College Student Competition Recommendation and Development Planning Prediction Platform Based on BP Neural Network Algorithm

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Abstract. With the development of today's society, the number of college students in China has steadily increased, and the number of college students is increasing. More and more college students choose to participate in competitions to improve their abilities. Therefore, our team has integrated the relevant competition resources of major universities and established a competition system with high efficiency, real-time interaction and high communication for the purpose of college students. The ordinary users are college students. In addition to registration, briefing, mutual help discussion forum and video broadcast of the event, the platform also provides users with professional classification based recommendation, college student development planning prediction, live broadcast, teammate recommendation, Special services such as rapid team formation, fast pipeline, experience sharing and authoritative guidance improve the user experience while simplifying the registration process. Form a unique platform for college students.

1. Introduction

1.1. Market size
In recent years, the number of college students has grown steadily. In order to encourage the creative enthusiasm of students, China has hosted many challenging competitions. These competitions not only can develop the intelligence of contemporary college students, but also make a lot of contributions to China's science and technology, and these competitions can be an advantage, whether it is a postgraduate entrance examination or employment search. To this end, we set out a college student competition service community based on the needs of college students.

1.2. Market capacity
Competition is a great challenge to students' design ability, practical ability, psychological quality, team spirit and physical strength. While testing students' comprehensive application of knowledge, they also focus on the practical hands-on ability of students, so it is a comprehensive ability for students. Comprehensive assessment. The subject competition not only examines whether the students' basic theoretical knowledge is well grasped, but more importantly, it examines the students' application and practical ability of theoretical knowledge. This is a solid grasp of the basic theory and strong hands-on
ability, especially its own is extremely rich. Innovative and team-oriented students create a stage for their ability to perform.

As the degree of emphasis on academic competition in colleges and universities continues to intensify, the level and type of academic competitions are not constantly adjusted and increased. At the same time, the number of participating schools and participating students at home and abroad has increased steadily, and the quality of students' submitted works has also been continuously improved. From the simple entry in the past to the current integration of discipline competition into discipline construction and curriculum. In the reform process of reform, scientific research and teaching mode, even some colleges and universities have taken the discipline competition as an important part of the teaching work to grasp and grasp. The Ministry of Education or other departments or companies or associations should also follow this trend and appear in various forms of competition. Like the four university competitions promoted by the Ministry of Education: the National College Students Mathematics Competition, the National College Student Physics Competition, the National College Student Mathematical Modeling Competition, and the National Undergraduate Electronic Design Competition, which are more inclined to science and engineering. In order to meet the needs of different professions, the Provincial Department of Education will introduce some competitions held by universities in the province. For example, the Jiangxi Provincial Department of Education has the Jiangxi University Students Science and Technology Innovation and Vocational Skills Competition in recent years, almost everywhere. Most majors.

The National College Students Mathematical Modeling Competition has been successfully held for 22 sessions since the first session. At the beginning, there were only more than 300 teams from more than 70 colleges and universities. Now there are more than 1,250 participating schools, and the number of participating teams is close to 20,000 and nearly 60,000. College students participate. In addition to these weight-level competitions promoted by the Ministry of Education, some of the subject competitions that followed have also grown at an alarming rate. For the promotion of software development technology, promote the cultivation of software professional and technical personnel, and deliver high-end talents with innovative ability and practical ability to the software industry, enhance the employment competitiveness of college graduates, comprehensively promote the development of the industry and the process of talent cultivation, industrial and The Blue Bridge Cup “National Software Professional Design and Entrepreneurship Competition” organized by the Talent Exchange Center of the Ministry of Information Technology. This competition was successfully held in 2010 for the first time. It was only held for four times in 2013, but the scale and number of participating schools have continued to record high. In 2013, there were a total of 65 sub-districts in 31 provinces and municipalities, with more than 1,100 participating institutions, and the number of participating students reached more than 20,000.

1.3. Demand Analysis

With the rapid development of the Internet, college students are increasingly dependent on the Internet, and there are more and more academic competitions in various colleges and universities. At the same time, college students are eager to improve their comprehensive quality, and it is urgent for them to have an app that integrates with the friends and makes friends for them. Practice, study and make friends. At present, there are only a few websites dedicated to college students' competitions, the content is not comprehensive, and the functions are not perfect, and there is no certain climate. At present, we are in the stage of cultivating the market. The market base is large, the number of users is large, and the degree of attention is high. Therefore, our climbing team integrates the competitions of major universities to establish a service-oriented university with high efficiency and real-time interaction. Sexual, highly disseminated competition community. Aiming to influence a new generation of college students and event enthusiasts, let them continue to exercise and constantly improve themselves, and also provide a platform for enterprises, governments, society, organizations, and schools to organize and host various events to promote information dissemination. Mutual benefit and win-win.
1.4. Market competition pattern and opponent analysis

Both Celluloid and Sichuan have developed to a certain scale and are temporarily leading (partial business model). Imitate the competition of Saiqi and Sichuan. Nearly ten, a few have combined their own resources and have developed. Take "I love the competition network" as the representative.

More than a dozen people who followed the "National College Student Information Network" were trapped. Take "go to the big game network" as the representative. (Preferential Public Welfare Mode)

Most of the websites are pure competitions and certain public welfare activities. The pattern is similar, with many restrictions and fewer highlights.

2. System design

2.1. System Solution

This platform uses AndroidAPP, WeChat applet and website as the presentation form, based on the optimized collaborative filtering algorithm to recommend college students to individualized competition, and BP neural network algorithm based on deep learning to predict the development planning of college students. Figure 1 platform system framework diagram.

![Platform system framework diagram](image)

**Figure 1. Platform system framework**

2.2. System Theory Analysis and Calculation

Android App uses Gradle and its recommended engineering structure to make the project easier to maintain and reduce the amount of code by multiplexing. Developers can achieve different levels of code reuse through inheritance, combination, function modules, etc.

Android App uses Google’s Gson to end json data. Compared with XML, JSON is more concise, making it easy to check and debug. JSON is more lightweight, writing, transferring, and parsing are more efficient; JSON uses compression during transmission. Technology can save more bandwidth.

Android APP uses OkHttp as a network request, and okhttp is extremely stable. okhttp supports SPDY (which is a TCP-based application layer protocol developed by Google to minimize network latency, improve network speed, and optimize user's network experience.) Allows all requests to connect to a host to share a socket. If SPDY is not available Connection pooling is used to reduce request latency. Responsive caching is used to avoid duplicate network requests. Even if there is a problem with the network, okhttp still works. It will reply from common link problems. If the server has multiple IP addresses, when the first fails, okhttp will automatically try to connect to other addresses. This is necessary for IPV4 and IPV6 as well as services hosted in multiple data centers.
Globalization: more than 1,000 operators in 212 countries;
Free for all: Global user verification SMS is sent free of charge;
Three seconds: the top channel ensures quality of service.

The website and the WeChat applet are developed using the ThinkPHP 3.2 framework: Mvc increases the usability of the code, separating the view layer from the business logic layer. When one of the three parts needs to be changed, just change that part. Code without having to change everything.

Grouping module: It can solve the division of labor coordination and deployment problems across projects.

AJAX support: built-in AJAX data return method, support JSON, XML and EVAL format to return to the client, the system does not bind any AJAX class library, you can use the familiar AJAX class library to operate.

View model: Easily and dynamically create database views for multi-table queries.

Association model: Simple and flexible way to complete multi-table association operations.

Database features: The system supports multiple database connections and dynamic switching mechanisms to support distributed databases. Use wangEditor editor the editing ability is very strong, basically the same as the word editing format.

Platform security: THINKPHP prevents SQL injection attack data from using md5 encryption, ensuring user data security administrator account password without weak password, preventing encryption from being transmitted on the blasted app and background, preventing the packet from being parsed and exposing the security of the information thread. Declare that the app generates the signature of the application.

1) Live video:
The live video implementation process is shown in Figure 2:

![Figure 2. Video live implementation flow chart](image)

2) Personalized recommendation collaborative filtering
The platform recommendation and user recommendation implementation of this platform are shown in Figure 3:
Figure 3. Tournament recommendation and user recommendation implementation map

Step 1: Set user behavior and score weight assignment:
- Click -> 1.0
- Search -> 3.0
- Collection -> 5.0

Step 2: UserCF algorithm steps:
1. Construct a scoring matrix based on a list of user behaviors. Input data: User ID, Event ID, Score;
   Step 1 Output Data: User ID (matrix row) – Event ID (matrix column) – Score
2. Using the scoring matrix to construct a similarity matrix between users and users. Input data: output of step 1; cache data: output of step 1 (cache and output are the same file, subsequent needs);
   Step 2 output data: user ID (matrix row) - user ID (matrix column) - similarity
3. Transpose the scoring matrix; input data: output of step 1; step 3 output: event ID (matrix row) – user ID (matrix column) – score
4. User-user similarity matrix* Scoring matrix after transposition; input data: output of step 2; cache input: output of step 3; step 4 output: user ID (matrix row) – event ID (matrix column) – score
5. According to the scoring matrix, the output of step 4, the user has had the behavior of the event set to 0; input data: the output of step 4; cache: the output of step 1; output data: user ID (matrix row) - event ID (matrix column) -- Score (final recommendation form)

The formula used to calculate the similarity matrix: cosine similarity: \[ \text{CosSim}(x, y) = \frac{\text{sim}(X(i) \cdot Y(i))}{\sqrt{\text{Sim}(X(i)) \cdot 2} \cdot \sqrt{\text{Sim}(Y(i)) \cdot 2}} \]

3) BP neural network algorithm based on deep learning
Figure 4. BP neural network algorithm based on deep learning

The neural network learning process is divided into two parts:
1. Forward propagation for loss
2. Backpropagation update w (weight)

Forward propagation loss: Calculate the weighted sum of the input layer features, multiply the input layer eigenvalue matrix with the corresponding weight matrix, and normalize it by sigmoid function to obtain the calculation result, and finally calculate the error with the real result.

Backpropagation update w (weight): According to the error result area correction weight, using the gradient descent method, find the derivative of sigmoid at li and multiply it by error to get the correction weight. Finally, add the previous weight update to complete once. Training optimization.

3. Test results
The following is the data for the initial platform stress test.

It can be seen from the data that the number of successful returns is 100%; the throughput is relatively large, and the response time is small, indicating that the stress test results are reasonable.
4. Conclusion
This paper integrates the relevant competition resources of major universities and establishes a competition system with high efficiency, real-time interaction and high communication for the purpose of college students' services. The ordinary users are college students. In addition to registration, briefing, mutual help discussion forum and video broadcast of the event, the platform also provides users with professional classification based recommendation, college student development planning prediction, live broadcast, teammate recommendation, Special services such as rapid team formation, fast pipeline, experience sharing and authoritative guidance improve the user experience while simplifying the registration process. Form a unique platform for college students.

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