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Exploration and research on tourism data integration facing the construction of wisdom tourism information system

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ABSTRACT

The construction of wisdom tourism information system reflects the specification and humanization of the collection and integration of tourism information, thus making the processing and digging of tourism data gradually realize digitization. With the fast development of society, tourism objects are becoming more and more demanding in the feasibility of tourism activities. Accordingly, the integration and the processing of tourism data need strengthening. As regards this aspect, there is no doubt that data collection and reduction need constant improvement, so as to increase the ability of comprehensive analysis on data. Under such circumstance, the objectivity reflected by tourism data can be fully embodied. Based on the positive exploration of the construction of wisdom tourism information system, the research is engaged in practice with the integration of tourism data in Daqing. Then a solid foundation of practice and theory is laid for the writing of this paper. Above all, the research can be more reasonable and scientific.

KEYWORDS

Wisdom tourism; Information system; Data arrangement; Practical application.

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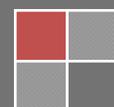
INTRODUCTION

The acquisition of tourism data counts on the integration and analysis of data. Nevertheless, tourism industry nowadays is growing rapidly. The tourism objects require more and more of the feasibility of tourism activities, leading the comprehensiveness and authenticity of service information to be continuously enhanced. The paper, with the combination of tourism data integration, methods and techniques, and loading methods and integration strategies of data, aims at discussing about the specific process of data integration via concrete study on integration of tourism data in Daqing. In this way, a tighter research thought is given to the paper, with an increasing feasibility of the study and application.

PROCESS OF TOURISM DATA INTEGRATION

Data collection

A lot of tourism data, instead of being simply embodied on the surface, are reflected among the subjects of tourism more often than ever, including tourist attractions, hotels and related administrative departments. But the collection of such data needs the collaboration of related departments, which puts forward new requirements for the departments' knowledge of their own data. From this, people can easily find that the knowledge of data serves as the premise of data collection. Only on such a basis can scientific arrangements be made upon research work. However, existent data can be directly collected, and simultaneously data collection can also be done towards corresponding equipment and appratus, including cameras, spatial digitizer and so on[1].

Data selection based on classification

Due to the chief adoption of digital equipment in information collection, higher requirements are raised towards the memory of data, which is also the premise of the classification of these data. Generally speaking, embodiment of data and information is diverse. Apart from the traditional picture and text messages, other kinds of media information have also seized an important position in tourism information system. Efficient classification and sorting of data information plays a positive role in the data processing.

Data mining

Only with the specific classification of collected data can users function positively towards the tourism information. But the direct collected data are usually superficial[2]. However, some data cannot be acquired through direct collection, such as the judgement criterion to discern whether tourism is in low season or not, the evaluation data of the environment in tourist attractions and so on. All these can only be obtained after data integration and analysis. These data themselves can reflect high-value current situations, and they can also be viewed as high-rank service information among users.

Data warehouse design

The design of database sets its goal mainly at those well-arranged data. ALL data should keep consistent in format, which can satisfy the demand of structure in database design. On one hand, it is the key to data integration; on the other hand, it can embody the scientificity and integrity of data. The design principles should be as clear and definite as possible. The increasingly strengthened requirements towards data files provide a solid foundation for the efficient analysis of data information.

Data processing

To process tourism data and information needs classification and effective design of database, the fundamental premise. Combined with requirements of data processing, data formats and operation can be efficiently united. In terms of different-format information, reciprocal transformation is needed. During that operation, the application of software is another key link of data processing, thus the error of it can be downsized to the minimum to meet the standards data require.

Data loading

The design of database has already been fully embodied in the above-mentioned process, but the next link is the data input of spatial and non-spatial data. It is called data loading. Spatial data loading needs to be operated on homologous platforms, while those non-spatial data loading needs to be finished by relational database. However, when it comes to the efficient management of data attributes, the goal can be achieved by the effective application of spatial data and attribute data [3].

METHODS AND TECHNIQUES

Different methods and techniques are employed in processing and checking different tourism information. The analysis and the integration focus on the collection of field real-time data, but consider the visit and investigation auxiliary. Besides, the collection of network data is nothing but reference data. Such a method of data collection has high accuracy that guarantees the integration and analysis of data. Its high accuracy is mainly embodied on the objectivity that the application of three-dimensional panorama has towards data collection, while the collection of GPS data is mainly embodied in its

authenticity. Questionnaire data collection and the collection of visit and investigation can show the universality of data sources. All these will continuously improve the quality of service information, and simultaneously provide efficient data foundation for the arrangement and analysis of data.

DATA LOADING METHODS AND INTEGRATION STRATEGIES

Data loading methods

Spatial database

Spatial database mainly means that data about geographical elements are collected and arranged in a certain area according to the model. The data need combining regularly and embodying by means of element gathering. The purpose to design spatial database is to better manage data, so as to provide efficient data for users. However, the construction of wisdom tourism system calls for a large number of spatial data and attribute data. The internal connection between them both is close, thus making common data in the model not satisfy the radical requirement[4]. Herein, the spatial data engine is efficiently used to manage together the above-mentioned data. In this way, the management scope of data can be expanded constantly, the efficiency of data management can be gradually enhanced, and therefore, data management platforms can ceaselessly reinforce its targeting at the efficient data integration (shown as Figure 1).
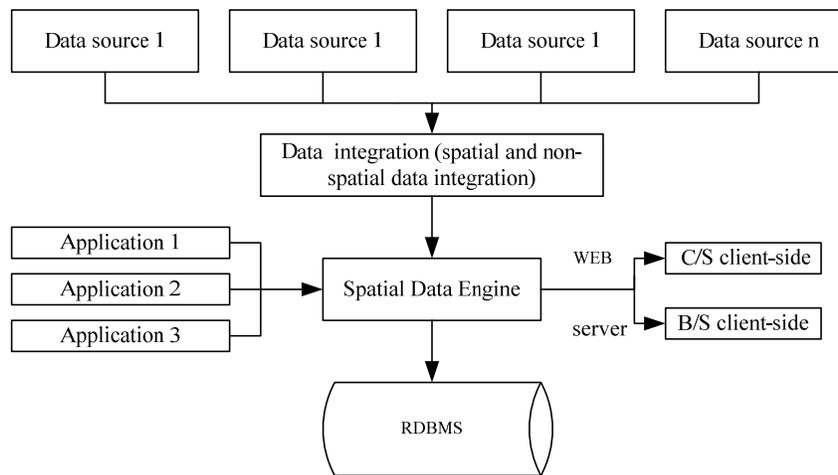

Figure 1 : The role of spatial data engine in information system

Data automatic loading

In the loading process of observation data, collected data aimed at real-time dynamic observation can be automatically identified through the application of computer technology. Thus the storage formats of data can be automatically converted, in a bid to the requirement of data mining. Through network transmission, the real-time data are efficiently transmitted into servers. Therefore, the promptness of information service is fully guaranteed, so as to satisfy the realistic requirement of information service. The paper adopts video dynamic observation as its observation method. With dynamic videos, tourist flow rate can be obtained. The specific procedure is shown in Figure 2.
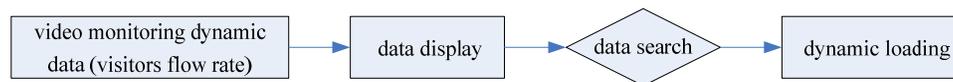

Figure 2 : Dynamic data loading process

Tourism data integration strategies

The characteristics and requirements of the system construction are clearly pointed out. They can embody important data and content in the 6 aspects of information system. Humanization and service concept are incessantly reinforced in the selection of such 6 data, thus leaving an important influence on the improvement of functionality. Technology of information data collection is blended on the basis, thus producing reciprocal data collection. The process mainly includes three-dimensional panorama data and others. In this way, positive role can be played in real-time monitoring of data and the requirements for virtual realization of wisdom tourism can be gradually met. Efficient arrangement and analysis are based on the theory of database construction. Herein, diversity should be formed in the means of data collection, thus providing firm techniques and ways of data collection (as is shown in Figure 3). In the following data integration strategies, data function of information system is scientifically improved, and tourism spatial data and data attributes are continuously strengthened.

Furthermore, efficient data integration is made between both of them, finally making the spatial and non-spatial data of the system get integrated and analyzed. The integrity of the database is ceaselessly enhanced.
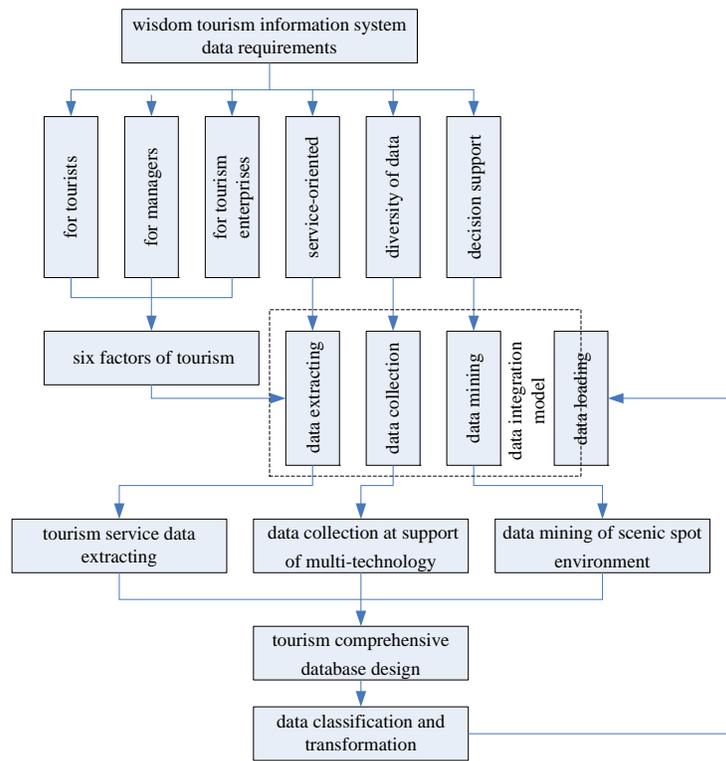
Figure 3 : Tourism data integration model facing wisdom tourism

EMPIRICAL RESEARCH OF DAQING TOURISM DATA INTEGRATION

Tourism spatial data collection

The actual measurement of GIS proceeds as the process "base station setting-data collection from moving station-data processing (export-difference-excursion)", and finally acquires precise data. Data received by GPS receiver need to be transmitted into personal computers. Data from moving stations and base stations should be dealt with by difference, so as to raise the accuracy of data. The transmission and processing of GPS data require Pathfinder office installed in connected computers. For those data that have been dealt with by difference, a data line and the software Pathfinder office are needed to drive them out into corresponding GIS formats, convenient for the softwares to process in the future. The software Pathfinder office supports many formats such as GIS, CAD and spatial database. The GPS data files after correction can be exported into ESRI Shapefile. After around 10-day on-site GPS measurement, 427 tourism elements are collected together, covering food, accommodation, transportation, traveling, shopping, and entertainment (as is shown in TABLE 1). All kinds of data, after being processed, are formed for the construction of information system.

TABLE 1 : POI spatial data collection table

sequence number	1	2	3	
districts	Sartu District	Ranghulu District	Longfeng District (including development zone)	Total
food	75	54	32	162
accommodation	23	30	14	67
transportation	6	6	1	13
traveling	10	5	11	26
shopping	14	14	5	33
entertainment	7	6	2	15
convenience for the people	54	83	20	160
total	189	198	85	472

Three-dimensional panorama information collection

The efficient application of three-dimensional panorama is to monitor the process of data collection. In this process, data collection has added the content tourism embodies. The application of such a means of data collection is based on the operation of information service system of wisdom tourism[6]. Effective simulation is conducted upon data observation in the application of three-dimensional panorama technology, thus providing efficient technology support for the virtual realization of the system. Effective data are collected about the air index of A-level tourism areas in Daqing and Daqing city. 2 or 4 observation points are set in each scenic spot. The observation data, after effective arrangement and processing, are browsed in the Internet through network technology. The data are totally browsed through. TABLE 2 shows the three-dimensional data collected in Daqing, including 15 tourist attractions with panorama scanning, 19 point-cloud scan stations, and 43 panorama shooting exibitions.

TABLE 2 : Three-dimensional panorama scan data collection list

sequence number	site	data collection quantity	collection time
1	Daqing city planning pavilion	panorama station 5 scan station 3	2011.07.13
2	Black Lake Ecological Garden	panorama station 1	2011.07.13
3	Lindian Northland Hot Springs	panorama station 5 scan station 3	2011.07.14
4	Lindian Manchu Garden	panorama station 1	2011.07.14
5	Heming Lake	panorama station 1	2011.07.14
6	Municipal Building	panorama station 10 scan station 10	2011.07.15
7	Dangnai Wetland	panorama station 3	2011.07.15
8	Serial Lake	panorama station 2	2011.07.15
9	Oil Field History Museum	panorama station 5	2011.07.16
10	Petroleum Science and Technology Museum	panorama station 1	2011.07.16
11	Oil Field Paradise	panorama station 4	2011.07.16
12	Longfeng Wetland	panorama station 3	2011.07.16
13	The Ironman Memorial	panorama station 1	2011.07.16
14	Kowtow Machine	scan station 3	2011.07.16
15	Liming Lake	panorama station 1	2011.07.17

Tourism service information acquisition

Application objects in the construction of the system are mainly those tourists who participate in tourist activities and management enterprises which provide tourism service programs. The effectiveness of the system concentrates on the requirement of the service objects. According to the humanization of the construction of the system, the acquisition of information targets mainly at the needs of tourists themselves. To arrange the tourism data collected and to pass on them to every service object in the form of message can increase the value of the message and make them the main source of information. Service objects participate in tourism activities for a full knowledge of food, accommodation, transportation, traveling, shopping and entertainment. The specific service data constitute the core of information. It is of great importance to analyze and arrange the data. Thus, service information can be acquired scientifically.

Tourism data mining

The process of data mining can be considered an important way to discover knowledge, and data can get efficient integration. By adopting data mining method, the effectiveness and regularity of data can be fully collected. Moreover, the potential information data can be fully mined. Tourism data collected mainly include overt information, but also a large amount of covert information. To mine the environmental data and spatial data can provide powerful support for the increase of decision information and deeper information in the database. The final results of data mining with their main forms can be effectively stored in number, picture and text, and further, they can lay a firm foundation for the loading and application of database.

The scenic spot environment data mining

The test data of scenic spot environment is to be further mined. Through the adoption of data mining, the environmental characteristics of scenic spots can be effectively found, thus making the data guide tourists positively. Scientific analysis should be performed upon anion data collected from scenic spots. Through the efficient application of computers, effective research can be carried out on the traits of the anion data, thus making the environment exert a minimum influence on anions. And finally the computing results of environmental data can become more accurate. The data can be used as references, demonstrating the humanization of tourism service. The characteristics of air in Daqing and the observation points can be effectively established. In order to decrease the hinder apart from weather conditions, the same data of the ground and weather should be analyzed. The details are shown in TABLE 3.

**TABLE 3 : Ata selection table of negative air ions of west garden in Daqing**

serial number	latitude	altitude	date	time	weather	attributes of underlying surface	number of the positive ions (the number of them per cm³)	number of the negative ions(the number of them per cm³)
			2011-7-15	5::33	sunny		4454	2533
			2011-7-17	10:02	sunny		1031	961
			2011-7-17	19:07	sunny		739	441
1-1	46.5917	125.0942	2011-7-19	6:01	sunny	waterproof	4422	3262
			2011-7-17	12:28	sunny		1016	1061
			2011-7-18	6:32	sunny		3900	3544
			2011-7-15	5:05	sunny		8946	4276
2-1	46.5914	125.0939	2011-7-18	6:09	sunny	permeable to water	16763	6263
			2011-7-16	5:55	sunny		9090	6126
2-2	46.5914	125.0942	2011-7-17	18:49	sunny		2153	971
			2011-7-19	6:24	sunny		8766	5238
3-1	46.58	125.0919	2011-7-15	6:00	sunny		7976	5407
3-2	46.5886	125.0939	2011-7-16	6:14	sunny	forest land	9739	5598
3-3	46.5886	125.0931	2011-7-16	6:27	sunny		4669	3673
3-4	46.5883	125.0944	2011-7-16	6:43	sunny		12544	11363

Tourism spatial data mining

Tourism spatial data range from name, classification, and altitude to latitude. With regard to this data mining, the characteristics and rules of the relations can be emphasized. The paper is designed to fully mine the data information on the name, category, altitude, and latitude of hotels. Then with distribution characteristics of the space as an entry point, the paper has also efficiently searched for the distribution of scenic spots, hotels, and residential areas. It supplies powerful data for related administrative departments of tourism enterprises.

Warehouse design of tourism comprehensive data

The warehouse design of tourism comprehensive data is regarded as the fundamental thing of data arrangement and analysis, whose importance shall not be ignored. In the process of design, to update something about structure and content is to raise continuously the efficiency of the application of database, therefore leaving positive influences on data analysis. On such basis, to effectively design the differences of data subjects can make the content of database comprehensive and the operation more succinct. It can satisfy the real needs of different objects. The logic lying within the design is mainly divided into two parts, the design of spatial database and the design of non-spatial database. Concrete design thoughts are shown in Figure 4.
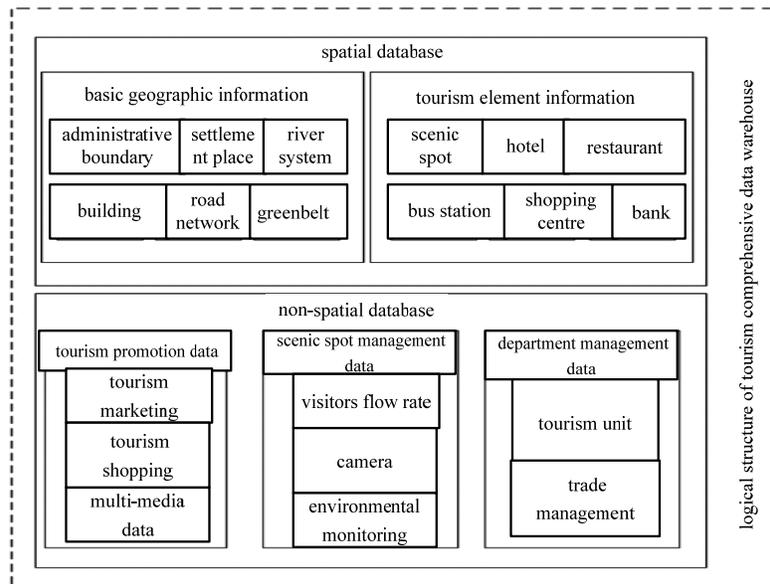
Figure 4 : Logical structure of tourism comprehensive data warehouses

The construction faces data warehouses reflecting different themes, acting as a pillar of the overall construction of data warehouses. With effective control in network firewall and controller of service parts, service of information and knowledge and decisional analysis can be supplies to users, which gives full play to data warehouses in terms of high-level information service.

CONCLUSIONS

What has been mentioned above is the exploration process on tourism data integration facing the construction of wisdom tourism information system. With tourism data integration in Daqing as the practice basis, tourism data integration can be effectively put to test. With a sturdy foundation of theory, the paper's primary goal is to lay a solid theoretical and practical foundation for the research in the days to come

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