

## Parallel Data Mining Algorithm Application and Evaluation of College Counselors' Psychological Guidance Ability

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### **Abstract**

*With the development of network and big data technology, how to dig out the effective information from massive data is the problem that we are facing. Traditional data mining algorithms in the face of big data, it is powerless. With the ability of parallel computing, data is processed on several machines, so the efficiency of data processing will be greatly improved. In this paper, the author analyzes the parallel data mining algorithm application in the evaluation of college counselors' psychological guidance ability, and puts forward the strategies of improving the ability of college counselors' psychological guidance. Based on the statistical analysis, the result shows that there were no significant differences in gender, but in the context of communication, female were better than male. The male instructors are superior to female instructors in the understanding ability of the observation and diagnosis and the plan of action. Obviously, training is a very effective way to improve the ability of College Counselors' psychological counseling, and it should be promoted and applied.*

**Keywords:** *Data mining, collaborative filtering algorithm, college counselors, psychological guidance*

### **1. Introduction**

With the arrival of the era of big data, information has been explosive growth, how to dig out the effective information from the massive data, is the problem we are facing. Traditional data mining algorithms in the face of big data, it is powerless. With the ability of parallel computing, data is processed on several machines, so the efficiency of data processing will be greatly improved [1]. The emergence of data mining, so that people can discover the knowledge from the data, find the law, and thus produce value, so the research of data mining algorithm has great significance. In the traditional data mining algorithms, are based on single processor, in the amount of data is not very large, the traditional data mining algorithm is very mature, not only high efficiency, precision is also very high [2-3]. Cloud computing appears makes the research of data mining techniques to be effective, when stand-alone cannot handle large data, using cluster parallel computing ability, on multiple machines and data processing, this data will greatly improve the efficiency, and with the increasing of the number of cluster nodes and computing speed will correspondingly accelerated[4]. In order to use dynamic resource allocation of cloud platform and parallel computing ability, to solve the primary problem is that how to integrate the traditional data mining algorithms into parallel algorithm for computing, making these algorithms can effectively migrating to the cloud platform.

The University of Education Service is closely related with the society, which fully reflects the integration of education and social education. Personnel training services is still the primary service of education services, and the cultivation of good psychological quality is the prerequisite for the maintenance of mental health, but also the inevitable requirement of the development of the people [5]. But, at the same time, we should also see, the Vocational College Students' cultural foundation is generally weak, psychological

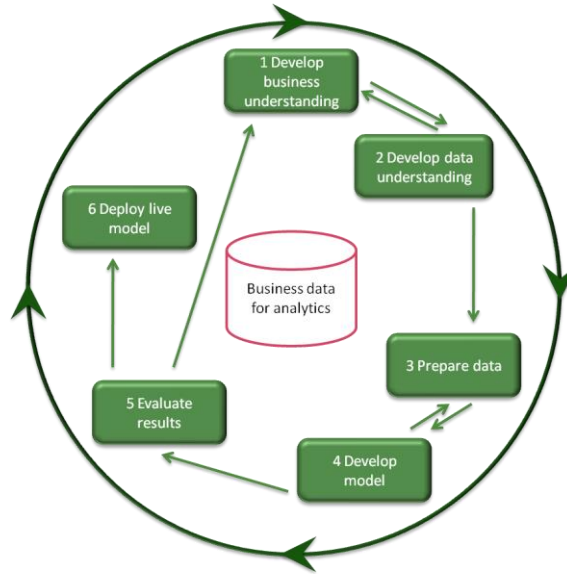
quality is not very high, many students because of the lack of confidence in their present learning and future employment, resulting in psychological pressure is very big, the part of the students will have some mental health problems. The psychological problems of the students in the traditional business scope and methods of work put forward the challenge. The development of healthy psychology can lead to the coordination and all-round development of moral, intellectual, physical and aesthetic aspects. It has important effects on the mental health, personality development, potential development and quality of life of each student [6]. It has other ideological education method does not have the special function is determined by the characteristics of psychological counseling, it can help students to awaken and maintain a healthy state of mind, to accept the correct ideological education to create a good psychological condition, help to improve the science and effectiveness of the ideological and political work, and so on. At present, psychological counseling has become a powerful supplement to the ideological education in Colleges and universities. It has become an important content of Ideological Education in Colleges and universities to strengthen psychological counseling in ideological education.

Counselors should improve their own quality, to be a model for students. First of all, to have good political quality, conscientiously implement the party's educational policy and regulations, love the work of counselors, strong sense of responsibility, good work style, self-discipline, and can carry out mental quality education for all phases of college students ideological characteristics [7]. Secondly, have a good mental outlook, counselors to consciously psychological education initiative, fully aware of the psychological education status and role in the education system, it is more important to the psychological education to have strong interest and a strong spirit of exploration, with to give to explore the research enthusiasm of students in the new psychological issues and phenomena, to respect the students, understand students, believe that students, arouse students psychological self-build, debug, the enthusiasm of the repair and the platform, provide convenience [8]. Again, want to have a good psychological quality, ideological and political work is complicated and difficult to unravel complex unprovoked, and psychological education of students and hidden intangible, fickle, the counselors should maintain good mental state and optimistic upward state of mind, emotions, good to control the negative emotions, training their love of mental quality education of sense of responsibility, perseverance, set a good example, with good psychological quality to influence the students, give full play to their models, the promotion of college students psychological education.

## **2. Data Mining and Collaborative Filtering Algorithm**

### **2.1. Data Mining**

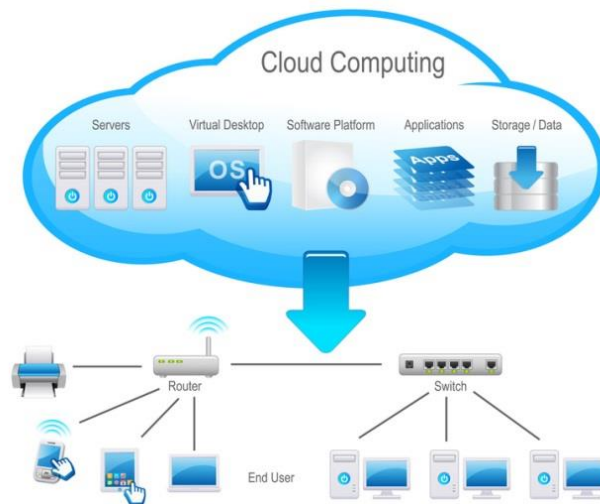
Data mining refers to a large number of incomplete and irregular information, mining the value of the knowledge or the law of the people. The object of data mining is mainly aimed at the business data in the large database. The process of data cleaning and integration, data conversion of business data, data analysis, evaluation model and knowledge representation, eventually to the user provide valuable information, to help users make corresponding decisions on data services. The storage of data sources can be arbitrary types: structured, unstructured, and semi structured data. Such as ordinary text files, relational database data, web data, and even pictures, audio, video and other data. Cloud computing is the development of distributed computing and distributed network storage technology fusion products, cloud computing essentially is a kind of distributed computing model. It will be a big task allocation in the pool of resources is composed of multiple servers can let users on-demand access to storage space, computation ability of service.



**Figure 1. Sampling Methods on Data Ming**

Cloud storage system uses distributed network storage technology to store data, and the use of redundant storage technology to improve the fault tolerance and reliability of the system, which can solve the problem of massive data storage. The emergence of distributed computing has provided favorable conditions for the massive data mining. In the face of large scale data, how to improve the efficiency of data mining algorithm is one of the difficult problems that need to be solved in the field of data mining. In the data mining technology, the distributed computing technology, massive data computing tasks cut into many independent small tasks and the task allocation to multiple computing servers for parallel computing. Finally, all the results merge, so as to complete the whole mining computing tasks. This method can be very good to achieve large-scale data mining tasks, and has a high efficiency and good scalability.

The emergence of cloud computing, making the data mining platform has a new direction of development, but also makes a new generation of data mining platform has become possible. Cloud computing is a computing platform that can provide dynamic resources, virtualization and high availability.



**Figure 2. Cloud Computing**

Cloud computing distributed storage and distributed computing to promote the new generation of data mining platform for change. Figure 3 is cloud based data mining platform architecture. Considering the parallel and distributed algorithm of mining algorithm and recommendation algorithm is a special and big topic, so the article does not include the parallel and cloud content of the specific algorithm.

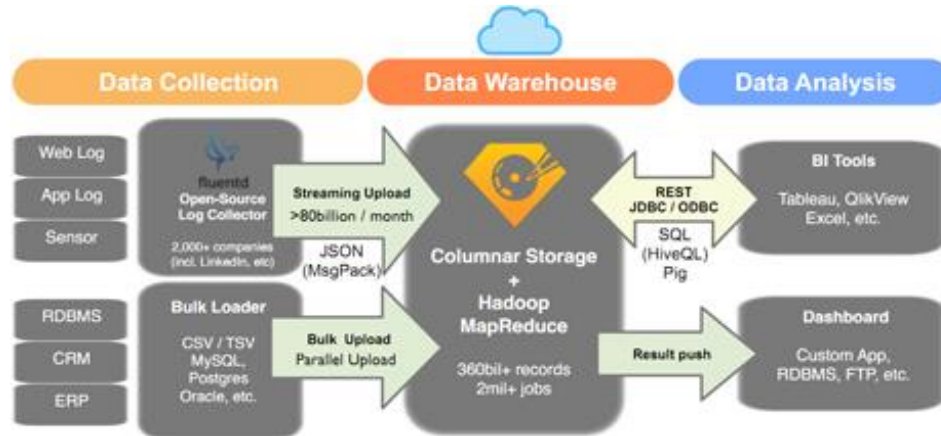


Figure 3. Cloud Based Data Mining Platform Architecture

## 2.2. Collaborative Filtering Algorithm

As can be seen from the algorithm process, the algorithm focuses on how to calculate the similarity between users according to the score matrix. Pearson correlation coefficient is a method used to describe the two vector correlation degree is proposed by Pearson. The greater the value represents the degree of correlation, the smaller the value of the relevant degree is small. Based on the user's CF as an example, the Pearson correlation coefficient calculation user  $u$  and user  $v$  similarity formula is as follows:

$$sim(u, v) = \frac{\sum_{i \in I(u) \cap I(v)} (R_{ui} - \bar{R}_u)(R_{vi} - \bar{R}_v)}{\sqrt{\sum_{i \in I(u) \cap I(v)} (R_{ui} - \bar{R}_u)^2} \sqrt{\sum_{i \in I(u) \cap I(v)} (R_{vi} - \bar{R}_v)^2}}$$

Cosine similarity is often used to calculate the similarity between the text, by calculating the angle between the two vectors to describe the degree of correlation between them. The smaller the included angle is, the more similar the two vectors are, the larger the included angle is. In the score matrix, each line represents the score vector of each user, and the similarity formula is as follows:

$$sim(u, v) = \cos(u, v) = \frac{u \times v}{|u| \times |v|} = \frac{\sum_{i=1}^n R_{ui} R_{vi}}{\sqrt{\sum_{i=1}^n R_{ui}^2} \sqrt{\sum_{i=1}^n R_{vi}^2}}$$

Proposed modified cosine similarity, adding the user's score mean, to effectively reduce the impact of the degree of user rating differences. By modifying the cosine similarity, the similarity formula between the user  $u$  and the user  $v$  is calculated as follows:

$$sim(u, v) = \frac{\sum_{i=1}^n (R_{ui} - \bar{R}_u)(R_{vi} - \bar{R}_v)}{\sqrt{\sum_{i=1}^n (R_{ui} - \bar{R}_u)^2} \sqrt{\sum_{i=1}^n (R_{vi} - \bar{R}_v)^2}}$$

Predict the user i on the project u score, can be calculated by the neighbor user has a rating of the project, the calculation formula is as follows:

$$P(u, i) = \frac{\sum_{v \in K \cap U(i)} sim(u, v) \times R_{vi}}{|\sum_{v \in K \cap U(i)} sim(u, v)|}$$

Add the user's average score, to effectively reduce the impact of the degree of difference in the user's score:

$$P(u, i) = \bar{R}_u + \frac{\sum_{v \in K \cap U(i)} sim(u, v) \times (R_{vi} - \bar{R}_v)}{|\sum_{v \in K \cap U(i)} sim(u, v)|}$$

### 3. Psychological Counseling Ability of Counselors

#### 3.1. Research Object

Through the network data mining, we collect the data from different colleges and universities. This study used the self-made questionnaire "college counselor psychological assistance ability, questionnaire combined with literature review and interview, adding the dimension of" knowledge and skills "design college counselor counseling ability questionnaire. After several exploratory factor analyses, the factors that remove the selected feature value is greater than 1, and a total of 9 factors were extracted. Reliability test showed that the homogeneity reliability coefficient of various factors in the each factor between the 0.6190.702, homogeneity reliability coefficient of the total is 0.963. The data entry and analysis of the questionnaire were conducted by using SPSS16.0 software.

From the Table 1, the current level of psychological counseling of counselors showed a moderate level. Among them, the counselors' psychological counseling knowledge and skills are the lowest, and the problem solving consciousness is relatively high.

**Table 1. Current Situation of Counselors' Psychological Guidance Ability**

Item	Mean	Std.Deviation
T1 situational awareness	4.2656	.63463
T2 problem solving consciousness	4.5385	.44245
T3 observation and diagnosis	4.1694	.51080
T4 problem solving skills	4.4375	.44096
T5 measures program understanding	4.2346	.56919
T6 communication skills	4.3590	.43822
T7 counseling relationship construction	4.4719	.43112
T8 adaptive ability	4.3063	.48333
T9 knowledge and skills	3.9754	.69644
T general situation	3.3077	.34929

### 3.2 The Difference of Counselors' Psychological Counseling Ability

Independent samples t test results are shown in Table 2 shows, male and female counselors only in communication situational consciousness, observation and diagnosis ability, measures understanding ability is very significant difference. In total score and other factors have no significant difference, independent samples t test results are shown in Table 3 shows and participated in the training and did not participate in the Counselor's training in the ability to solve problem and measures understanding ability, the counseling relationship construction, knowledge and skills, as well as scores have significant difference, and in the other factors of no significant difference.

**Table 2. The Gender Difference of Counselor Counseling Ability**

project	male	female	t
Communication scenarios	4.3821±.51403	4.4580 ±.77624	2.007*
Consciousness of problem solving	4.5793 ±.44525	4.4688 ±.43808	.97
Observation and diagnosis	4.2939 ± .45920	3.9722 ±.53538	2.519*
Problem solving ability	4.4817 ±.45204	4.3587 ±.41851	1.096
Awareness of measures	4.3659 ±.50030	4.0104 ±.61890	2.530*
communication skills	4.3821 ±.47470	4.3194 ±.37403	.553
Counseling relationship	4.5073 ±.46925	4.4087 ±.35408	.876
adaptability	4.3400±.53244	4.2500 ±.39232	2.007*
Knowledge and skills	4.0965 ±.62196	3.7754 ±.77786	.97
General situation	3.3733 ±.34061	3.2015 ±.34469	2.519*

**Table 3. Trained Experience Difference of Counselor Counseling Ability**

project	participated in training	not participated in training	T
Communication scenarios	4.3810 +.60068	4.0635 +.66348	1.910
Consciousness of problem solving	4.6071 +.35845	4.4432 +.6234	1.446
Observation and diagnosis	4.2417 +.51605	4.0476 +.49481	1.415
Problem solving ability	4.4817 +.45204	4.3587 +.41851	3.321**
Awareness of measures	4.5655 +.38675	4.2024 +.45152	2.590*
communication skills	4.3631 +.51265	3.9886 +.61469	.283
Counseling relationship	4.3810 +.40706	4.3485 +.48770	2.083*
adaptability	4.5571 +.35210	4.3238 +.53095	1.789
Knowledge and skills	4.3951 +.47008	4.1727 +.47125	2.083*
General situation	3.3912 +.31534	3.1711 +.37278	2.297*

For investigation of counselors with different working years in coaching to whether there is a difference, the single factor analysis of variance (One way ANOVA). The results showed that counselors with different working years in total and communication ability, adaptation ability, the counseling relationship construction, problem solving skills, problem solving, there is significant difference between the consciousness and problem situation awareness capability. Further the "post hoc multiple comparisons" found, in these exist significant differences in dimensions, work for more than five years of counselor psychological assistance ability strong to work for 5 years all counselors; overall with increase of counselors work experience and the psychological counseling ability also gradually improved. In addition, after T experience and analysis of variance, the current college counselor's psychological counseling skills in education, professional, age, title and position of the difference is not significant.

**Table 4. The Difference of Psychological Counseling Ability of the Counselors' Working Experience**

	1-2 year	2-3 year	3-5 year	More than 5 year	F
Factor 1	3.8000 ± 0.87155	4.2222± 0.63551	4.4476±0.737 35	4.8333±0.738 7	5.355 * *
Factor 2	4.26667 ± 0.78912	4.6111 ± 0.85493	4.6250±0.987 85	4.8750±0.176 7	3.025 *
Factor 3	3.9762 ± 0.83838	4.1481 ± 0.65276	4.2059±0.762 51	4.5833±0.117 8	1.143
Factor 4	4.2833 ± 0.61870	4.3056 ± 0.55464	4.4931±0.518 10	4.8750±0.115 4	1.771
Factor 5	3.8500 ±0.7837	4.2500 ± 0.46771	4.3611±0.436 89	4.500±0.8769 3	3.330 *
Factor 6	4.0889 ± 0.52653	4.4074 ± 0.43390	4.4444±0.356 35	4.668±0.6527 6	3.082 *
Factor 7	4.1867 ± 0.46270	4.5111 ± 0.38834	4.5611±0.407 89	4.700±0.5546 4	3.123 *
Factor 8	3.9143 ±0.55464	4.3778± 0.85493	4.42221±0.85 493	4.500±0.4242 2	4.602 * *
Factor 9	3.6556± 0.69427	4.0208 ±0.98576	4.0758±0.608 23	4.167±0.1178 5	1.610
overall	3.0607± 0.43838	3.3005 ± 0.37459	3.3808±0.265 34	3.5673±0.067 99	3.316 *

## 4. Enhance Psychological Counseling Strategies

### 4.1. Enhance the Role Consciousness of the Counselors' Psychological Guidance

Studies have shown that the teacher's role identification will affect them in the education of competence, and the work of their own identity, thus affecting the success or failure of the education work; only on their professional roles are clearly defined and identified, in order to engaged in the educational work for with maximum performance and play. Therefore, as a college instructor is guidance to the healthy growth of college students, guide and bosom friend, coach also plays the role of psychological counseling to students. At present, the age of college counselors is small, and the professional background is single. Generally speaking, it is a professional or similar professional graduates or graduates of Ideological and political education. Many counselors on psychological counseling relatively unfamiliar more do not talk to go up have psychological counseling role consciousness. Therefore, we should pay much attention to

the development and improvement of Counselor's consciousness of psychological counseling. The author thinks, college counselors as psychological counseling consciousness guidance counselor involved in the whole process of psychological counseling, not only pay attention to all the students usually subtle psychological changes, should also actively communicate with students, found problems in a timely manner, and to seek ways to optimally solve the problem. To strengthen the role of counselors as the role of psychological counselors, to enhance the ability of the Counselor's psychological counseling has a positive role.

#### **4.2. The Learning and Training of the Ability of Psychological Counseling**

Research shows that whether in mental health education and training has a significant impact on the counselor counseling ability, training to improve counselor counseling ability has a positive role in promoting. Therefore, we must attach importance to psychological counseling ability training of counselors. In view of the problems of the existing psychological assistance ability training of counselors in Colleges and universities, the lack of such as training, the training content is not comprehensive, training, in view of the problem is not strong, timeliness is not strong and so on, the author thinks that specification of the college counselors psychological assistance ability training system must be established, namely, to establish a college counselor counseling skills training system based on improving. A relatively complete psychological counseling training system should include the following: the training needs of the counselors' psychological counseling ability training needs analysis, the choice of training content, curriculum module design, *etc.* Through the interview of counselors, understand the specific needs of the front-line instructor on psychological counseling, psychological counselors work encountered confusion and on psychological counseling and training requirements and expectations *etc.*, the demand for this type of interview assessment establishment of training content and training methods have important reference value. In the selection of training content, we should strengthen the study of the theory of psychological counseling and psychological counseling skills training. Which requires colleges and universities science industry and trade department the school counselor counseling training, the establishment of the long-term mechanism, organization of the school psychological consultation center of teacher of counselors for psychological counseling basic skills training, only in this way can we counselors psychological counseling may participate in, is also conducive to the counselors master type of psychological problems of students, and enhance their participation in the psychological counseling of self-confidence, stimulate their participation enthusiasm of psychological counseling.

#### **4.3. Strengthen the Counselor's Psychological Counseling Skills**

Strengthen the psychological guidance of counselors. The content of supervision should include three aspects: professional learning supervision, work practice supervision and the supervision of personal psychological health. Through the professional supervision of psychological experts, guidance counselors to conduct psychological theoretical knowledge of learning, regular organizational case analysis research, organize seminars, guidance in the case of personal growth. School psychological consultation center can regularly carry out psychological salon, can not only help the counselors to ease the psychological pressure, to solve their study, work, life in the presence of confusion or psychological problems, improve their psychological endurance ability and self-adjustment ability, but also can make the instructor face to face, equal exchange of work experience, together to discuss the difficulty of psychological counseling work, focus, mutual support, mutual weapon, in order to establish and improve college



counselors' mental health support system. Strengthen the professional practice of psychological counseling for counselors.

From the school level, to increase the training of counselors' psychological counseling ability, as mentioned above, to establish a training system based on improving the psychological counseling skills of counselors. In addition, it should be in the policy, the use of the system, the activities of the funds to give some support. In the selection of the time to close, choose to have a psychological and other related professional personnel engaged in this work, and actively encourage counselors to engage in various psychological education research activities. Improve the rules and regulations, clear psychological counseling in school education in the status and role of the formation of a reasonable organization and supervision measures to ensure the normal development of the work of psychological counseling. From the individual level, ideological and political workers to develop autonomous learning habits, and constantly sum up and reflect on the psychological laws of students.

## 5. Conclusion

Overall, the current college counselors' psychological counseling ability showed a moderate level of deviation. Among them, the counselors' psychological counseling knowledge and skills are the lowest, and the problem solving consciousness is relatively high. Visible, with more emphasis on psychological problems to carry out the work of mental health education in Colleges and universities and colleges and universities, most of the counselors to student's psychology is very concerned about the issue, solve the psychological problems of students' awareness of strong and urgent, but the psychological counseling knowledge and skills is very lack, which will affect the counselors' better to carry out psychological counseling. There were no significant differences in the total score and other factors between male and female counselors on the gender difference. Visible, male and female counselors in counseling capacity difference are very small, indicating that both men and women can be competent for the job, because there is no obvious difference in the other seven factors. Of course, we should also see although overall there was no significant difference, but in communication situational awareness, women are superior to men, and in the observation and diagnosis ability, the measure plan understanding ability in males than in females perform better. This may be related to the characteristics of male and female. Women in psychological counseling have a unique advantage, the mind is delicate, good at expression and communication, this is very meaningful to solve the psychological problems of students. The male counselors thinking carefully, strong logical thinking, well at diagnosis, the problem has a unique opinion, therefore, in the observation and diagnosis and the ability to understand the program is better than the female counselor. In training experience and trained counselors general psychological counseling ability and solve problem ability, measures cognitive ability and relationship counseling construction aspects were significantly higher than did not participate in the training of instructors. With the lasting development and in-depth development of school psychological health education and universities pay more attention to the counselor counseling skills training, some colleges and universities have begun to regularly to the instructor related to training, the training in different degree to improve the Counselor's basic physical theory, professional knowledge and skill level, to lift a counselor psychological counseling skills played a positive role in promoting. Obviously, training is a very effective way to improve the ability of College Counselors' psychological counseling, and it should be promoted and applied.

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