

PAPER • OPEN ACCESS

## Mobile Phone Application of Agricultural Resources and Environment Information Based on Agricultural Short Message Service Content

To cite this article: Yanxiang Hu *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **281** 012013

View the [article online](#) for updates and enhancements.



**IOP | ebooks™**

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the collection - download the first chapter of every title for free.

# Mobile Phone Application of Agricultural Resources and Environment Information Based on Agricultural Short Message Service Content

Yanxiang Hu, Lixin Sun, Xin Liu, Yang Ping and Ming Wang

Institute of agricultural information and economics, Beijing Academy of agriculture and Forestry Sciences. Middle road of Shuguang garden, Haidian District, Beijing

hyxiang\_2006@126.com

**Abstract.** With the rapid development of mobile Internet, mobile application has become a new form of information service. Agricultural short-message service system has a large number of agricultural resources and environmental information, through mobile applications to display these data, to facilitate people at any time and anywhere to understand the changes in agricultural resources and environment over the years, mobile application push message is conducive to users to obtain the latest agricultural resources and environmental information. In this paper, the technical route of transferring short MMS service to mobile application is put forward, and the traditional short MMS content is presented by using mobile application. Help to improve the user experience, expand the user base. This paper describes the construction scheme and implementation method of the agricultural resources and environment information service platform based on mobile application in detail.

## 1. Introduction

Agricultural informatization is one of the important ways to solve the problems of agriculture, countryside and farmers. Ministry of Agriculture 12316 Short-term MMS Platform is a comprehensive short-term MMS service platform for the Ministry of Agriculture to help it carry out information transmission work. It contains a large number of agricultural resources and environmental information. At present, the platform has nearly 100,000 users. With the development of platform operation, the problems and shortcomings of short message service mode are exposed gradually.

- It sent three times a week, serving nearly 50,000 people each time. The annual cost of MMS is about 1.5 million yuan. To serve more users, the amount of service cost will be more.
- Users can not choose whether to receive relevant MMS content according to their preferences. Subscription and unsubscribe belong to one-time behavior and are not convenient enough.
- Restricted by storage, historical short MMS messages are likely to be deleted, and users' ability to process and utilize information is particularly limited.
- Short MMS is one-way service which is difficult to meet the needs of users personalized, unable to obtain individual appeals and criticism suggestions.

Now smart phones become an indispensable tool for people to live, mobile applications become the main media for information acquisition and dissemination[1]. Mobile application has become a new form of agricultural information service mode[2]. In the field of mobile agricultural information



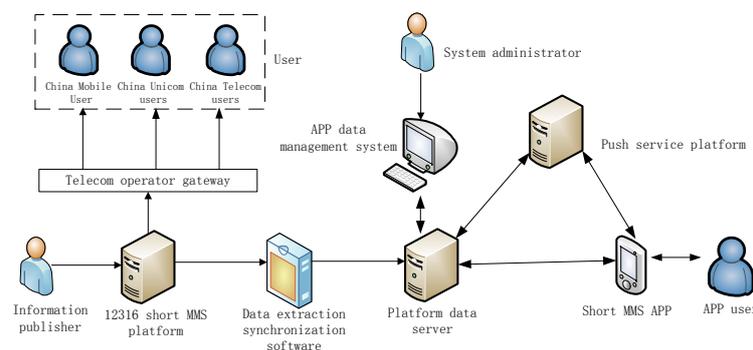
service, research and application have been carried out around database technology, short message platform, decision support system technology, visual communication and so on [3] [4]. Various kinds of mobile applications to meet the agricultural production and living needs of agricultural users emerge in endlessly, bringing new information service experience for the majority of users [5] [6].

With the advent of the Internet of Things and the big data era, the data and experience accumulated in the construction of agricultural informatization will be a strong support for the improvement of the quality of agricultural information services in the future [7]. The valuable knowledge content of short MMS is still worth maintaining and utilizing. Therefore, the construction of agricultural short MMS platform based on mobile applications, serving the majority of farmers-related users, not only can make up for the shortcomings of short MMS mass distribution, but also meet the needs and habits of current users to obtain resources and environment information like plant protection technology and regional soil pollution etc .

## 2. Design of MMS mobile application

In combination with the above background, we designed a short MMS service platform for agriculture based on mobile application, aiming at reducing the cost of short MMS transmission, improving its value, expanding its scope of transmission, enhancing the timeliness of communication, enhancing the user experience effect, and using the new technology of mobile Internet to solve the traditional short MMS service in agriculture. Problems existing in industry information service.

The network architecture of agricultural short MMS service platform (short MMS APP platform) based on mobile application is shown in Figure 1.



**Figure 1.** System architecture diagram of agricultural short message service platform based on mobile application.

The short MMS platform 12316 in Figure. 1 is a service platform that generates and publishes information automatically according to the short MMS information input by the official information publisher. The platform sends the short MMS content to the corresponding subscribers' mobile phones through the operator gateway in the traditional way. In order to improve the efficiency of information storage, every short MMS content is saved in the frame of mobile phone, text and picture are saved in txt and JPG format respectively, and finally stored in the server in the form of compressed packets.

In order to improve the scalability of the platform without changing the 12316 short MMS platform, a short MMS platform based on mobile applications is implemented. We designed a data extraction synchronization software to automatically extract short MMS content and save it to the platform data server in the form of database tables. It is convenient for the APP data management system to visually manage [the short MMS content displayed in APP. Short MMS APP platform also joins the message push service, using the message reminder to push the latest information to the APP users.

The following details are given to the design of each module of the short message MMS APP platform:

### 2.1. Data extraction synchronization software

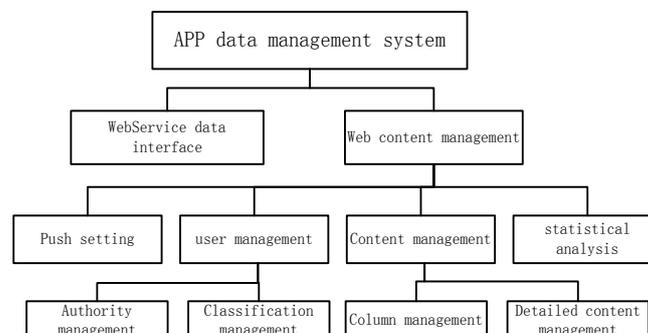
The 12316 MMS platform server is used as the data source to extract the information from the short MMS compressed packet, parse the smil file, get the corresponding files and order of the contents, and finally synchronize the information to the short MMS APP platform database table according to the agreement.

SMIL is the abbreviation of Synchronous Multimedia Integration Language. It is an important application of Extensible Markup Language (a subset of Standard Universal Markup Language). SMIL file is mainly composed of head and body 2. The head part is some additional information and layout attribute values of MMS content. The body part defines the file name and display time corresponding to MMS content. Here is an example of a simple SMIL file that contains only one picture and one text message. When generating short MMS list and content in APP, only body content is needed. Therefore, the data extraction synchronization software needs to parse the body part of the smil file, extract the SRC attributes of image and text in the par part, corresponding to the files in the decompressed folder, and save them in the database table in turn, thus generating the most direct data source of the APP platform.

```
<smil>
<head>
  <layout>
    <root-layout width="352" height="144" />
    <region id="Image" width="176" height="144" left="0" top="0" />
    <region id="Text" width="176" height="144" left="176" top="0" />
  </layout>
</head>
<body>
  <par dur="50000ms">
    
  </par>
  <par dur="50000ms">
    <text src="1392950537937_53.txt" region="Text" />
  </par>
</body>
</smil>
```

### 2.2. APP data management system

The data management system of APP is mainly responsible for managing the data in the data server of APP through visualization. The data includes data extracted from synchronization software, user information data, pushing historical data and so on. Figure 2 is the main function of the APP data management system.



**Figure 2.** APP data management system function diagram.

Web Service data interface provides a functional interface for APP client to access data server. It organizes data in JSON format, which is clearer and more concise than XML format, and improves the efficiency of data transmission and analysis.

Push settings module can set the properties of push mode, push time and push object. Short MMS push platform is generally set to automatic push mode, that is, content generation platform publishes a piece of information, platform database will immediately add a record, which will prompt the message push platform to push the corresponding new cancellation to APP users. The message is displayed to the user in a way of message reminding.

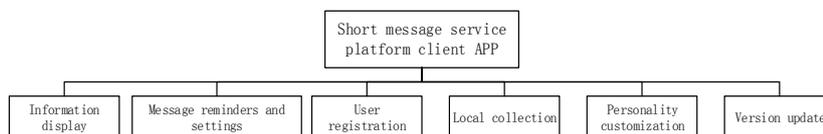
Because the content of short MMS is very rich and the amount of data is large, the system provides the function of keyword extraction and classification. At the same time, it is convenient for users to view the content of short MMS with the same keyword (column). It not only improves the efficiency of content management, but also improves the consistency and concentration of related short MMS.

*2.3. Short message service platform client APP*

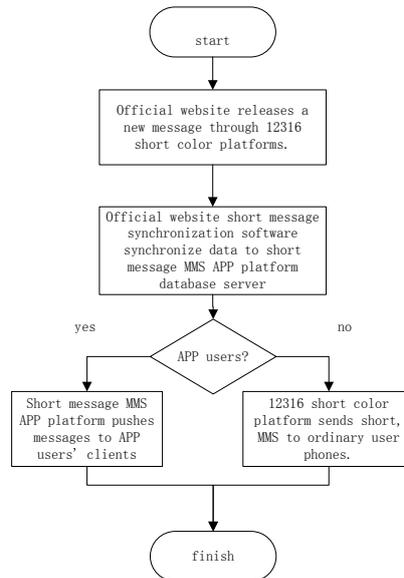
Short MMS Platform Client APP Short MMS Platform Client APP is another way of Short MMS Short MMS Platform Client APP Short MMS Short MMS Short MMS Short MMS Short MMS Short MMS Platform Client APP is another way of Short MMS Short MMS Short MMS Short MMS Short MMS Platform Client APP through the APP Data Management System provides The server is stored for statistical analysis of APP information management system. APP mainly includes six functional modules, as shown in Figure 3, in which the first time users use APP, they need to submit a personal phone number registration, and then can unrestricted access to all short MMS content, and according to preferences to set the layout of the APP module; local favorite content can be stored locally, and the APP open each time. After that, it will automatically save the latest 10 MMS messages to local users for easy access in the absence of the network. Message reminder and settings module helps users selectively receive or block new messages pushed by the server, not only to know the latest news in the first time, but also to avoid interruption when they do not want to receive the message.

*2.4. Platform execution process*

The short message issued before the completion of the platform is called the short history MMS. In order for APP users to see the short MMS content, we first synchronize it manually to the platform background database. After the implementation of short message service platform, a new information release process is shown in Figure 4. Whenever an official administrator issues a new SMS or MMS via the 12316 Short Color Platform, the synchronization software automatically synchronizes the data to the Short MMS APP Platform Data Server, and then the platform sends the SMS content to the user in two different forms according to the type of user: for the user who has installed the APP, the platform will send the new short and MMS content to the user. Users who choose not to receive the message push will not receive the message reminder. When they actively open the APP request, they can see the new information and content; and ordinary users who do not install the APP. The platform sends short, MMS directly to the phone.



**Figure 3.** APP function structure diagram of MMS platform.

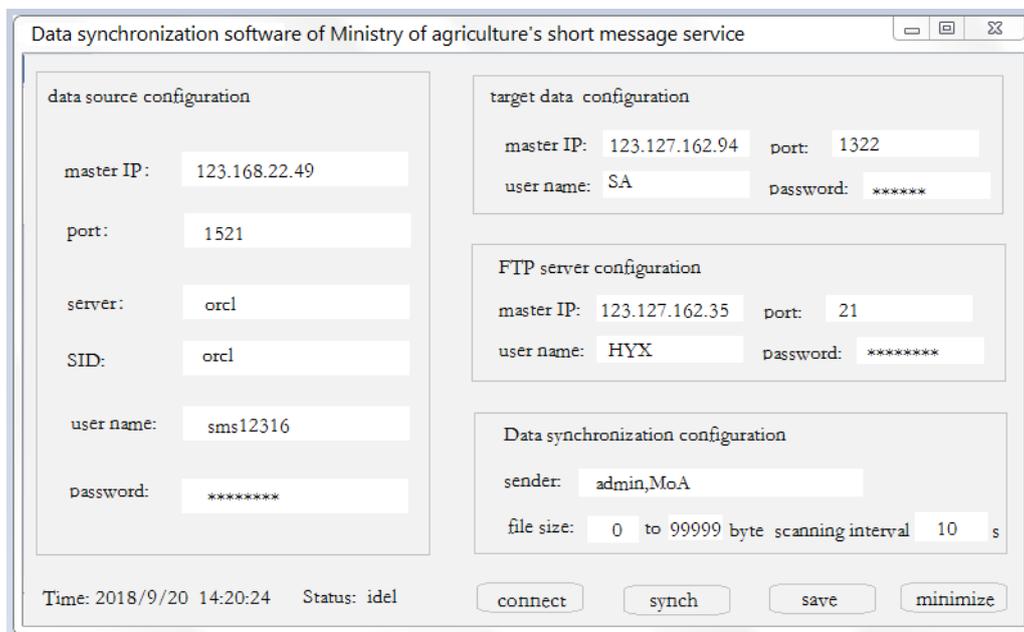


**Figure 4.** The release process of a new message in the short message MMS APP platform.

**3. Implementation of short message MMS mobile application**

Agricultural short MMS service platform based on mobile applications uses SqlServer database,.Net platform C# language to implement C/S structure data extraction synchronization software and B/S structure of APP data management system; client APP uses Android SDK and Java language, SQLite database, Baidu cloud push SDK to achieve.

Data synchronization with extraction synchronization software interface is shown in Figure 5:

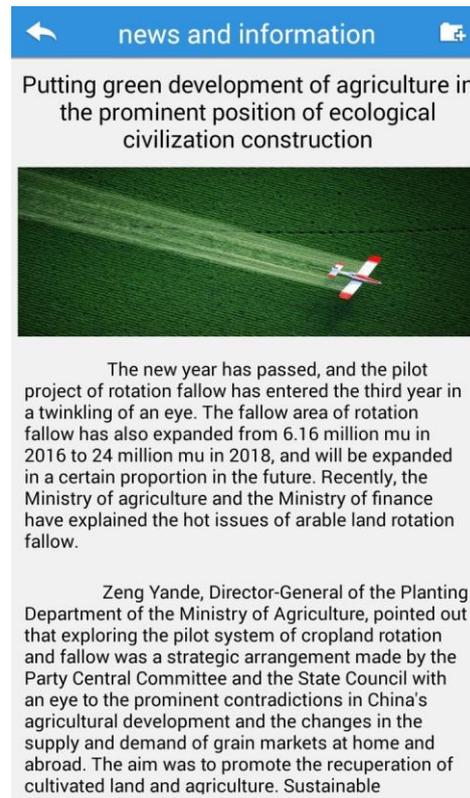


**Figure 5.** Data synchronization with extraction synchronization software interface.

Part of the interface of the short message MMS APP platform is shown in Figure 6, 7:



**Figure 6.** List page effect in Agricultural ecosystem information APP.



**Figure 7.** Detail information page effect of Agricultural ecosystem information APP.

Within two months after the deployment of the MMS platform, the conversion rate from the original ordinary users to the APP users was more than 30%, and the new APP users were 10% of the original ordinary users. On average, more than 80 new users used APP to view the content of the agricultural MMS every day, and the arrival rate of the push message was 95%. Although the agricultural information service mode based on short MMS is in the coexistence period of new and old modes, the data show that APP is popular with more and more users. With the passage of time, the full popularity of smart phones in rural areas and the increasing popularity of APP, the form of APP will be one by one. Gradually replacing the traditional way has become the leading force of agricultural information service.

**4. Conclusion**

Based on the current situation of agricultural information service, this paper analyzes the shortcomings of traditional short MMS mode, and realizes the agricultural short MMS service platform based on mobile application by taking advantage of the mobile application in information service in the current mobile Internet tide. The presentation form of agricultural information was synchronized from the traditional short MMS to APP, forming a new situation of agricultural information service with the coexistence of old and new modes. At the same time, the interaction between users and information publishers is enhanced and the quality of information service is greatly improved. After the implementation of the platform, the effect is remarkable, and the number of APP users has increased dramatically, which shows that the innovation of new mobile Internet technology in agricultural information service has been successful again. With the increase of the number of users and historical data, in order to ensure the long-term stable operation of the platform and meet the increasingly rich information service needs more flexibly in the future, the platform needs to pay more attention to the

improvement of performance in addition to the expansion of functions. These needs to be gradually accumulated and improved in the future operation process.

### Reference

- [1] Egwu, & Williams, E. (2016), Communication and adoption behaviour of information technology by rural farmers in ebonyi state. *Asian Journal of Agriculture and Rural Development*, 6(1), pp.14-20
- [2] Zheng, Yaming, Analysis of agricultural information service needs in the suburbs of Beijing, *MATEC web of conferences*, vol.175, pp.04031
- [3] Jianping liang. Application Mode Construction of Agricultural Information Service Based on Cloud Computing, *Computer science and application*, ISSN. 2161-8801, 2013, vol.3, no.3, pp.184-190
- [4] Prince, M. E., Buah, S., Ouedraogo, M., Zougmore, R., (2017). An assessment of mobile phone-based dissemination of weather and market information in the upper west region of ghana, *Agriculture & Food Security*, 6
- [5] EskenderBezaabPytrikReidsmabP. MarijnPoortvli etc, Exploring farmers' intentions to adopt mobile Short Message Service (SMS) for citizen science in agriculture. *Computers and Electronics in Agriculture*, vol. 151, August 2018, pp.295-310
- [6] Jacob HøxbroeJeppesena EmadEbeidbRune HylsbergJacobsen, Open geospatial infrastructure for data management and analytics in interdisciplinary research. *Computers and Electronics in Agriculture*., vol. 145, February 2018, pp. 130-141
- [7] Huang, Yanbo. Agricultural remote sensing big data: Management and applications. *Journal of Integrative Agriculture*. Vol.17, no. 9, pp. 1915-1931