Implementation of system for college students' career planning based on user interest model

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Abstract. In order to help users discover their real interests, and recommend positions and tasks that match their interests scientifically and accurately, the system is different from most of the ability enhancement and job-hunting system on the market. This system relies on artificial intelligence technology, and we design the function of long-term companionship and personalized solutions to help users find the career direction they are interested in, and push tasks periodically according to the recommendation algorithm to help users improve their vocational skills, ultimately to help college students to identify what they really like and rapidly improve their ability.

1. Introduction
In recent years, with the increase of the number of college graduates in our country, the employment situation college students are facing is more and more severe. If they want to stand out in this era of severe situation, they need to set goals as soon as possible, make career planning well in advance, constantly improve their comprehensive ability, and strive to meet the requirements of society and enterprises [1]. According to the White Paper on the Growth of Chinese College Students, 95.7% of the students are confused at the present stage, the most serious of which is freshmen and seniors [2]. Through investigation and research, it is found that occupation is one of the ten confused problems of college students.

College students' career planning in China is still at the basic stage, still at the level of employment guidance, with three characteristics of homogeneity, fault, and short-term [3]. In order to solve the problems existing in the traditional way of college students' career planning, we put forward a good solution. By analysing and mining the data of students' majors, characters, abilities and specialty, we can recommend resources for college students' selective learning, and cultivate or tap their interests, so as to help college students find the industries of interest, carry out career orientation and solve the problems of college students. The confused and unclear status quo of career planning will gradually narrow the gap between university education and social needs.

2. Overview of the system as a whole
This paper presents a career planning system based on user interest model for college students. The system framework is shown in Fig.1.
Fig. 1 System Design Framework

Firstly, the platform UI layer shows the resources such as articles to users, then the system captures the data of user's operating behaviour through JS injection monitoring, analyses the data in the form of vector space model, establishes the user model based on tag system (interest, ability) vectors, and then recommendation system analyse the current user model to recommend personalized resources and tasks for users, and generate personalized analysis reports. Then the user evaluates the personalized results, and the system updates users’ model, optimizes the recommendation algorithm iteratively, mines user’s personalized interests, and improve their abilities.

The software flow chart of the system is shown in Fig. 2.

Brief description:

1. When the user logs in the software at the first time, the system will require him to fill in basic personal information, including the major, basic interests and hobbies that he is studying as the most basic data of the recommendation system.

2. In the initial stage, the system pushes relevant industry information to user according to his professional information and other basic information. The system will collect the user’s behaviour data when he read articles.

3. When the user's behaviour data accumulates to a certain extent, the system will analyse the data by algorithm, generates his interest model, and show him the proportion of reading all kinds of information in the form of system messages.
4. We will list careers that meet his interests. He can choose one as his employment direction according to his own requirements.

5. When the user choose his preferred employment direction, the platform will use the predecessors data generation neural network recommendation algorithm to push more relevant information for him and help him choose his preferred position more carefully and deeply. At the same time, at this stage, the system will customize task cards for the user to help him systematically improve his capabilities.

6. If the user can actively accept the task and successfully complete the task, then we can determine that the user has indeed found the position that he is interested in and suitable for. We will also record this data in the background as the incremental learning data of artificial intelligence. If the user can't improve his ability through task blocks smoothly, we will re-select the position he may be suitable for.

7. When the user completes the corresponding system tasks, the system will recommend some enterprise resources to him according to the quantity and quality of the tasks completed by him (the platform will have periodic quizzes to confirm the quality of the tasks completed by the user), so that he can "go out" successfully from the product.

3. Implementation of System Interaction

This system is based on three-layer structure and uses C/S development mode[4]. The three-layer structure of the system is server, database and client. The structure of the system is shown in Fig.3.

![System Structure Diagram](image)

Fig.3 System Structure Diagram

3.1. Server

On the server side, we use the cloud server to support the interaction between the mobile phone client and the database. The steps to connect the Aliyun server are as follows.

Step 1: Buy Ali Cloud Server and enter the instance
Step 2: Replicate public network IP
Step 3: Run the “mstsc” command: Quickly call out the running window by the shortcut key “WIN + R” and enter the remote table “mstsc”
Step 4: Paste Copied Public Network IP
Step 5: Enter the password of the server’s users and modify the password

3.1.1. Backend

The back-end uses framework technology to make the implementation of the interface simple by building the framework.

First, Set up a hash graph.

JsonHashMap JHM = new JsonHashMap();

Then use the getpara () function to get the information from the front end and determine whether it is empty or not, and return the error if it is empty.

String password = getPara("password")

The put () function is used to return the desired data to the front end.
Jhm. putCode (- 1). putMessage ("string");
RenderJson (jhm);

3.2. Client
The front-end and back-end of the system are developed using APICloud. APICloud is a dual-system APP development platform encapsulating multiple functions [5]. App developed using APICloud can be supported by both IOS system and Android system.

3.2.1. Front-end
The front-end uses HTML as the basic framework, and adds CSS and JavaScript on the basis of HTML to enrich the content of the page.
First, define the style of each subpart in the <head> tag.

```
<style>
</style>
```
Divide each module.
```
<div class="">
</div>
```
Fill in the sections.
```
<div class="user_information_board">
<a style="font-size: 0.7rem; color:E53939">My message</a>
</div>
```
Define response functions.
```
Apiready = function()
```

4. Core Algorithms
In order to avoid the occurrence of cold-start phenomenon and to make more accurate recommendation for users, users should fill in basic information and select the categories of interest when using this software, so as to build a simple user label system for users and form a simple user portrait. The models are shown in Fig.4.

![Fig.4 Representation of user model, resource model and task model (vector space model)](image)

The core technology is content-based recommendation algorithm and incremental learning and deep learning algorithm. On the one hand, the cosine similarity algorithm is used to compare user model (interest, competence) and resource model (interdependency, difficulty). The Naive Bayesian algorithm is used to calculate the probability of suitability, and the personalized recommendation cosine similarity algorithm and Naive Bayesian algorithm are implemented as formula (1) and formula...
(2), respectively. On the other hand, by extracting the personalized recommendation results of each user model and corresponding feedback modification, large data sets are generated, which are divided into training set and test set. BP neural network algorithm is used to train and learn the existing data. Through test set testing, the fitness of user model and resource model is fitted, and recommendation algorithm is continuously optimized and improved to make recommendation aggregation. The results are getting more and more accurate.

\[ \text{Similarly} = \cos(\theta) = \frac{\sum_{i=1}^{m} X_i \times Y_i}{\sqrt{\sum_{i=1}^{m} (X_i)^2} \times \sqrt{\sum_{i=1}^{m} (Y_i)^2}} \]  

Where \( X \) and \( Y \) represent two vectors, \( X_i \) and \( Y_i \) are the components of vectors [6].

\[ c = \arg \max_{c} p(c_j|d) = \arg \max_{c} \frac{p(c_j)p(d|c_j)}{p(d)} \]  

\( c \) is the overall fitness probability; \( d \) is the current user model; \( i, j \) each component label; and \( n \) is the label to calculate the weight.

5. Testing and Analysis
To test the availability of APP, we first enter a person's personal information. After inputing, you can view personal information through "my" interface, which is shown in Fig. 5(a).

![Fig.5 User Interface](image)

(a) Personal Information View Interface  (b) APP Home Page  (c) Recommended Interface  (d) Growth Footprint

Then we test the function of APP. The interface of the front page of APP is shown in Fig. 5(b). According to the interests of the personal information entered in advance, the recommendation is completed through the algorithm. The recommendation interface is shown in Fig. 5(c).

Our software tailors every user's growth footprint. In this section, we will provide guidance for users in the form of task cards, and push tasks they need to them to complete in order to achieve better learning at the current stage. The growth footprint interface is shown in Fig. 5(d).

The "growth footprint" section of the system provides each user with a customized capability growth solution. Users can browse relevant resources selectively according to their preferences and needs, or rely on the "growth footprint" section to develop their required abilities in a planned and purposeful way. After testing for APP and after using it for a period of time, the recommended career planning is provided to users accurately.
6. Summary
This paper proposes an APP system for college students' career planning based on user interest model, which can not only provide resources for users, but also precisely recommend articles, news and predecessors to users through the labels that users affix to themselves and the label system constructed for users based on users' browsing behaviour and browsing preference according to the recommendation algorithm. This research system has strong practicability and high recommendation accuracy, which provides convenience for college students' career planning.

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