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Research and Implementation of Special Agricultural Products Promotion System Based on Android

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Abstract. In order to break the difficult realistic predicament of the promoting special agricultural product, so that, the agricultural product resources can be effectively promoted, the survey based on the mobile GIS technology architecture, integrated application of mobile Internet technology and JavaScript dynamic, interactive technology, having the aid of Android Studio development tools to design and implement a set of special agricultural products promotion system based on Android. The system adopts the four-tier architecture model of the database layer, platform layer, business logic layer and application layer to achieve high cohesion and low coupling characteristics of the system. Based on the comprehensive application of technology architecture of mobile GIS and various technologies, solving the deficiency of two-dimensional presentation of agricultural product promotion information for the traditional mobile terminal system. The practical application in Fumin county shows that the system has the advantages of strong real-time dynamic interaction and vivid visualization of information, it has effectively built a visual, interactive platform of mobile communication between supply and demand sides for local agricultural product promotion to increase the application level of rural information technology, helping rural agricultural development and raising farmers' income have important application value and practical significance.

1. Introduction

The China Internet Information Center published the forty-first “Statistical Report on China’s Internet” shows that as of December 2017, the scale of Netizen in China reached 772 million, and the scale of mobile phone Netizen reached 753 million, of which rural Netizen accounted for 27\%. It can be seen that mobile applications under the Internet model are changing people’s traditional lifestyles. However, these applications still mostly concentrated on social entertainment, game, traffic navigation, online shopping, learning and other fields in the city at present. Under the current strategy background of the new rural construction and the precise poverty alleviation, how to assist rural economic and social transformation with information technology and promote the integration of urban and rural development is a problem which must be faced and worthy of in-depth discussion in the process of rural economic construction [1-2].

Rural property is abundant, but it is limited by the logging level of information technology applications, making it difficult to introduce the characteristics and high-quality products to the outside world in time. It is difficult for farmers to arrange production and sales, according to the market and the demand of consumers. Consumers cannot fully understand the related circumstance of agricultural products supply and seriously hampered the increase of farmers' income and the development of the rural economy. Therefore, developed foreign countries have taken the lead in
applying GPS, Bluetooth and other technologies for agricultural production and product promotion, and have achieved significant economic and social benefits [10, 15]. Domestically, the related research of agricultural information technology promotion applications based on GPS and GIS is relatively late. In particular, research on the “three rural issues” related application areas for designing agricultural products based on the mobile Internet is relatively less, the comprehensive functions are poor, and the scope of popularization is small [3-8]. However, with the continuous development of technology, especially the continuous popularization and application of Android smart phones, it provides a convenient information, interactive platform for both farmers and consumers, and provides hardware support and technical support for the introduction of specialty agricultural products.

In view of the above considerations, this paper fully utilizes the characteristics of mobile GIS technology, mobile Internet, dynamic interaction technologies, and Android mobile terminal equipment. It aims to build a bridge between farmers and consumers as a bridge of communication, taking the promotion of special products in Fumin County as an example to research a mobile terminal application system of special agricultural products based on Android. Achieving the dynamic and real-time promotion of special and high-quality agricultural products, avoiding the overstock of agricultural products caused by missed sales opportunities [6].

2. Overall System Design
To make the system achieve the characteristics of high cohesion and low coupling, meanwhile to achieve the unified maintenance of the code and system to improve its stability, with operability and practicability, the overall architecture shown in Figure 1 is improved.

2.1. Business Flow Design
The essence of the special agricultural product promotion system is to establish an interactive information platform for farmers and consumers. With text, pictures, maps and spatial location information as the core, hence, we design two types of login methods for “WeChat” and “visitor” to achieve visualized operations. Taking “WeChat” as an example, with account information needs to be bound to implement the related function interface. The information service is obtained from the server side and the mobile terminal through the Baidu Map and the Service API interface, meanwhile, the consumer selects the module, checks the status of the GPS, and queries the information category regional information to query the information obtained according to the requirements; Based on the map of Baidu Map, for details, in the environment of navigation function positioning be opened, 4GiWIFI network, etc., to locate the search information on the map, and the calling function is selected, the responsible person is contacted to understand the situation, so that the specialty agricultural products can be completed with ordering business. The mobile terminal is necessary to combine mobile GIS technology with dynamic interactive technology to provide visual navigation. The basic business process of this application is shown in Figure 2.
Discrete database
Special agricultural products introduction system based on Android
Platform layer
Application layer
Business logic layer
Database layer

Baidu Map API interface
Service API interface
Base interface
Mobile terminal: Android
Development language: JavaScript scripting language
Mobile GIS technology
Dynamic interactive technology
Mobile Internet

Access to the SQLite database

Figure 1. The overall architecture of the system

Figure 2. The business process diagram
2.2. System Function Design
This research is aimed at the current difficulties in the promotion of specialty agricultural products, using information technology to establish the platform for information interaction between farmers and consumers, to achieve the purpose of promoting the special agricultural products. The system is composed of two parts: the client and the server side. It implements information front-end interaction and background data management. The functional division structure diagram of the system is shown in Figure 3.

2.2.1 Client Design. The function of the client is mainly composed of four modules: homepage, list, navigation and personal centre. Users can view the promotion of current information involved in five aspects through the homepage function module, including farming, entertainments, special fruits, townships and cereals: The entertainment and special fruits mainly display the special agritainment, tourist attractions and special fruit varieties grown in seven townships. Consumers can directly locate a designated area, such as the distribution of agricultural products bases and farmers, for this purpose, a “navigation” function has been specifically designed in the functional structure of the application to achieve positioning, enlargement and reduction of the surrounding area. It can also call the camera taking function, save the photos directly to the mobile phone album, and combine with two-dimensional code to facilitate more users. According to the business requirements, the home page module functions are shown in Figure 4.

2.2.2 Server-side design. According to the type of data received and stored, the front-end data are maintained, while the information that the back-end database involves positioning and navigation through the Location Manager in the Android system to uniformly manage the navigation function, and the Location Manager handles the problems related to the geographical location through it provided a series of properties and methods. First initialize the Baidu map SDK, configure the client’s position object properties, and then obtains the navigation positioning service of the application through the get System Service () method, and then register an Event Listener after obtaining the location function, then gets the method of the request Location Updates () method, that is, the method of service to obtain real-time geographic location information data. In this method, a parameter Location Listener is included to listen to the changes in the data. The event listener contains a class for storing real-time data. In order to get the current latitude and longitude and other geographical location information, calling the relevant class method to achieve this function.

2.3. Database Design
The Android operating system has a built-in SQLite small relational database management system is responsible for storing data information. SQLite is a relational database management system based on an embedded SQL database engine, which has the advantages of supporting transaction processing, zero configuration and low resource consumption. It has the features of open source and lightweight.
In order to facilitate program calls, create the following method in BarndbHelper.java:

(1) CreateTable_UserInfo (): used to create UserInfo (user information) data table;
(2) CreateTable_ProductsInfo (): used to create ProductsInfo (product information) data table;
(3) CreateTable_SpatialInfo (): used to create SpatialInfo (spatial location information) data table;
(4) CommentInfo_Save(): save comment information to UserInfo data table;
(5) SearchInfo_Save(): save the query information in the ProductsInfo data table;
(6) getDataResult(): query the spatial position data information in the DataResult table.
Among them, each promotion section of the agricultural product information business contains attribute data, such as an area, and special effects of various types of agricultural products. These attribute data are the main carrier of the promotion business and an important part of the promotion process. It plays an auxiliary understanding role for the crops of the products, provides the visual dimension of the physical visualization for the promotion of the agricultural products, and proves that agricultural products have distinctive objectivity.

3. Key Technologies and Implementation

3.1. Mobile GIS Technology

In recent years, mobile GIS technology has been widely used in agriculture\textsuperscript{[12]}. However, the development of mobile GIS for the application of information services in this article requires the use of JavaScript scripting language to insert HTML static pages, and calls Baidu Map API to build applications. Finally, application deployment is installed on the smart mobile terminal device of the Android system.

This system is designed for online navigation software that can realize basic functions such as positioning, map zooming, moving, querying, and navigation through the Baidu Map API and Android SDK\textsuperscript{[13]}. Before using the API, the user needs to obtain the Baidu Map mobile version API Key, apply for the key to obtain the map on the Baidu map platform, and convert the geographic coordinate position on the interface of the Map View. Get Project() method in Android’s Project conversion tool class\textsuperscript{[14]}. At this time, the mobile terminal map navigation service function is started, and the navigation route map of the target location can be obtained by clicking the navigation button.

3.2. Mobile Internet

The mobile Internet technology uses mobile access technology to connect with the Internet and acquires information communication technology under wireless conditions. It has achieved wide application of wireless terminal technology between users and users\textsuperscript{[13]}. For mobile Internet, its architecture is generally Core network, access network, mobile subnet and mobile terminal\textsuperscript{[14]}. For example, through a mobile wireless network, mobile phones can be successfully connected to the Internet to facilitate mobile phone users to obtain real-time information, and can also promote wireless communication and Internet resources with highly fused\textsuperscript{[15]}. To further improve the design of smart mobile terminal devices, using the Webview control to achieve Web access in the wireless WIFI network environment, using the Webkit technology to achieve the function of accessing pages in the mobile smart client\textsuperscript{[16]}, not only can browse the agricultural product resources, but also can make use of dynamic load function to update the relevant content, only need to bind WeChat account to achieve authentication login, consumers can also use QR code scan code download installation. Empirical research shows that information interact between farmers and consumers is carried out using mobile internet services enable farmers to use mobile terminal devices to promote special agricultural resources, while consumers use various resources and personalized services to acquire specialty agricultural products, such as location navigation and transactions.

3.3. Dynamic Interaction Technology

Interactive technology can realize the touch and gesture operation function of mobile GIS terminals\textsuperscript{[15]}. To operate maps on mobile devices, touch-sensitive and gesture-related gestures must be supported: two-touch zooming the map, and sliding to pan the map, etc. Information interaction is a two-way information input and the feedback embodiment of user and resource information in the search process, which is helpful for users to query special agricultural product information. Through the information exchange to achieve user operations to provide consumers with real-time navigation interface. Consumers can also monitor the situation in real time with the mobile terminal device anywhere and comment on the information it knows according to their own wishes.

The JavaScript scripting language can respond to the user’s input by embedding or loading HTML text to achieve the dynamic interaction capabilities of HTML static pages\textsuperscript{[16]}. In the development of
the application, comprehensive consideration of actual needs and technical difficulty to achieve, in order to enable consumers to understand various aspects of Fumin country and achieve a simple and easy to operate the page, select the JavaScript language to achieve real-time dynamic interaction of Web pages to achieve the picture index, which is to click on any picture to open another interface. Information interaction and navigation interface are shown in Figure 5.

3.4. The Realization of Special Agricultural Product Promotion System

The login interface of the special agricultural product promotion system uses the “WeChat login” method as an example in this article. The information interaction and navigation interface of the system is shown Figure 6, which shows the information of the functional modules that the system can implement. According to requirements, the system can flexibly load SQLite database data and map services. With the 4G/ WIFI signal enabled, consumers can obtain agricultural product related data through the database server, query the required information, and comment on the corresponding information. After the consumption is successful, the review information and consumption records are uploaded to the back-end database management; in order to meet the communication between the farmer and the consumer, the dynamic interaction technology is used under the mobile Internet-based, mobile GIS technology support and the mobile GPS service id turned on. Interface interactions can be implemented to help map positioning services, making special agricultural products effectively promoted.

Figure 5. The information interaction and navigation interface of the system
4. Conclusion
The special agricultural product promotion system based on Android designed in this study is supported by mobile GIS technology, mobile Internet, and dynamic interaction technology. It uses the JavaScript scripting language of the Android Studio development platform to target featured agricultural product promotion business, and integrates Baidu maps and SQLite database data as the foundation is to build a mobile interactive platform between farmers and consumers. The system can provide spatial information inquiry, online sales, navigation positioning, spatial location, and interactive commentary for the distribution of agricultural product bases and promotion of featured agricultural products. The application practice of this system in Fumin County's special agricultural product information shows that the system adopts the mobile GIS technology architecture and uses the Baidu Map API to achieve spatial navigation of agricultural product production bases to the geographic location. The two parties can quickly and efficiently promote or obtain various information resources and personalized service for specialty agricultural products. Eventually rely on dynamic interaction technology to achieve information exchange between consumers and farmers. The information service has strong real-time dynamics and interactive information display. The advantages of sexuality and spatial visualization are vivid and vivid. In the current practice of new rural construction, it has important application value and practical significance for improving the application level of rural information technology, helping rural agricultural development, and increasing farmers' income.

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