Journal of Computing and Electronic Information Management
ISSN: 2413-1660 | Vol. 11, No. 1, 2023

Research and design of intelligent tourism personalized recommendation algorithm in big data environment

Yuanjing Zhu, Xiaolei Zhong*

DIANCHI COLLEGE OF YUNNAN UNIVERSITY, Kunming 650228, China
* **Corresponding author**: Xiaolei Zhong (Email: 1018761837@qq.com)

Abstract: In recent years, with the rapid development of the Internet, many information technologies of intelligent society and cash have been applied to various fields. In order to respond to the trend of technological development and use technology to improve the development of the tourism industry, the intelligence, informatization and personalization of the tourism industry have also been extensively studied. Smart tourism more refers to the application of Internet, cloud computing, Internet of Things, information processing and other technologies to achieve the integration of tourism infrastructure and tourism framework, and ultimately enable tourism departments and tourists to make wise choices. All tourists can rely on the massive data formed by big data to form a big data platform to help tourists formulate personalized tourism, digital tourism, and ultimately achieve barrier-free tourism. For tourists, the selection of attractions and the planning of amusement routes are the most troublesome. Therefore, the research focuses on the personalized recommendation algorithm for intelligent tourism services under the big data environment, and uses this algorithm to develop a tourism service robot to provide people with personalized tourism services and recommend the optimal solution to people. In this paper, the Dijkstra algorithm can be used to solve the shortest route, and the optimal route planning between multiple scenic spots is successfully realized, which verifies the scientificity and practicability of the algorithm.

Keywords: Smart tourism; Cloud computing; A big data; Barrier-free tourism; Dijkstra algorithm.

1. Research background

With the development of economy and society, people's living standards are improving day by day, and the pressure brought by work and life should not be underestimated [1] [2] [3]. People begin to take tourism as a common way to adjust their mood and release pressure. However, in today's fast-paced living environment, saving time and energy has become people's greatest demand. In the past, most people used to book hotels and attractions in local travel agencies. With the widespread application of information technology, the tourism industry has also joined the ranks of network information technology. At present, most of the medium and large travel agencies have started online information management. However, some small and micro travel agencies still use the traditional manual management method, which is obviously not suitable for the development of today's network big data era. Therefore, it is necessary to develop a travel App system software that can be widely accepted by users, so as to better promote the development of travel business, and also meet the basic needs of travel users to book travel routes and attractions online.

The tourism App software developed by the subject has certain practical significance for tourist users, travel agencies/merchants and self-improvement in terms of knowledge, development technology and spirit. For tourists, they can browse various travel information online through the travel App software system, such as accommodation, attractions, food and travel routes, etc., and it is also convenient for tourists to book travel-related products online; for travel agencies or merchants, the The development of travel app software system can increase a large number of online customers, and can also create more income for travel agencies and broaden sales channels; for individuals, through the development of travel app software systems, not only can they further master relevant knowledge and deepen their knowledge. Understand the development technology related to the Android platform, and can improve the programming ability of the combination of MySQL database and web technology.

2. Research content

The designed travel App software system technically uses Android platform + back-end to run JSP and HTML web page development technology, presents it to users with an intuitive and operable interface, and accesses its data from MySQL database; The architecture will be based on two modes of C/S+B/S, [4] including app-side module and background management-side module. The app-side module is used by registered users, and the background management-side module is used by administrators. Through the routes and homepage classification provided by the client of the travel App software system, registered users can complete the booking and placing of orders through modules such as routes; it can also be used by merchants to publish travel products and view them, and administrators can also use the background to surround It is composed of modules that manage tourism-related information, so as to provide users with a set of tourism App cloud management software systems that can view various types of tourism information, scheduled routes, scenic spots, etc. anytime, anywhere, and conduct big data tourism analysis and management.

3. Related technologies

3.1. System Design Patterns

Before mobile Internet technology has not been taken seriously and applied to daily use scenarios, a large number of existing systems still adopt the traditional desktop-based C/S development model in their design methods. One feature is that it can be used based on a stand-alone state or a local area network environment, avoiding the risk of interference caused by viruses; but at the same time, there is another unfriendly place, that is, once the system is in use, the program finds a bug in the case of , the client needs to be redeployed, especially when a large number of clients are deployed, the workload can be imagined. The application APP software developed based on mobile devices is designed based on the C/S mode. When it is updated, it can be automatically pushed to the customer's mobile phone and installed by the customer. Under normal circumstances, the app is in line with displaying data and completing operations, and the provision of data depends on the back-end system of the web, which is designed based on the B/S model. The current mobile application software is usually developed using the C/S and B/S hybrid modes [5].

3.2. Android Development Technology

Compared with the closed IOS system, Android has been warmly welcomed by major mobile phone manufacturers around the world because of its good open source characteristics, and it has good ecological diversity [6]. The underlying core of Android is still based on the open source and easily modifiable Linux kernel, so as to develop and provide some underlying drivers, thus providing a technical and interface support for upper-level applications. The system structure is shown in Figure 1 below:

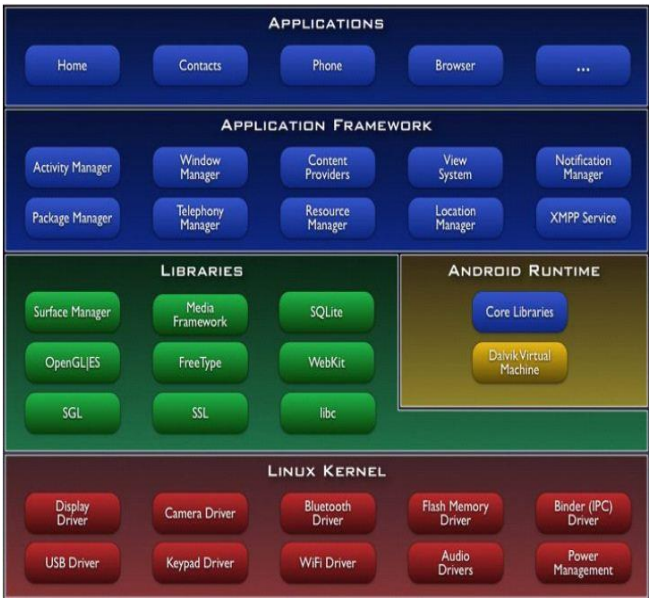


Figure 1. Schematic diagram of Android system architecture

3.3. JSP development technology

JSP is one of the most frequently used website development technologies. Based on Java language, HTML scripts are embedded to complete the display of JSP page elements. JSP page jumps can be realized by adding codes in the JSP page scripts. You can also set the interface. The page layout that renders the elements of the page [7].

3.4. MySQL database technology

MySQL is one of the most widely used relational databases [8]. Compared with the databases developed by other commonly used systems, it has the following characteristics: First, it is open source and suitable for multi-platform development; second, it supports multiple types of interfaces, and the JDBC interface can be used to execute the commands of the database interface to complete the data access.

4. Dijkstra's algorithm for the nearest line

Dijkstra's algorithm, also known as the labeling method, is a search algorithm for the shortest path proposed by Dutch computer scientist E.W. Dijkstra in 1959. The principle of the algorithm is to solve the shortest path of a single source point in the network graph, that is, to solve the problem of the shortest distance from a fixed point to any vertex in the network.

The basic idea:

Let a set S store the vertices whose shortest path has been found, and S can be expanded; let V be the set of all vertices in the network; then the set of vertices for which the shortest path has not been found is V-S. Add the vertices in V-S to S one by one in the order of increasing shortest path length, until S contains all the vertices, and V-S is empty.

step:

(1) Let the source point be V1, then S only contains vertex V1, and let W=V-S, then W contains all vertices except V1 in the graph. The distance value corresponding to V1 is 0, that is, D[1]=0. The distance value corresponding to the vertex in W is specified as follows: if there is an arc < V1, Vk > in the network graph, the distance of the vertex of Vj is the weight of this arc, otherwise it is ∞ (infinite number);

(2) Select a vertex Vk with the smallest distance value from W, and then add it to S;

(3) Whenever a vertex Vk is added to S, the distance value of each vertex in W must be modified once. If Vk is added as an intermediate vertex, so that the value of < V1, Vk >+< Vk, Vj > is smaller than the value of < V1, Vj >, then use < V1, Vk >+< Vk, Vj > to replace the original distance value of Vj ;

(4) Repeat steps 2 and 3, that is, the vertex with the smallest selected distance value in the modified W is added to S, and the distance value of each vertex in W is modified, and so on, until S contains all the graphs in the graph Up to the vertex, that is, S=V. At this time D[N] is the shortest path length value from V1 to Vn.

This algorithm solves the problem that the actual distance traveled from a certain starting point to the destination is the shortest or the time it takes to reach the destination is the "shortest" without considering the influence of transfer time and speed in the complex urban traffic network. The innovation of this algorithm is that it can recommend the shortest route and save time; however, there are still some shortcomings, such as the transfer time cannot be taken into account.

Relevant code:

```
clear;
clc;
M=10000  ;
a (1, : ) = [0,3,2,5,M , M ,M] ;
a (2, : ) = [zeros(1,2),2,M,4,5,M] ;
a (3, : ) = [zeros (1, 3 ),2 ,3,7,M] ;
a (4, : ) = [zeros(1,4 ) ,5,6,10];
a (5 , :) = [zeros (1,5),2,7] ;
a (6 , :) = [zeros (1,6),4] ;
a (7, : ) = zeros(1, 7) ;
a=a+a ' ;
pb (1:length(a) ) =0 ; pb (1)=1 ;index1=1 ; index2=ones (1, length (a) ) ;
d ( 1 : length(a) ) =M;  d ( 1)=o ; temp=l;
while sum(pb)<length(a)
    tb=find(pb==0 ) ;
    d (tb)=min(d(tb) ,d (temp ) +a (temp , tb)) ;
    tmpb=find (d(tb) ==min (d (tb) ) ) ;
    temp=tb ( tmpb (1)) ;
    pb (temp) =1 ;
    index1= [index1,temp] ;
    index=index1 (find(d (index1 ) ==d (temp) -a (temp , index1 ) ) );
   if length (index)>=2
      index=index (1 ) ;
   end
    index2 (temp ) =index ;
end
    index1, index2 ,d
```

5. System Design

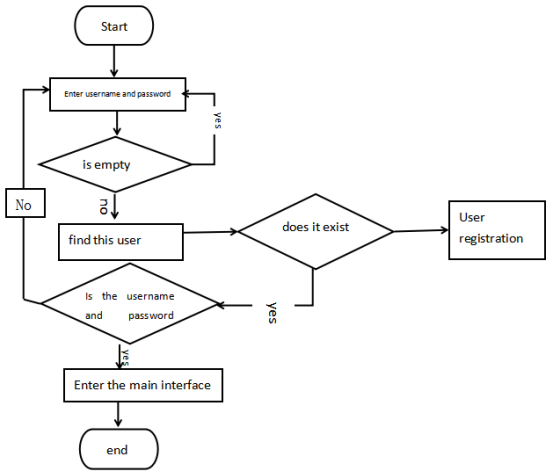
5.1. System functional structure design

The designed travel App software system is divided into: the website front-end and the back-end management end according to the structure of the function and the role of use. Different users have different permissions accordingly. The front desk of the website is used by registered users, and the background management terminal is used by administrators.

5.2. System Process Design

The system flow is an abstract description of the designed function module business and logic execution process, and it is presented intuitively through language and graphics, so that it can be better used for code writing processing. In terms of this travel App software system, its process processing can be specifically divided into three main types of processes: login process, travel route reservation and travel information management process.

The user login process design is shown in the following figure2. Only when the user is logged in can book travel-related information and interact with travel stores, otherwise the operation of functional modules related to data storage cannot be completed.



6. Conclusion

In this paper, a travel recommendation system based on hybrid recommendation algorithm is proposed, and a hybrid recommendation strategy is studied: including hybrid user interest modeling and heuristic travel itinerary planning algorithm based on multi-dimensional scenic spot scoring, and then design and implement based on the hybrid recommendation strategy. A travel recommendation system. The research content of this paper mainly includes the following three aspects: (1) On the basis of traditional user interest modeling, a hybrid user interest model building method is proposed. According to the static and dynamic information of users, a short-term user interest model and a long-term user interest model User Interest Model. And the interest drift algorithm is designed respectively, which reflects the user's interest in tourist attractions more accurately and in real time. (2) Design a heuristic tourism itinerary planning algorithm based on multi-dimensional scenic spot scoring. First, starting from various attributes of scenic spots, combined with the established user interest model, a personalized and comprehensive recommendation for tourist attractions is generated; then using heuristics The proposed itinerary planning algorithm adopts the method of first grouping and then arranging the route to plan the itinerary for the obtained scenic spot recommendation results, which effectively improves the time-effectiveness ratio of the user's itinerary, and is of great significance to the planning of tourist routes. (3) According to the analysis of the needs of users and the system, the overall architecture of the system is designed, and then the design of the background server and the iOS client are given respectively, and the main functional modules of the iOS client are realized based on the MVC development model. Finally, through the design of algorithm experiments, the validity of the heuristic itinerary planning algorithm is verified according to the time-effectiveness ratio of the itinerary, and specific travel scenarios are designed to verify the functionality of the system.

References

[1] Liu Yangyang. Research on optimal path planning for self-driving tour based on improved Dijkstra algorithm [J]. Science and Technology Innovation, 2020(17):75-77.

[2] Wang Chunpeng. Intelligent prediction method of tourist flow in scenic spots based on BP neural network [J]. Modern Electronic Technology, 2021, 44(16): 175-178

[3] Yang Xiaomin. Tourism route optimization algorithm based on matrix decomposition and ant colony algorithm [J]. Information Technology and Informatization, 2022(03):138-141.

[4] Zhang Ruijiao, Chen Chongcheng, Huang Zhengrui, Fang Hui. Improved Genetic Algorithm to Solve the Problem of Cultural Tourism Route Planning [J]. Journal of Guizhou University (Natural Science Edition), 2022, 39(01): 57-64.

[5] Yin Haoyi, He Zhenming, Zhang Ying, Zhao Nuan. Viterbi tourism route planning algorithm based on grid model [J]. Beijing Surveying and Mapping, 2021,35(07):884-889.

[6] Li Xu, Li Jingwen, Yu Na. Tourist route recommendation method based on user needs [J]. Computer Engineering and Design, 2021, 42(05): 1339-1345.

[7] Wu Xiongbin, Guan Hongzhi, Han Yan. Random travel time travel route optimization model and its algorithm [J]. Computer Engineering and Design, 2019, 40(02): 573-577.

[8] Chen Jianke, Chen Pinghua. Tourism route recommendation algorithm based on interest heat map [J]. Computer Engineering and Design, 2018, 39(09): 2941-2946.