

Construction of Psychological Crisis Prevention Mechanism Based on Association Rule Mining Algorithm

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Abstract: the Psychological Crisis of Students is an Important and Urgent Topic in the School Mental Health Education. the Psychological Crisis of College Students Not Only Directly Affects the Physical and Mental Health of Individual College Students, But Also Plays a Very Important Role in the Stability of the Whole School. the Formation of College Students' Psychological Crisis Has Its Own, Family, School, Society and Other Reasons. Therefore, We Should Strengthen the Cultivation of College Students' Psychological Quality and Take Effective Measures to Construct the Prevention and Intervention System of College Students' Psychological Crisis. Association Rule Mining is to Mine Valuable Knowledge Describing the Correlation between Data Items from a Large Amount of Data. for Large Databases, There Are Problems Such as Too Long Execution Time of Algorithms. Apriori Algorithm is Analyzed and Discussed, and an Effective Association Rule Mining Algorithm Based on Apriori Algorithm is Proposed. Finally, the Algorithm is Applied to the Evaluation Data of College Students' Mental Health, So That Relevant Functional Departments Can Effectively Formulate the Intervention Plan of College Students' Mental Crisis and Reduce or Eliminate the Crisis.

1. Introduction

Crisis is a State of Disintegration Caused by Events or Circumstances Beyond People's Resources and Coping Ability, Which Individuals Cannot Cope with. If the Crisis is Not Relieved in Time, It Will Lead to the Dysfunction of Individual Behavior, Emotion and Cognition [1]. Mental Health, as an Efficient, Satisfactory and Continuous Mental State, is the Integrity and Coordination of the Subject's Cognition, Emotion, Will, Behavior and Personality, and Can Effectively Promote and Realize the Individual's Own Development. the Development of Modern Society Requires College Students Not Only to Have a Solid Professional Foundation, But Also to Have a Healthy Personality. the Psychological Crisis of College Students Will Seriously Affect the Future Development of College Students. in the Process of Striving for "Upward Mobility", People Tend to Attach More Importance to Benefits Than Righteousness and Lack Social Responsibility, Which Has Become a Rapidly Spreading Common Social Psychology [2]. Recently, Some People Proposed to Introduce the Concept of Ontology into the Mining Field, Thus Promoting the Research Progress of Hierarchical Association Rules [3]. Ontology-Based Association Rule Mining Supports Domain Classification and Generates Semantic Rules between Levels, Which Improves the Practical Significance of Mining and the Satisfaction of Users with the Results. It is Imperative to Use Association Rule Mining Algorithm to Mine the Psychological Data of Growing College Students.

2. Association Rule

2.1 Association Rule Concept

Association rules set two constraints, minimum support and minimum credibility. Support for rules refers to the proportion of tuples supporting $X \cup Y$ in the database to all tuples; Given transaction database D and ontology description T , find out all association rules with support and

confidence greater than or equal to minimum support Ins and minimum confidence mc , that is, find out all strong association rules in D with the concept information provided by ontology as support. Credibility refers to the proportion of tuples supporting Y in tuples supporting X [4]. The minimum support degree and the minimum confidence degree are the two thresholds explained by the user. Mining association rules is to discover all the rules in the database where the support degree and the confidence degree are greater than the minimum support degree and the minimum confidence degree. When the user is not satisfied with the mining result, the support degree and the confidence degree thresholds need to be reset, thus repeating the above mining process, so the algorithm efficiency is not high. And these rules are not all interesting or useful to users [5]. Rules with confidence not lower than the minimum confidence specified by the user are constructed from the obtained frequent sets. The key to mining association rules is to calculate frequent sets, and frequent itemsets are all itemsets with support above the minimum support value set by the user.

2.2 Association Rule Definition

In 1993, R. Agrawal et al. first proposed the concept of association rules. its general definition is as follows: $I = \{I_1, I_2, \dots, I_m\}$ is a set of items, d is a transaction database, where each transaction $T \in I$. each transaction has an identifier, called TID. if there is $x \in T$ for a subset x in I , we say that a transaction t contains x . Let x and y be a subset of I , and the association rule is an implication form like $X \Rightarrow Y$, where $X \in I$, $Y \in I$, and $x \in y = \varphi$. If the proportion called by $A \cup B$ in D is S , then the support degree of association rule $A \Rightarrow B$ in D is S , which can also be expressed as probability $P(A \cup B)$; If the ratio of a to c in d is c , then the confidence of association rule $A \Rightarrow B$ is c , which is expressed as conditional probability $P(B|A)$. that is:

$$Support(A \Rightarrow B) = P(A \cup B)$$

$$Confidence(A \Rightarrow B) = P(A|B)$$

3. Apriori Algorithm

Apriori algorithm is one of the most influential algorithms for mining frequent itemsets of association rules. It uses a priori knowledge of the nature of frequent itemsets, and uses an iterative method called layer-by-layer search, k - itemsets, to search for $(k+1)$ itemsets. Therefore, ontology-based mining can provide users with more valuable information, and may even find more useful rules [6]. It attempts to find k clusters that meet a particular criterion, usually using the standard of squared difference. The time complexity of the K-means algorithm is $O(nkt)$, where n is the total number of data, k is the number of clusters, and t is the number of times the algorithm loops, usually $k, t < n$, so the efficiency of the algorithm is higher. All non-empty subsets of frequent itemsets must also be frequent itemsets. Using Apriori property to find frequent itemsets is divided into two processes: connecting step: to find L_k , through L_{k-1} . Connect with yourself to generate a set of candidate k - itemsets, and record it as C_k . Pruning step: C_k is a superset of L_k ; Its members may contain infrequent items. Scan the database to determine the count of each candidate in C_k , thereby determining L_k . In contrast, the push method is a better method to solve user participation [7]. However, how to make use of the nature of constraints to make the frequent itemsets generated are the itemsets satisfying the constraints. This requires different implementation methods according to the properties of different constraint types. The whole database needs to be scanned repeatedly for pattern matching of candidate itemsets, which is very expensive. The algorithm is not sensitive to new items.

The Apriori algorithm obtains the largest item set and deletes it, thus obtaining the K -dimensional frequent item set. The elements participating in the combination are processed, and some elements that do not conform to the combination are decided to be excluded according to the processing result. This reduces the possibility of combination and the number of cycles, thus improving the efficiency of mining. The algorithm is as follows:

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L1 = {Larg el -int emsets};
C1 = database D;
For(k = 2; Lk - 1 ≠ F; k++) do begin
Ck = con_apriori(Lk - 1; min sup) // Combine projects {for each int er
If (Ii = Ij)
Then c = Ii ∪ Ij;
C insert into Ck
End if }

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The traditional association analysis Apriori algorithm will encounter the so-called “bottleneck of item set generation” when it is applied, that is, the efficiency of the algorithm will be drastically reduced due to too many generated item set options. Apriori algorithm effectively uses this property to narrow the search scope and improve the efficiency. Similarly, for other anti-monotone constraints, the nature of frequent constraints can also be used to prune [8]. According to the value of the clustering center, each object is reassigned to the most similar one; Updating the clustering center means recalculating the average value of objects in each family and using the average point as the new clustering center. In addition, in a data warehouse with a large amount of data, the results obtained by ontology mining are association rules with strong generality, high confidence and a small number, which is helpful to avoid the appearance of a large number of complicated mining results. At the same time, too many candidate sets may generate a large number of rules. How to select useful rules from them becomes another problem. There are two main reasons for generating too many candidate sets: (1) The capacity of the database being mined is large; (2) The threshold of support selected by the user is too small. For simple constraints, the inverse monotonic constraint is reversible with the monotonic constraint, that is, it is not a monotonic constraint or an inverse monotonic constraint. It describes in detail a method to achieve monotonic constraints, the main idea is to transform the monotonic constraint into a negative anti-monotone, find the opposite boundary, and then generate a monotonic basic item set.

4. The Construction of College Students' Psychological Crisis Prevention Mechanism Based on Apriori Algorithm

The occurrence of college students' psychological crisis events is often caused by the accumulation of various factors and the induction of a certain event. Before a psychological crisis occurs, individuals will have subtle changes in their emotions, words, behaviors and bodies, and even send out distress signals. Therefore, when a situational crisis occurs, it is not only to deal with the accident itself, but also more important and complicated to provide emotional and psychological help to the parties concerned. To prevent the psychological crisis of college students; In other words, the possibility of college students' psychological crisis can be reduced through the psychological crisis prediction system and prior intervention mechanism, so as to ensure the healthy development of college students' psychology. In this study, psychological evaluation data of a university for four years are extracted for testing and analysis. In the process of mining, we can analyze the psychological evaluation data of all students, and we can also mine the association rules by grade, department and specialty. Apriori algorithm is used to mine the psychological data of all students in school. The results of mining association rules between nine-dimensional psychological symptoms are shown in Table 1, and the results of mining association rules between attributes and obsessive symptoms are shown in Table 2.

Table 1 Association Rules Between Dimensions of Nine-Dimensional Psychological Symptoms (Part)

Serial number	Association rule	Support	Confidence level
1	Anxiety, hostility→Forced	0.21	0.94
2	Anxiety, psychosis→Depression	0.24	0.84
3	Terror, interpersonal relationships → Depression	0.31	0.95
4	No coercion, no bigotry→No somatization	0.33	0.88

Table 2 Association Rules Between Attributes and Obsessive-Compulsive Symptoms (Part)

Serial number	Association rule	Support	Confidence level
1	Student cadres, female→No coercion	0.06	0.45
2	Only child, rural→No coercion	0.09	0.42
3	High income, female→Forced	0.14	0.66
4	Student cadres, low income→No coercion	0.03	0.57

Through the mining results, we can see that there is a certain potential relationship between psychological dimensions. For example, for a high proportion of college students suffering from obsessive-compulsive symptoms, there is a high possibility of accompanied by anxiety, depression, interpersonal sensitivity, paranoia and other symptoms. We should establish a corresponding pre-crisis prevention and education mechanism to ensure the healthy development of college students' mental health. At the same time, we should early warn the occurrence of college students' mental crisis and take corresponding pre-intervention mechanisms, including mental health education mechanism, psychological crisis early warning mechanism and psychological crisis pre-intervention mechanism. The parties concerned are in a state of psychological or emotional imbalance and can adopt a balanced intervention mode to help individuals regain their pre-crisis balance. The possibility of symptoms such as terror and psychosis is is very high. There is a high possibility that the students with paranoid symptoms in the computer department are accompanied by depression, anxiety, psychosis and other symptoms. The focus of psychosocial transition mode intervention is to measure the internal and external difficulties related to the crisis, and to help the parties to choose new behaviors, attitudes and environmental resources in combination with personal coping styles, social support and environmental resources, so as to enable them to acquire the ability of independent control. Therefore, it is an important prerequisite for effective intervention of college students' psychological crisis to accurately judge the signals and severity of college students' psychological crisis.

A very important step in the crisis intervention mechanism is post-intervention, which includes psychotherapy and psychological counseling. If the mental condition of the parties is serious, they need psychiatric treatment. Although the support level among the students tested is not high, they have a high degree of confidence. Obviously, the harm caused to children by single-parent families due to maladjustment of parent-child relationship is affirmative. Effectively prevent the expansion of college students' psychological crisis effect and ensure the healthy development of college students' psychology, mainly including the rapid linkage of crisis emergency mechanism, psychological crisis intervention mechanism and psychological crisis treatment mechanism, etc. Post-crisis follow-up treatment and consultation are mainly conducted by psychiatrists and psychological counselors to help the parties recover their pre-traumatic cognitive, emotional and behavioral functions and reduce long-term psychological risks in the future. Compared with students in rural areas, students living in large and medium-sized cities have more pressure on their study and life due to their parents' different educational concepts, and the symptoms of compulsion are more obvious. The students who have served as student cadres have rich social experience and handle interpersonal relationships well. In the daily psychological crisis management, we should keep a high degree of vigilance against the abnormal changes, psychological or physical defects, life events, family clues, and cognition of suicide of college students, and carefully study and judge the severity and risk level of the crisis, which will help to prevent and intervene the psychological

crisis or suicide of college students.

When establishing the crisis response mechanism in schools, we should first emphasize the preventive role of education and publicity, carry out various forms of publicity and education, and set up psychological education courses and lectures in schools according to the age and psychological development of students. Students from rural areas, influenced by material conditions, living environment and information, have higher confidence in obsessive-compulsive symptoms. Because many places are still backward in thinking that men are more important than women, the proportion of girls suffering from obsessive-compulsive symptoms is much higher than that of boys. Children from one-child families have developed the habit of taking themselves as the center because of their superior living environment since childhood. This will easily lead children to fall into the psychology of absolute self and narrow self, which is unhealthy and easily leads to psychological crisis. The proportion of students suffering from nine-dimensional psychological symptoms such as somatization, depression and compulsion has generally decreased due to the fact that the psychological counseling center for college students has been preventing the psychological crisis of students by strengthening the construction of teaching staff, carrying out special mental health education activities and offering a series of school-level elective courses on mental health for a long time. So that they can deal with losses in a healthy and appropriate way and end the impact of the crisis on them. Therefore, it is very important to require the parties to receive psychological counseling after handling the crisis.

5. Conclusion

College students should have not only a solid professional foundation, but also a healthy personality. The psychological crisis of college students will seriously affect their future development. In the school mental health education system, a mechanism should be formed to prevent and intervene students' psychological crisis, and a working system for psychological crisis intervention should be established to make crisis intervention scientific and operational. Association rule mining algorithms can be roughly divided into two categories: incremental update algorithm based on Apri-ori algorithm and incremental update algorithm based on FP-tree. This paper discusses the basic idea, advantages and disadvantages of Apriori algorithm, an association rule algorithm based on Apriori algorithm, and puts forward an improved algorithm aiming at the deficiency of the algorithm. Then, by processing the scanning frequency of elements and excluding some elements that do not conform to the combination, a new set of frequent items is formed, which reduces the number of cycles, thus improving the efficiency of mining. Apriori algorithm is applied to the psychological health evaluation data of college students, thus helping the school psychological counseling personnel to prevent and channel the psychological crisis of college students and promoting the further smooth development of the school psychological health education.

References

- [1] Wang, Yumeng., Ma, Hanpeng., Yao, Rongrong. (2019). Analysis on the construction of dual prevention mechanism in coal mines. *Inner Mongolia Coal Economy*, no. 6, pp. 108-109.
- [2] Xu Jingjing. Research on the Construction Mechanism of College Students' Mental Health Problem Prevention System. *Journal of Shandong Agricultural Engineering College*, vol. 2, pp. 100-101.
- [3] Tao, Lin. (2017). Construction of mechanism for prevention and resolution of grass-roots social conflicts from the perspective of social governance innovation. Copied newspaper materials: public management and policy review, no. 4, pp. 11-20.
- [4] Zhang, Chang. (2018). Management Theory Analysis of Enterprises Building Dual Preventive Mechanism. *China Business Theory*, no. 2, pp. 104-105.

- [5] Wang, L., Li, S.L., Xu, P.P., et al. (2018). Temporal association rules mining algorithm based on frequent item sets tree. *Kongzhi yu Juece/Control and Decision*, vol. 33, no. 4, pp. 591-599.
- [6] Li, Q., Zhang, Y., Kang, H., et al. (2017). Mining association rules between stroke risk factors based on the Apriori algorithm. *Technology and health care: official journal of the European Society for Engineering and Medicine*, vol. 25, no. S1, pp. 1-9.
- [7] Zhang, Z., Pedrycz, W., Huang, J. (2017). Efficient Mining Product-Based Fuzzy Association Rules through Central Limit Theorem. *Applied Soft Computing*, vol. 63, pp. 235-248.
- [8] Li, M. (2018). Investigation on application of association rule algorithm in English teaching logistics information. *Cluster Computing*, no. 4, pp. 1-7.