of electronic maps, tourism information query, and tourism information analysis system and so on.

## 5. Function Design of the System

### 5.1 The structure of the function module of the system

Zaozhuang tourism information system can be divided into two modules: Tourism application subsystem and Administrator Management subsystem just as Fig. 2 showed.

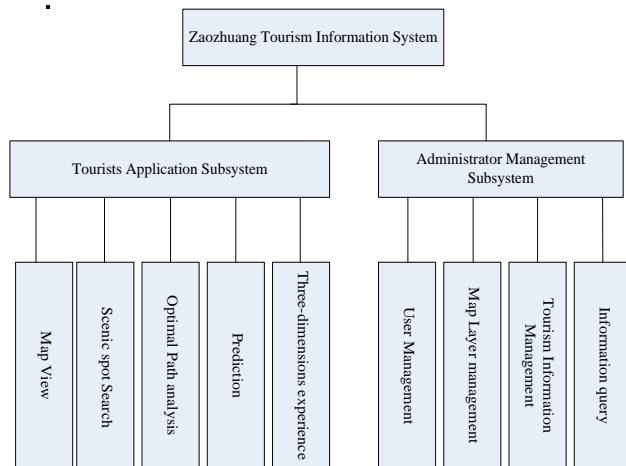


Fig. 2 The structure of the function module of the system

### 5.2 The Function of Zaozhuang Tourism Information System

#### (1)Map view and search function

In the system, the map can be zoomed in and out and roam. And display of the layer can be controlled according to the display effect of the map. Furthermore, the replace name can be queried and retrieved. It also can view scenic tours maps, attractions maps, travel maps and the attributed maps of the surrounding restaurants, hospitals, shopping and other relevant sites. Finally, the related attractions introductions and customs and other information can be queried and retrieved, as well as multimedia information online viewing.

#### (2)Spatial information measurement

It can customize the measurement of the region area and the distance between two points. And it also can arbitrarily choose elements to show the distance or area.

#### (3)Statistical analysis and statistical mapping display

Users can query the statistical information on the map as a unit of province, district and county. Users can also select

the required data indicators and immediately produce statistical maps. As for the queried attribute information, it can further statistical analysis functions, and show the results of the statistical analysis in the form of charts.

#### (4)Multiple Window Linkage

In the system, maps can be viewed in more than two windows where we can compare with tourism attractions graphic data changes in different historical periods.

#### (5)Typical Feature Dimension

Planar (e.g.: viewing excursions area), linear (e.g.: walking routes), point-like (for example: attractions, facilities, etc.), annotation (for example: names, text, etc.) elements can be marked on the map. Also it can be used for emergent command plotting to take emergency measures. Plotting content can be plotted directly on the basis map, and the existing layers also can be imported directly as the plotting and exported. As for any map, they can all make special topic graphics in the current display realm [6].

#### (6)Displaying the scenic spots

Displaying the scenic spots in three-dimensional image and creating three-dimensions to experience the world. With the main function of query, the last generation of the Internet, whether Yahoo, or Google, provides most of the text information to meet people's basic need of information. Audio-visual experience is the inherent demand of the people, and the new three-dimensional form of the Internet can fully meet people's need of information. In the 3D virtual world, people build virtual environments and complete travel experience interactively. Therefore, if virtual reality technology is applied to the travel information system, the users will feel the charm of tourism attractions in Zaozhuang.

#### (7)Optimal path analysis

It can choose the shortest distance, least time-consuming lines among of many traffic routes. At the same time it takes into account the traffic jams, and links with meteorological information to analyze [7]. This have more significance for tourists who drive by themselves, especially drive go-anywhere vehicle. When go-anywhere vehicle drives on-road sections, for example, go-anywhere vehicle goes through the relatively shallow and narrow river, on the basis of slope, elevation, it analyze, and selects the route. According to parameters specified by users, based on DEM data, calculate it analyzes statistical data. After analyzing it list, and automatically marks analysis results graphics which can be referred by the tourists on the map. In addition, the system also includes analysis, across analysis functions and so on.

#### (8)Dynamic and interactive features

It dynamically updates Web information, stores in the database directly, and publishes information on the Web, which is attractive to tourists.

#### (9)Prediction function

The system can predict Weather, travel peak, the number of tourists forecast.

#### (10)System management, data maintenance and update

Many data on the web site is old information a few years ago, and has not been updated timely, which is useless for users. A practical information system must be updated the data timely. The Html format file applied to the system can be edited into the library and managed in the format of database. And then we can make use of maintenance tools to edit, revise, and store in the database so as to save time, save the maintenance persons' time and save space occupied by data.

## 6. Conclusions

The tourism information system in Zaozhuang based on WebGIS and virtual reality technology is fully functional, designed properly and meets the need of tourism development in Zaozhuang city. Compared with other similar projects, this system has more functions and more comprehensive features, which not only allows users to find almost all the information from the system, and allows users to enter virtual reality to experience the charm of tourist attractions in Zaozhuang. The successful development of this system will be a major breakthrough in the tourism industry in Zaozhuang and fill in the blank of lacking tourism information system in Zaozhuang. But in the data, there are the problems of practical geographic information and sharing issues. These data applied to System needs to be updated. Each professional department has more new data, due to the high cost of data acquisition and data security and other reasons, so sharing data cannot be realized.

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