Study and Implementation of Minority Mobile Application Recommendation Software

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Abstract. The development of network technology has greatly enhanced the degree of informationization of life. Although computers and mobile phones in developed regions have spread all over, there are still some minority peoples living in remote areas that have problems such as low mobile penetration rate, scattered national application software, language barriers which is due to information occlusion. In this case, this paper uses the collaborative filtering algorithm and the recommendation algorithm based on content to implement the recommendation system, use the loop neural network to implement the smart translation function, and finally incorporate other techniques to design an ethnic minority applications recommendation App that is suitable for ethnic minorities. This App is convenient for them to learn Chinese, strengthen their communication with the outside world, improve their living standards and expand their horizons. At the same time, this software can speed up the popularization of smartphones and promote the development of information technology in minority areas.

Keywords: Ethnic minorities · Collaborative filtering algorithm · App recommendation

1 Introduction

China is a multi-ethnic country. The minority people are an indispensable part of the forest of our nations. Ethnic Minority areas are mostly located in mountainous areas with poor natural environment, with backward culture, education, economy and so on. To develop, we need to strengthen exchanges with other countries, so it is necessary for us to improve the communication between minorities and foreign countries. Smart mobile phones, as a means of communication, have been basically popularized in ethnic minority areas, and used as the primary means for most people to obtain information. However, until now, there is no App for promoting the knowledge and culture of ethnic minorities, which undoubtedly hinders the mutual understanding and

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communication between ethnic minorities and the outside world, and also hinders the spread of ethnic culture.

By investigating the major application store, we find that the supported minority languages in App store are very few, mainly the two languages of Tibetan and Uighur. Most of the applications that support minority languages are the typewriting, dictionary and translation application. Compared with other Chinese Apps, these Apps are relatively weaker in the ability of human-computer interaction. Popular Apps for ethnic minorities, such as Holvoo, Ehshig and Bainu, are only designed for one minority language. The most popular phones only support Chinese. A small part of smart phones can set up ethnic minority languages, but how to find applications suitable for their learning, entertainment and life from the millions of App for minority people who are not familiar with Chinese?

In order to solve the above problems, this paper proposes a software which can be used to search Apps for minority people. This paper designed an application to solve the retrieval and usage problems caused by the language barrier. Based on the language, culture and usage preferences of ethnic minorities, the application recommends users their favorite mobile Apps.

2 System Development

2.1 Background Analysis

In recent years, products and services related to mobile information are changing the survival and competition mode of traditional industries and further affecting people's lives [1]. However, these changes do not appear to be obvious in minority areas, so we propose the recommended Apps to promote the development of minority areas, help enjoy the convenience and speed brought by the development of modern information technology. At present, minority smartphone users are still in great demand for applications, moreover, learning and entertainment, as the important part of people's lives, are particularly crucial and essential demand module in the applications. Therefore, considering the above factors and the difficulty of resource development, we decided to choose learning and entertainment as the main content of application recommendation.

2.2 Platform Configuration

Main configuration of the server: Ubuntu Server 16.04 LTS Linux, PHP Laravel framework [2], Nginx [3], MySQL, PHP, Python. Finally, this paper deploys the mobile terminal software to make it easy for users to use.

3 System Functions

The whole system consists of server and mobile client application. The server mainly includes: data crawling; data processing and storage; screening and recommendation. The client is an ordinary mobile phone application. The main function modules are: smart App recommendation; one-stop search App; one-click real-time translation. The overall software architecture diagram is shown in Fig. 1.

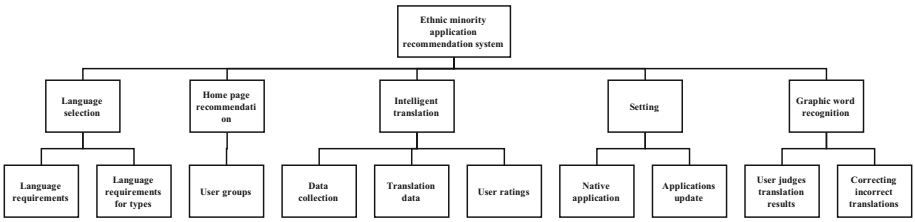

Fig. 1. App function modules

Among them, "language selection", "home page recommendation" and "intelligent translation" these three functional modules are the main part of the recommendation platform, mainly providing users with different kinds of demand services. "Language Selection" function module not only enable users of different ethnic groups to use the software, but also enable them to learn and inherit their own language in this fast-paced era. This function module provides convenient ethnic application search and download function for ethnic minority compatriots who are not familiar with Chinese; on the other hand, it also provides them with the opportunity to learn other national languages. When users switch the language to other national languages, bilingual or even multilingual learning can also be carried out. "Home recommendation" function module firstly recommends minority applications in the highly download, and then the mainstream App sales list. This allows fewer and more dispersed minority applications to be downloaded centrally. The function module of "screenshot translation" provides users with the translation function outside the application. The popular Apps, such as Meituan, Taobao etc., are all Chinese software. Even if the user switches the language of the mobile phone system, it is still displayed in Chinese, which brings operational difficulties to many minority users. As long as the recommendation App is running in the background, users can click the hover ball screenshot in other applications to point-to-point translation.

According to the criterion of several main minority languages used by Chinese ethnic minorities at present, based on the analysis of the types of language demanded by smartphone users and the number of requirements for each language, the right language should be chosen from the point of view of design and use.

3.1 Home Recommendation App

The home recommendation database mainly consists of three sub-databases: user preferences, user groups, and user reports in that these factors can basically reflect the user's demand for software. The formation of user preferences firstly predicts user preferences through users' basic data and behavior, and then secondly mines user historical behavior data to discover users' preferences. User groups are mainly divided by information such as mother tongue, race, gender and geographic location, and aggregate the common preferences of a certain group of users. User reports are formed by user feedback, correction of data, and optimization of the smart recommendation system. Ultimately, this software can group users based on different preferences and recommend applications with similar tastes.

3.2 Graphic Word Recognition

The database of picture-text recognition is composed of three sub-databases: collecting graphic text data, identifying graphic text data, and identifying and correcting. It is free open interface for other developers to collect image data. Collect the image wanted to identify and convert it into TIF format to generate the box file. Summarize the image and text data submitted by the client and classify similar images for evaluation.

3.3 Intelligent Translation

In recent years, with the "deep learning technology" and other artificial intelligence machine translation added, machine translation is more and more powerful. It is no longer just translating one word into another language but is able to constantly recall complex sentences that have already been understood to understanding the specific meaning of each pronoun. In addition, we have to understand that machine translation is a process of decoding and encoding. For example, when translating Chinese into Tibetan, the original Chinese text should be first decoded into "neural code" and then encoded to generate the Tibetan language.

4 Software Functions Implementation

The design and development of recommendation mobile phone App for minority applications is based on the needs of users, the significance and feasibility of development. Drawing on the design concepts of several mainstream application stores in China, this paper establishes the structure according to the requirements of "harmony and different" of various national cultures in China.

In the process of software functions implementation, first of all, this paper uses Java language to design the page controls and display modules. The screen capture of App interface is shown in Fig. 2.

Fig. 2. Snapshot of APP

Then, the main function is to apply the external screenshot click translation function. For example, we open Alipay, take a screenshot through the floating ball and then click to translate, as shown in Fig. 3. Users can submit data for translation training through the interface and evaluate the translation quality [4, 5]. Then it feedbacks to the neural machine translation training model to improve the translation quality.

Fig. 3. Snapshot of provided translation function for another App by touch point ball

4.1 Key Modules Implementation

Recommendation function is the key and emphasis of the whole recommendation App implementation and is also an important part of the whole system. One of the main functions of the recommendation App is to recommend the Apps that conform to local characteristics to ethnic minority compatriots, so the recommendation function plays an important role in the development. It not only has the recommendation function of traditional application store, but also has the characteristics of national characteristic recommendation.

The collaborative filtering algorithm was proposed by Goldberg et al. in 1992. The principle of collaborative filtering algorithm is as follows: firstly, the user's basic data is predicted by the user's preferences; secondly, the person with similar interests is divided into the same group; finally, the user's favorite software is recommended to other users with similar interests. For example, I like Meitu Xiuxiu and the recommendation algorithm will recommend Meitu Xiuxiu to other users in the same group. The algorithm flows chart shown in Fig. 4 [6]. The content-based recommendation algorithm [7], which does not consider human factors, only considers the things with the same keywords and tags. Its implementation principle is as follows: First, it makes recommendations based on the similarity between the collected information resources and user interests; then, by calculating the vector similarity between the user interest model and the applied feature vector, it recommends the application with high similarity to the client of the model; finally, because each customer operates independently, they have their own independent feature vectors, this algorithm ignores the interests of other users. Therefore, there is no problem that the evaluation level is high or low and it is possible to recommend a new application or recommend an unpopular application. These advantages make content-based filtering recommendation systems unaffected by cold-start and sparse issues.

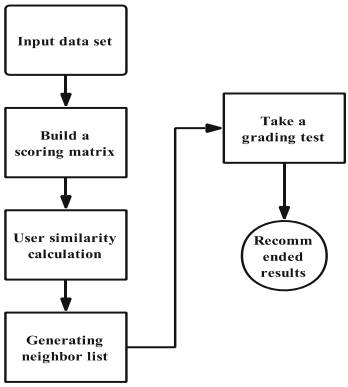

Fig. 4. Flow of d User-based CF

The application recommends the software through collaborative filtering algorithm. Based on the evaluation of content recommendation, it can recommend more personalized results to each user so that it is more convenient access to information. This paper uses Python to crawl the minority and Han nationality App in the main application store and then selects the star rating and user rating as input and calculates the correlation between App by using Pearson correlation evaluation. Now that the prediction is completed, this paper presents a recommendation to the user based on a similar App. The flow chart of the whole process is as follows in Fig. 5:

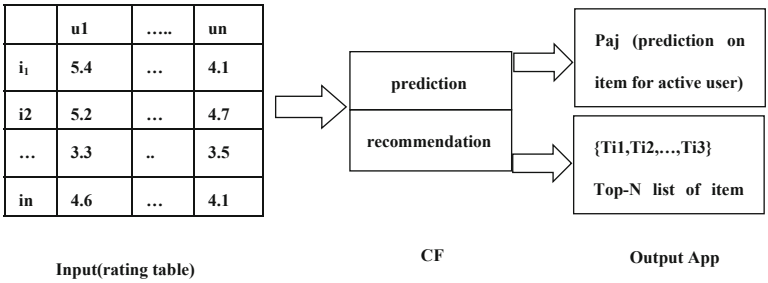

Fig. 5. App recommendation process

4.2 Database Development

In order to obtain real-time and useful data information, reduce the power consumption of ICT network devices [8], and prevent the loss of information in the process of transmission [9–11], this paper chooses a better network interface [12]. All the data in the minority application recommendation App is reflected in the database. Every function mentioned above has corresponding data in the database and its own attributes, which can facilitate the management of various data [13]. Of course, in addition to database development, the configuration of the App server and other development environments need pay attention. After running the program, the normal use of the recommended App can be guaranteed only if the databases can be connected properly.

5 Conclusion

At present, the development of Apps for ethnic minorities in China is increasing year by year. But ethnic applications are scattered, and most ethnic minority users are unaware of their existence. For another, due to the obstacles to the cognition of Chinese, many efficient and convenient Chinese Apps are not popularized in minority areas, which hinders the development of ethnic areas to a certain extent. Therefore, this paper mainly combines the characteristics of ethnic minorities and the needs of users and designs the main function module of ethnic minority application recommendation App. This can help minority users to make reasonable and effective use of network resources, promote economic development and increase cultural inheritance and exchanges.

Now many mainstream application stores such as Huawei, Xiaomi serve basically the Han population from the interface design to App search. The recommendation App has language selection function with mainstream minority languages. This makes it possible for ethnic minority compatriots to overcome language barriers. The recommendation App also gives priority to the recommendation of minority-related App, which solves the problem of scattered application of ethnic minorities. The recommendation software provides mobile phone users with the external click translation function so that minority users can use mobile phones with no language barriers in

other App. With this paper' work, it is bound to accelerate the development of information technology in minority areas.

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