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Chapter 10

Virtual Reality in Village Folk Custom Tourism

Zhuowei Hu and Lai Wei

Additional information is available at the end of the chapter

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1. Introduction

With the prosperous development of socialist construction in China, the tourism is increasingly becoming new growth point of economy and one of the main pillars of the tertiary industry. It becomes hotpot in current international tourism industry because of rich national cultural connotation and strange exotic ambiance.

Some famous tourist cities of China, such as Xi'an, establish the tourism resources information system in natural landscape, human landscape, heritage, and achieve a modern tourist information services and management through the advanced network geographic information technology. Although there are a lot of development examples of tourism information system, they have various deficiencies. Using of information technology has penetrated into modern tourism industry. It brings new business revolution for rapid development of tourism. However, present tourism system is out of keeping with development requirement of village folk custom tourism industry. Application of virtual reality technology in tourism not only can play a part in drumbeating, influence and attractiveness, but can also meet the tours and aesthetic demands of those people who haven't or not be capable of getting there in a certain level. We can combine with virtual reality and real reality to make system more unfeigned. At the same time, 3D visualization and virtual reality makes up for insufficient of space scenes expression in WebGIS. It can make geospatial data realistically exhibit in real space, dynamically and figuratively depict objective phenomenon of landscape, and provide new technology for decision maker in reasonable planning of scenic spot. Therefore we integrated WebGIS, Network, spatial information, 3D modeling, 3D roaming and multimedia technology to establish the "Village Folk Custom Tourism Service System". It can use virtual reality technology to make virtual reconstruction and 3D simulation for typical folk custom information.

This system is based on spatial information technology and multimedia virtual reality technology. It can display famous scenic site, local customs and practices, entertainment and

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tourist transportation, deeply mine local characteristics of village, build external propaganda window, establish visualization and publishing platform, achieve systemic organization and efficient management, promote culture exchange and protect excellent traditional folk custom tourism resource.

This system can use virtual reality technology to simulate and display typical folk custom information. We put some data, such as geographical data and tourism thematic, into a computation module, and make intuitive information. Through the comprehensive analysis and evaluation, we can provide statistical analysis information for user and decision maker by internet.

This system mainly includes 4 function modules. They are management and analysis of village resoureces, e-commerce of town and village folk tourism, town and village folk tourism landscape display and self-service of village folk tourist information.

2. System functional design

2.1. Management and analysis of village resoureces sub-system

We design the management and analysis of toen and village resource sub-system according to characteristic of folk custom tourism resource, business process or requirement of mamagement, system flexibility or security and efficient or convenience of development. Then we divide the system in function.

2.1.1. Management module

The goals of this sub-system are specification of folk custom tourism resource, effective management and accurate analysis. It integrated tourism landscape virtual display and provide folk custom tourism resource data and analysis result for other sub-system. Data information has been classified and evaluated in collection of folk custom tourism resource.

The management system has 5 parts according to different stages of data flow. There are information collection and classification, folk custom tourism resource evaluation, subsidiary information management, attribute of layer management and system information management.

The information collection and classification module can put the single information to the database according to specification data. If there are not tourism resource single data, we can use GPS to measure the coordinate and manually put them into the database. After that, we classify the data according to some classification methods.

The folk custom tourism resource evaluation module is used to evaluate the single resource information according to evaluation model. Then we evaluate the tourism resource within study area through single evaluation information and attribute from database, such as folk custom tourism resource density, population density, economic

capacity density and so on. It can propose a reasonable management for tourism enterprise and village management.

The subsidiary information management module manages the scenic spot information, tourist information, socio-econom, and naturalenvironment information.

The attribute of layer management module can manage the basic information of folk custom tourism resource, monomer tourism level, different kinds of image and description information of reflecting the appearance.

The system information management moduel can add, delete and modify the system user.

2.1.2. Analysis module

Analysis module is based on collection, classification, evaluation and specification data of management module. It contains 4 parts, such as information inquiry and statistics module, spatial query module, spatial analysis module and folk custom tourism resource planning.

The information inquiry and statistics module can do condition query by attribute of folk custom resource. The system can provide search according to study area, number, level and type. Then it can display and print the search result by image, report and statistic chart.

The spatial query module can use to do research between the attribute and image. On the one hand, we can do research for folk tourism resource by roi which selected by people, on the other hand, we also can do research according to single attribute and highlight it.

The spatial analysis module can achieve density analysis, buffer analysis, network analysis and so on of folk custom resource. It can support the folk custom tourism resource planning module.

The folk custom tourism resource planning module can design and plan the tourism with GIS spatial analysis. Then it can analyze priority development area

2.2. E-Commerce of town and village folk tourism

This module can combine with folk tourism industry and e-commerce technology and achieve management of business information, local information display, public information display and information search for tourist, tourism enterprise and village administrator department. It can use information technology to improve competitiveness of tourism industry and quality of market service.

2.2.1. Business-oriented folk tourism e-commerce

Some business can use single self-service to establish small web site themself. This system can provide 2 functions.

1. Add Information

This function provide some operating of text edit, picture display, panorama show and audio/video display. The business can add some information about folk scenic spot into system and display them.

2. Message Reply

The system can provide message board function. Tourist uses this function to evaluate the service quality.

2.2.2. Travel-oriented folk tourism e-commerce

This module can provide some functions through centralized service platform, such as standard template and advanced customization electronic map making, blog prepared, 3D simulation making, audio/video management, message reply and so on. If user wants to display scenic spot by general function, they can chooes standard template. If user wants to make a panorama, they can choose advanced customization.

2.2.3. Trourist-oriented folk tourism e-commerce

1. Release of Demand Information

It can provide 2 ways, such as standard template and advanced customization.

2. Business Space Management

This system provides some functions, such as electronic map making, blog prepared and so on.

2.3. Town and village folk tourism landscape display

This sub-system contains 2 modules. There are 3D GIS and augmented virtual reality.

2.3.1. 3D GIS module

1. Geographical Environment Multi-Scale Display

The multi-scale detail of landscape can simulate some information in different status, angles and ranges.

Scale Visualization: It can simulate change of size and clarity in different distances and movements.

Adaptive display: It is a simple form for landscape information display. It can add some detail information into the simple model according to some demands.

Omnibearing display: We can use mouse to choose different viewpoint for omnibearing display.

2. Interactive of 2D Map and 3D Scene

2D map can provide tourist information on plane, such as distribution of tourism resource, service facilitity and travel traffic.

Distribution of tourism resource: It contains distribution of attraction, tourism project and ecological landscape, such as farm courtyard, folk games and river.

Distribution of service facilitity: It contains restaurant, hotel and internet café.

Travel traffic: It contains travel route in scenic spot, such as bus line and tourist route.

Eagle eye function: We choose some destination point to see the 3D scene.

3. Scenic Tour

We can use mouse to select interest area and roam in 3D scene. We also can set start and stop, then roaming by tour line. It can help tourist to achieve self-navigation.

2.3.2. Augmented virtual reality

1. 3D Model Display
    1. Single Object Stereo Display

It can support e-commerce for volk custom tourism. Then it also can model and display folk characteristic landscape and feature product by stereo.

2. Freedom Browse by Mouse Control

We can choose different modes of mouse to display single object in omnibearing.

1. Small Regional Virtual Display
    1. Small Regional Virtual Display in Scenic Spot.

It can make model of scenic spot. Then it cans virtual display the model.

    2. Panorama Display in Scenic Spot

It cans virtual display the scenic spot by panorama.

2.4. Self-Service of village folk tourist information

2.4.1. Overall function of sub-system

This sub-system is a guide information service program, which is based on mobile terminal, such as PDA and mobile phone. User cans download the program and install it in their mobile terminal. The program can determine tourist position by GPS signal recived. Then it can obviously display information about nearby scenic spot and give some routes for navigation. Then it also can provide voice service, such as location, special resource and so on.

This sub-system also can manage guide resource and provide download site. User can download the map and navigation data to mobile terminal by wired and wireless.

2.4.2. Intelligent guide

The system can determine the position of tourist by GPS. Tourist can set the auto-play voice guide information and image. In different terminal platform, it provides different guide services. It combines with GPS module and provides self-navigation and voice guide service.

2.4.3 Guide service information

It can provide attraction introduction, characteristic picture, recommended tourist route and distance of current location.

2.4.4. Mobile tour guide information service system

It can provide data information of guide information by different ways. User can add, modify and manage information, which related with attraction. Then user also can obtain other information in wide range of ways.

The map and navigation data can be downloaded to mobile terminal by many ways, such as local cable, mobile communication network, wireless, Bluetooth and internet.

2.4.5. Mobile guide terminal

The software adapt to different mobile terminals.In smart phone or PDA with GPS, it can achieve the multimedia guide service through GIS and GPS. In smart phone or PDA without GPS, it can achieve simple voice guide service.

3. Design proposal

3.1. Management and analysis of village resources

The overall design thinking of this sub-system is achieving data base management of tourism resource basic information, scoring information, classification information and multimedia information; establishment model base of folk tourism resource classification, evaluation, development and planning; achieving conditional query, interaction query, visualization query of tourism single source basic information. It can provide release and management service of tourism attraction, tourism facilities and traffic information for village management department.

In order to simplify deployment and management of system, the logical structure of system uses multilayer structure based on BS. It is good for management of data and service. The system can be divied into presentation layer, web layer, application layer and data layer. It is shown in Figure 1

The presentation layer is public interface for user accessing system. It is mainly forward user request to web service through internet and intranet by browser. Then the server returns the logical organization information to user. In this layer, it do not achieve the real business logic, it is only for forwarding the user request.

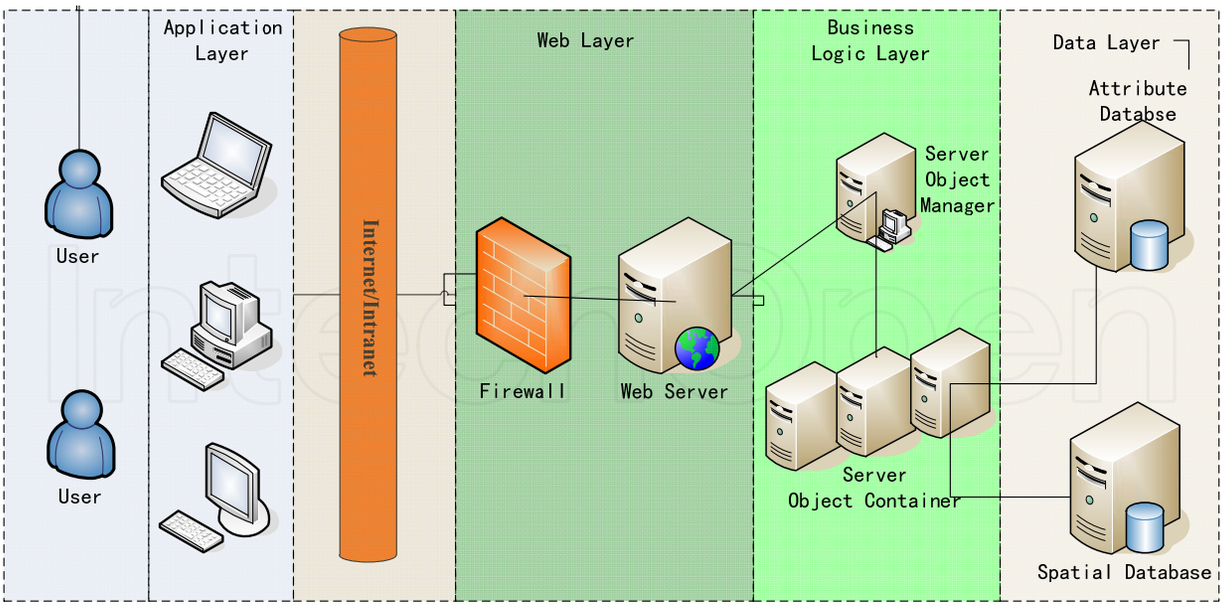


Figure 1. Design Proposal of Management and Analysis of Village Resoureces

The web layer is under the presentation layer. It can receive the request of user from presentation layer and reject the illegal request through firewall. So it can ensure the security of system operation. In web layer, we dispose the netword application system, which is developed by ArcGIS Server and ADF foR JAVA. It can process non-spatial data without GIS analysis function.

The business logic layer is GIS server center which is based on ArcGIS Server platform. Whole GIS analysis inner system is achieved in server. Server object manager can equal divide the complex and expensive GIS operation into server object container through load balancing and cluster technology. The server object container can call the spatial data to complete the operation and return the result to web layer.

Data layer mainly intergrates the basic data, which are from folk custom tourism resource management and analysis system. There are 2 databases for storing data. One is attribute database, other is spatial database. Data layer can make a relationship between 2 databases.

The system architecture of enterprise GIS has a clear level and division. Different level can achieve different function. It is good for full use of resource and maintenance of system. This structure can improve system stability, decrease system bottle-neck effect with complex operation for GIS data, increase processing power with high concurrency.

1. System User Role

The system user role has 2 parts. One is user, another is administrator. It can restrict modify permission of system data and ensure system data security.

1. System Administrator

System administrator is administrator of government and management department of tourism resource. They can login management system and modify the data and user permission.

2. System User

System user is business operation personnel of relative department and tourist. Then only access the system for obtaining information without modifying database.

1. Database Structure Design

Spatial database mainly contain basic layer and thematic layer of folk tourism resource distribution, which is shown in Figure 2. Basic layer contains administrative, river system, traffic road, remote sensing image and so on. Thematic layer contains distribution map of folk tourism resource and best travel route map. Intergration of basic layer and thematic layer can simulate reality thing and display on the system interface. User can make an interactive analysis by spatial data layer.

Attribute data mainly contain information of basic layer, landscape information of folk tourism resource, socio-economic information, environmental information, tourist information, classification, evaluation indicator and system user information. Each information stores into a table. It is managed by SQL Server.

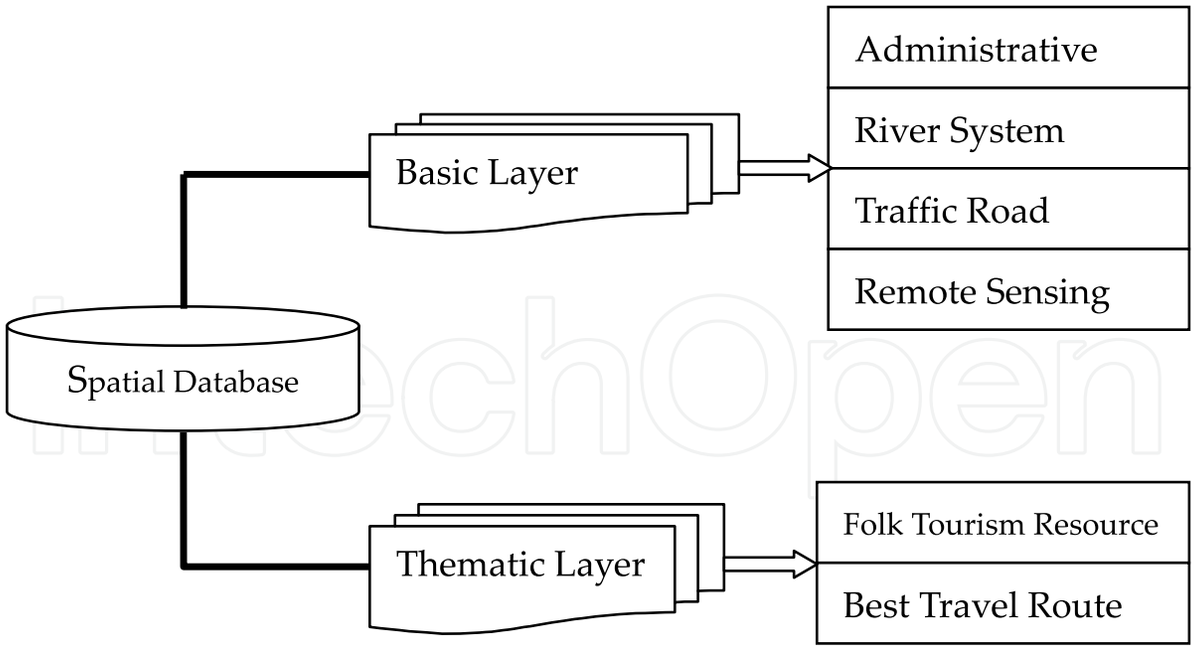


Figure 2. Hierarchy Structure of Spatial Database

3.2. E-Commerce of town and village folk tourism sub-system

Structure of e-commerce of village folk tourism sub-system is shown in Figure 3.

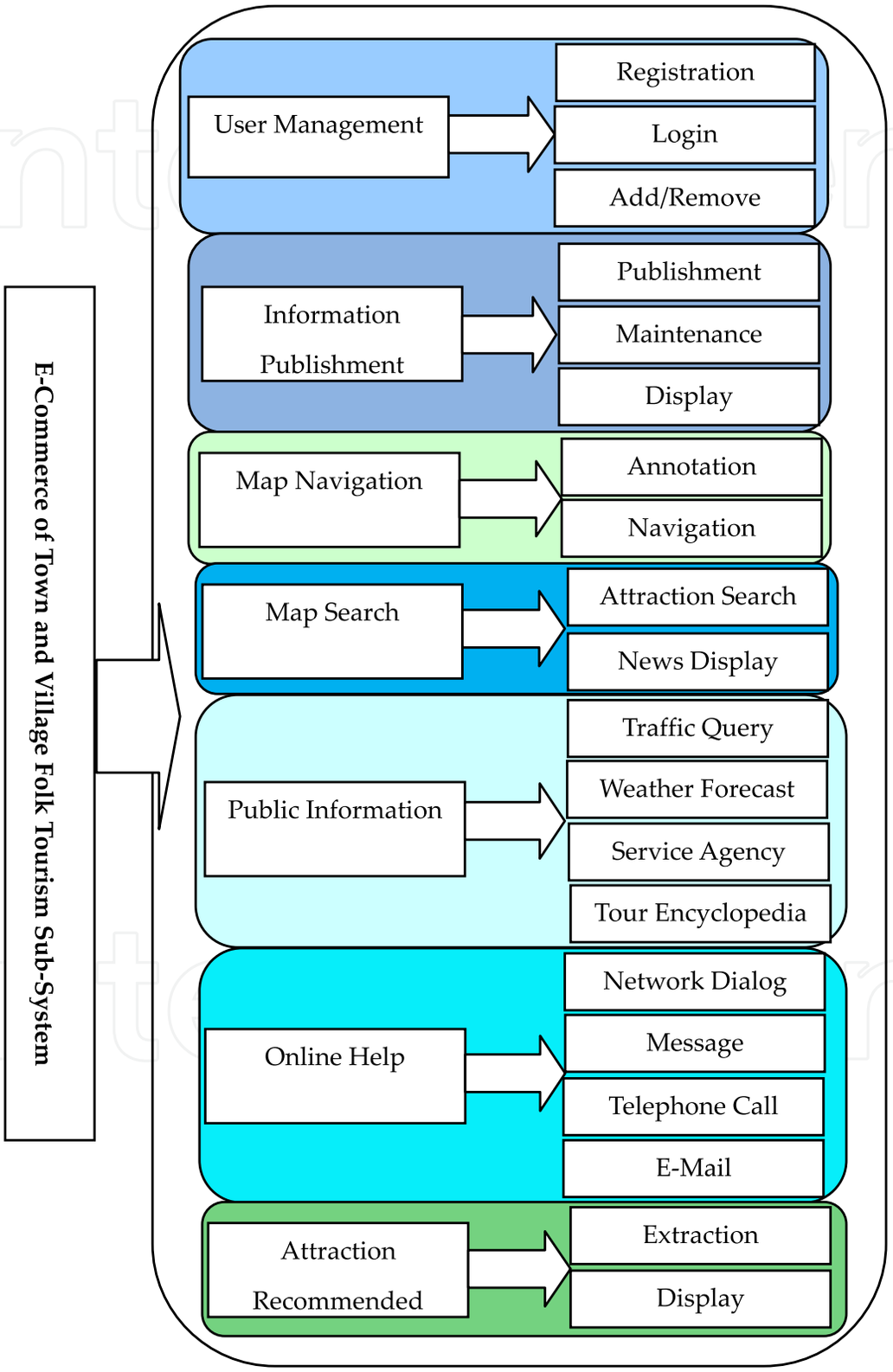


Figure 3. Structure of E-Commerce of Town and Village Folk Tourism Sub-System

3.2.1. User registration module

The Figure 4 shows categories and permissions of users.

Function describe: user account verification, information detail record, user management

Enterance parameter: User ID

Database operation: We can store data and modify data through user registry.

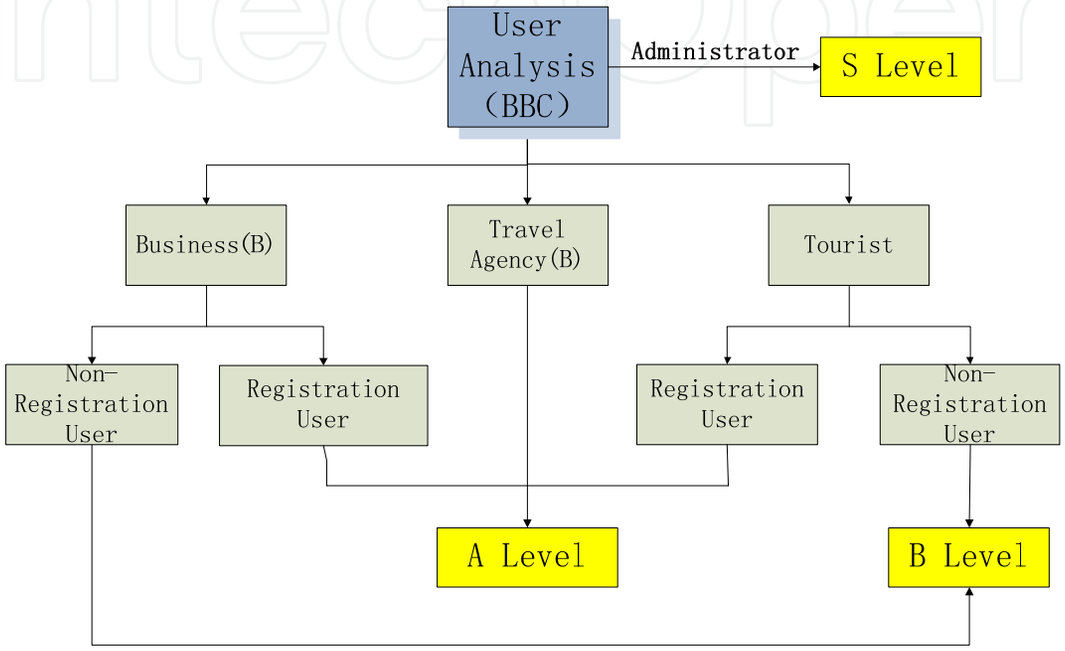


Figure 4. User Categories and Permissions

3.2.2. Information publishment module

1. Information Publishment

Business, tourist and travel agency can publish their information after registration. We can entry information through click "Add" button. Each information is relationship with a record of businessinfo. Database uses "update" statement to update.

2. Information Maintenance

The information maintenance contains manual and automatic ways.

1. Manual

It is managed by web administrator. When information contains false, reactionary, superstitious and violation information, we can use "delete" statement to manual delete.

2. Automatic

It is depand on database. It use automatically retrieve to analyze information. If there is time-out, then delete it. It can reduce the record redundant of database.

3. Category Display

It can provide a variety of classification system for use. It contains source category, region category, folk characteristic category, basic tourism project category and so on.

3.2.3. Map navigation module

1. Attraction Navigation

When mouse move to a certain province, the system can automatically displays totals and news of folk tourism in this province. If I click a province, the system automatically displays the map of this province.

User can choose interest attraction to obtain detail of attraction, scuh as text, picture, video, panorama and so on.

2. Map Annotation

It is achieved by system administrator. When user adds some information, he can put forward request through message and call. System administrator receives request and make an annotation in the map. Then he makes a relationship with attribute of shape file.

3.2.4. Map search module

1. Attraction Search

User can entry the name of attraction into the system. System can match data from business database and display the result to user. The result is made relationship with attribute of shape file and show in map.

2. News Show

When user click the attraction in result, the system can show some information and news of this attraction, such as organize activity, favorable price policy and so on.

3.2.5. Attraction recommended module

1. Information Extraction

To do attractions recommended must first be extracted from the business information form and tourists on their evaluation. Through attractions search system selects the top of the evaluation of data and displays on the homepage.

2. Information Display

When attraction information has been extracted, we need dislay these informations. It contains text, picture, audio, video, panorama and so on.

3.2.6. Public information module

Public information module can provide daily information service for tourism, such as traffic routing, weather forecast, local service agency and so on. This information can provide tourism through superlink.

3.2.7. Online help module

1. Network Dialog

It can display in floating windows by QQ dialog. If user wants to consult, he can click on the dialog.

2. Electronic Message

It is message board. User can leave a message to administrator. System administrator can solve the question by message.

3. Telephone Call

In homepage, there is telephone number of administration. User can call the number for help.

4. Email

User can send a email to administrator. Administrator can reply email in 1-2 work days.

3.3. Town and village folk tourism landscape display

Town and Village folk tourism landscape adaptive display component divided to two functional modules horizontal. One is the 3DGIS module, and it strengthen the virtual reality module.3DGIS module in charge of display the geographical elements of the village folk landscape. This module displays the real landscape in multi-scaled 3D and roam. It also has the assist function of spatial query and analyze. Strengthen the virtual reality module is to show independent 3D model and small region virtual reality landscape more meticulous and vividly based on the 3DGIS landscape display. In the same time, multimedia technique display village tourism humanity landscape which could not be displayed by 3DGIS.

Adaptive display component could be divided to three levels from bottom to top, which is database and model, interface and function. The database and model level bring various kinds of base data to database and then abstract to model base. Adaptive display component achieve model management interface of model base inside, and service interface to other subsystems outside. These interfaces recombine and realize the main function of adaptive display component.

The realization flow of town and village folk tourism adaptive display component mainly composes of four level contents, data, model, interface and display. Every level is supported

by a higher level. Finally, the whole component supply concise calling method and other subsystems acquire adaptive display related service through external interface.

The base data is multi-source data. Part of the data need to acquire by field measurement and graph-taking. Database management most of the data, and some special data is managed by file style.

Model is the general name of abstract data structure and data management method. It includes 3D model and other virtual reality model. The gathering of various kinds of model and mutual association compose the model base.

Interface is divided into internal model interface and external service interface. The former realize model objectification function, and form adaptive displayed concrete object. The later supplies methods for other system to call this component.

After model instantiation, the component displays the village tourism omnidirectional stereo by virtual reality method at last. And it displays the user concerned tourism information by spatial analysis and inquire supplied by 3DGIS at the same time.

3.4. Self-Service of village folk tourist information

3.4.1. System structure and function module

Mobile intelligent tourist guide termination and information system general structure shows as Figure 5 follow. The system is divided into tour guide information service system and mobile tour guide termination.

3.4.2. Mobile intelligent tour guide termination system and function

As shown as Figure 6 following. Mobile intelligent tour guide termination platform divide into termination with operating system above Windows mobile6.0 kernel and ordinary mobile phone. The termination provides different kinds of tour guide information service base on developable interface offered by the system and hardware platform system function.

On PDA and intelligent mobile phone with Window mobile6.0 kernel, the termination supply GPS orientation and map service mainly formed voice tour guide and data system service.

On the develop interface limited ordinary mobile phone, it allows user to press button operation to supply voice tour guide and data system service.

3.4.3. Tour guide information data service system

Shown as Figure 7, the main function of tour guide information data service system is to receive and accept tour guide service information data. And it realizes data management, provides multiple data interface, and allows mobile tour guide termination or remote computer users to visit local data. Based on applying for data, it provides tour guide map data, voice data and information service data for download.

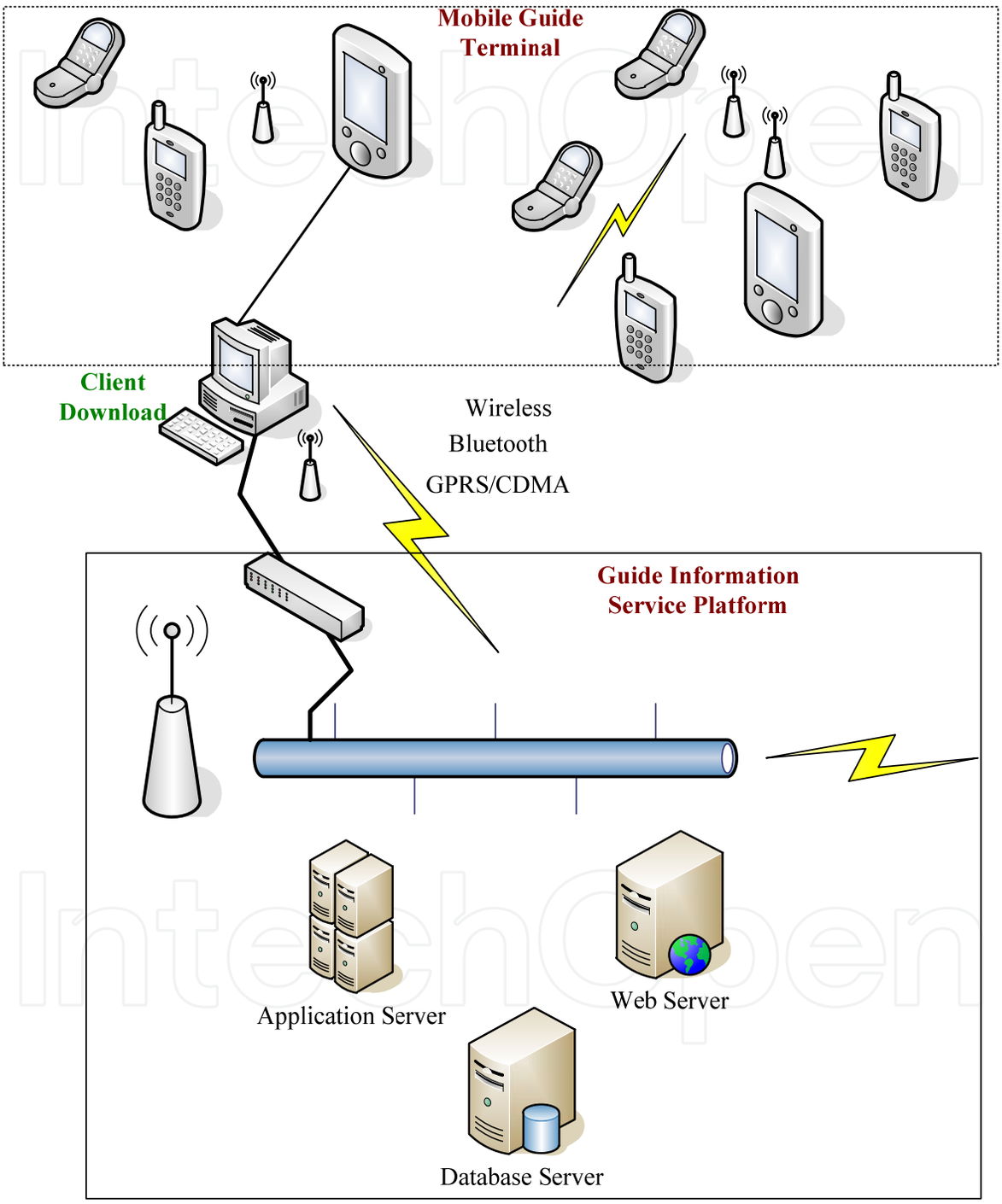


Figure 5. System Structure of Mobile Intelligent Guide Terminal and Information Service

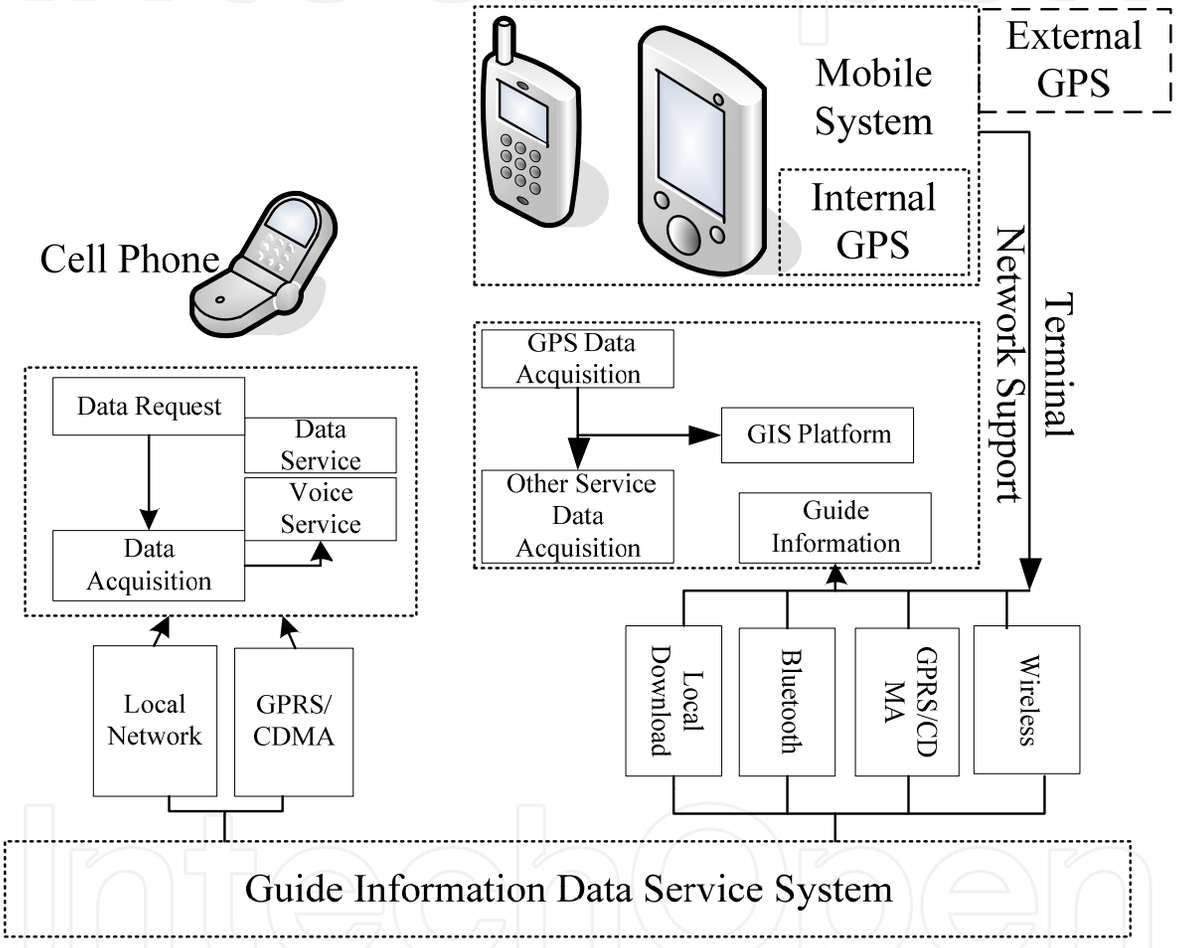


Figure 6. Function Structure Diagram of Mobile Intelligent Tour Guide Terminal

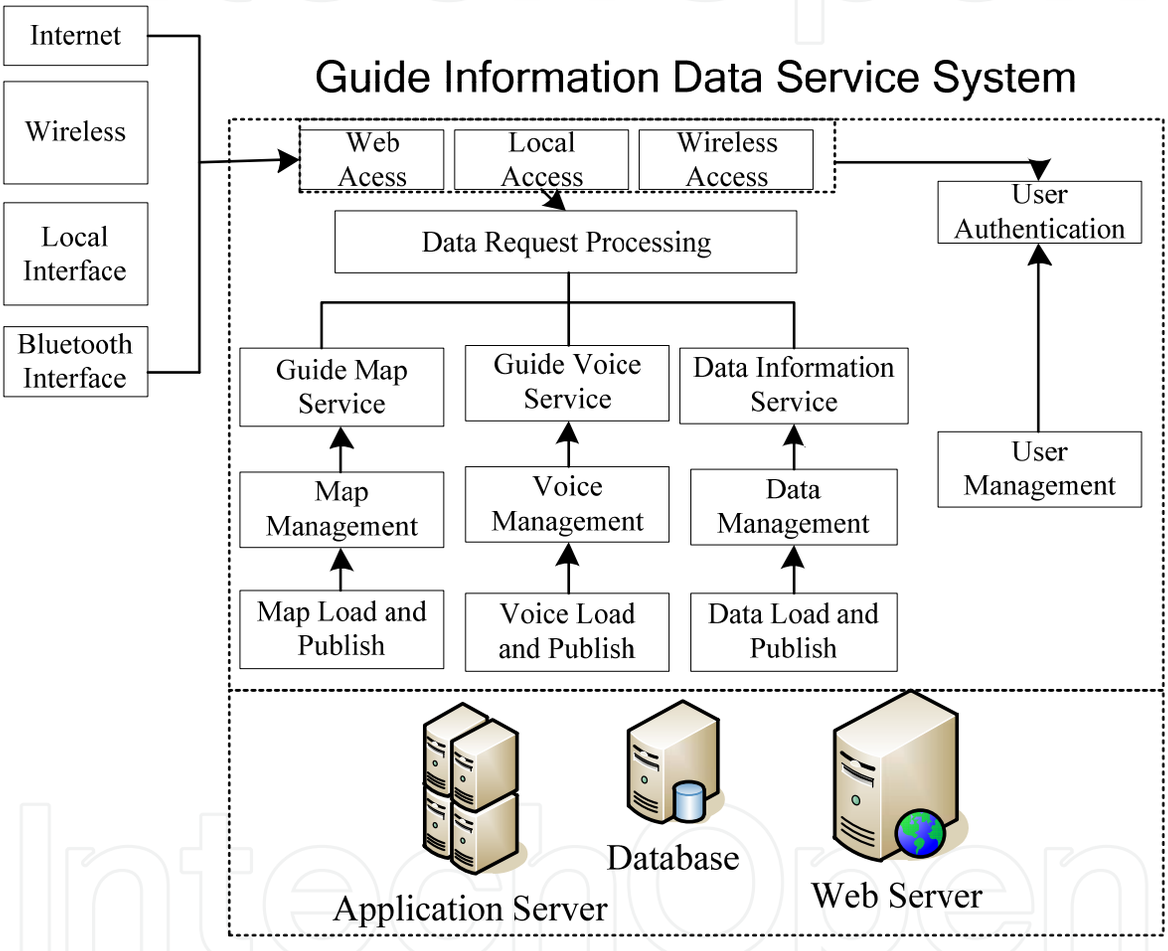


Figure 7. Function Structure Diagram of Tour Guide Information Data Service System

3.4.4. System interface design

The system interface design is shown in Figure 8.

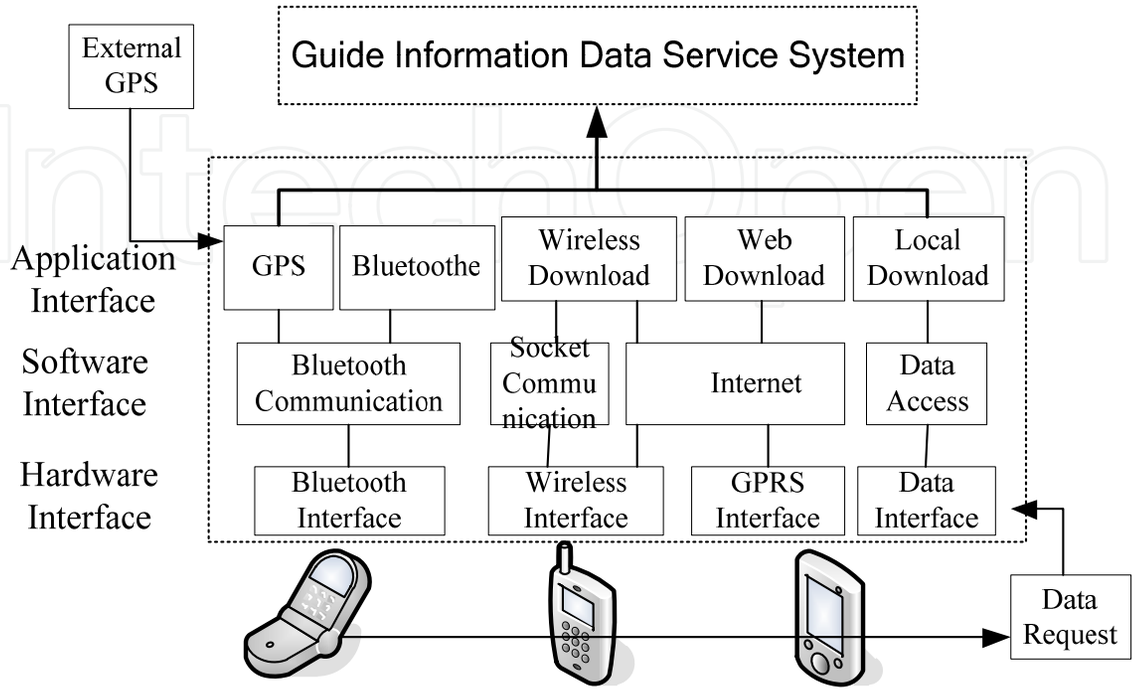


Figure 8. Mobile Intelligent Tour Guide Termination System Interface Design

4. Conclusion

Nowadays, the development of rural folk tourism industry is going on a high-speed way as a typical information-depended industry.It is urgent to solve the problem with the information management of rural folk tourism .So the chapter carrys out the study about it. It is to achieve a scientific and effective management about the information of rural folk tourism resources.

At present there are still the some shortcomings: 1. The way of rural folk tourism resources management is less efficient,updated data is not convenient.Tradition methods of rural folk tourism resources management are based on the type of rural folk tourism resources to set up various databases to manage all kinds of folk resources data.The method is of great inconvenience to add or amend data in future.Additonally,it is likely to result in defferent types of rural folk tourism resources in defferent information storage standard and causes much in convenience for the informtion retreval of rural folk tourism resources.the realization of tradition information management system about rural folk tourism resources is based the client-server software architecture model. A direct result is poor sharing of rural folk tourism resources information in the way. It is difficult to achieve the interactive effects between the tourists and rural folk tourism industy. 2. The developed information system of rural folk tourism resources integrates resources management and analysis-evaluation of

rural folk tourism resources. To manage the information of rural folk tourism resources is for the purpose of better managing and making use of the rural folk resources and furtherly offer a scientific basis of usage ,protecion and exploitation.the traditional management method is separated from management and evaluation,when need to evalute,we must be though statistical analysis software to compute.In additon,the types of rural folk tourism resources is diverse and distribution of scattered, This will not only increase the difficulty of evaluation but also less efficient.

To deal with problems above, the main contents of this chapter are as followed: 1.because the type of rural folk tourism resources is complex, in a great amount, and it need to be updated frquently, a database of rural folk tourism resources based on centralized database model is constructed, in which all kinds of the rural folk tourism resources data is stored in standard catalogs. Spatial data and attribute data are stored in the same database by ArcSDE and achieve the effective correlation between them.2.To develop the information system of rural folk tourism resources based on the Browser-Server software architecture model, management and analysis-evaluation of rural folk tourism resources are closely integrated.It manages vectora and information data altogether. Types, scale, hierarchy, function, value of rural folk tourism resources are evaluted by the AHP-based method of evalution and the results of evalution are get. The experience for the rational use of rural folk tourisms resources, protection of the environment, the overall effect of playing is offered. Scientific data which determines the construction order of tourism is provided and improve the efficiency of evaluation.

This chapter fully studys the ideas of design, implementation and key technologies.the methodology of development integrated the access interface of database based ArcSDE which make use of Java and ArcGIS Server develops the information management system of rural folk tourism resources.The resources of rural folk tourism are Scientifically managed, analyzed and evaluted.

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