Design and Application Analysis of College Students' Psychological Early Warning System based on Mining Algorithm

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ABSTRACT

The development of a psychological management system for university students has already been an important tool for monitoring and preventing the psychological crisis of college students. A large amount of data is stored in the student administration database of the University, but the data processing is simple statistics, memory, and inquiry. In this paper, the application of the big data technology in the present psychological management system is described. This can enlarge the investigation and selection index of the psychological crisis, realize the dynamic control of the psychological alarm data, and monitor the psychological situation of the high risk group in real time, and it can raise the early identification and the alarm accuracy and the effectiveness of the psychology crisis of the student.

Keyword: *Big data technology; College Students' psychology; Psychological warning; Dynamic management*

1. INTRODUCTION

With the rapid development of science and technology, we have entered the era of people's Congress data. Now the daily data records are more than the historical data records of human beings, and the data usage has developed from GB (9th power of 10) to TB (12th power of 10). Facing the complex semi-structured or unstructured data resources, the traditional data storage, analysis and processing technology is difficult to complete, resulting in the concept of big data, Data mining and data applications on big data have already become the topic of information science. This is the focus of expert attention in this field.

In recent years, some of the world's top scientific and technical periodicals have set up the big data technology application column and began discussing the application of big data technology in each science and technology city. In the field of psychology, many psychologists have begun to collect and process various data using various big data platforms for relevant research. Currently, the student management system is not only enough to use these data, such as simple statistics, memory, backups, and retrieval, for the objective record of the student's psychological health index; Database and data mining technology provide the space and resources for the prevention and development of psychological crises for college students.

Facing the changes of social life and the pressure and setbacks in learning and communication, some college students have successfully resolved their depression through various ways and quickly presented a positive mental outlook; However, a considerable number of college students are sinking deeper and deeper in the quagmire, and even go to extremes. When college students encounter problems, they are willing to talk to the people they trust in order to alleviate the psychological pressure, which makes it possible to take precautions. The college students' psychological crisis early warning system is based on this foundation.

This paper consists of the following parts. The first part introduces the relevant background and significance of this paper, the second part is the related work of this paper, and the third part is an overview of data mining algorithms. The fourth part is the establishment of psychological crisis prevention system based on data mining. The fifth part is conclusion.

2. RELATED WORK

Chun'an et. al take the risk control theory as the theoretical guidance and the college of tourism of Huaqiao University as the pilot[1]. A novel hybrid air quality early-

warning system for pollution contaminant monitoring and analysis was proposed[2]. Patriarca et. al present an alternative methodological framework for the development of leading indicators[3]. In recent years, scholars have made more and more achievements of College Students' psychological crisis early warning index system, including the theoretical basis, content and construction methods of the early warning index system[4]. Dablander et. al (a) review limitations of early warning signals based on critical slowing down to better understand when they can and cannot occur, and (b) study the conditions under which early warning signals may anticipate critical transitions in online-monitoring settings by simulating from a bistable dynamical system, varying crucial features such as sampling frequency, noise intensity, and speed of approaching the tipping point[5]. This system provides a new way for doctors to monitor patients with mental illness, which but further study and training is needed to establish an effective model[6]. Based on a combination of qualitative and quantitative analysis, Liu et. al conduct a series of studies on three typical types of network public opinions, i.e., Internet rumors, online public opinions of college students, and emergent public health incidents in terms of the transmission mechanism, early warning, and decision-making mechanism, as well as the evolution mechanism of the network public opinion[7]. To improve the accuracy of stress detection and stress warning errors, Li designed a new psychological stress detection and warning system based on wireless network transmission[8]. Zhao et. al present an in-depth analysis and research on the identification of psychological crisis signals of college students using the optimized Dufferin equation[9]. Sun et. al provided a solution of physiological data collection and early warning system for the elderly living alone based on Internet of Things technology[10]. The psychological crisis warning system for university students is to prevent the psychological crisis of university students through joint efforts by college students., schools, families and society. Its function is to timely monitor the operation and development of relevant individuals, predict their development trend according to the analysis and research of early warning objects, early warning indicators and early warning information, and timely find and identify potential or actual crisis factors, so as to take preventive measures, limit or eliminate crisis behaviors, and reduce and reduce emergencies induced by psychological crisis, Minimize the profits and losses caused by the crisis.

2.1 Definition of data mining

Data mining is also known as knowledge discovery in a database and is an automatic or convenient model extrac-

tion. This model indicates hidden knowledge in large databases, data warehouses, or other large amount of information storage. Data mining is the process of extracting hidden, potentially useful information and knowledge of people hidden from mass, incomplete, noise, blurred, and actual application data that is not manipulated. Data mining is an advanced processing process to represent knowledge in the identification and use model of data sets. Advanced processing refers to the process of interacting with a plurality of stages and repeating the adjustment to form a spiral rise process. The task of data mining is to discover knowledge from large amounts of data. Knowledge is the result or crystal of human perception, including experience knowledge and theory knowledge. From the engineering point of view, knowledge is useful for the formatting and reuse of problems. In a conventional decision support system, knowledge based knowledge and rules are established when an expert or programmer inputs from outside. The task of data mining is to discover knowledge not found in large amounts of data. This is how the system automatically acquires knowledge. The information that the decision-maker understands can be obtained directly using queries, data mining, and online analysis processing (OLAP) or data mining tools, such as "list the sales of each subsidiary in the last month". In addition, some relationships and trends hidden in a large amount of data, even the experts who manage these data are not able to find them, and these information may be crucial for decision-making. The purpose of data mining is to solve such problems.

Knowledge discovered by data mining is generally expressed as follows. Concept, rule, rule, mode, constraint, visualization, etc. These knowledge can be provided directly to the decision makers and can assist in the decision-making process. Existing knowledge systems can be modified to experts in related fields. You can also migrate new knowledge, such as professional systems, rule libraries, to the knowledge storage organization of the application system.

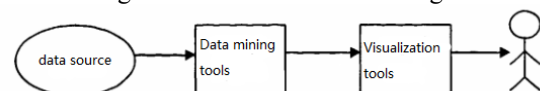A data mining environment is shown in Fig. 1.

Figure 1 Data mining environment graph

Data mining is the process of creating models in large amounts of data using different analytical methods and tools to discover relationships between data. This model and the relationship can be used for decision and prediction.

2.2 Data mining function

Data mining functions specify the type of model to be found in the data mining task. Data mining tasks are divided into two description and prediction. Descriptive mining tasks describe the general characteristics of data in a database. The predictive mining task infers from the current data to predict. Data mining makes positive and knowledge-based decisions by predicting future trends and behaviors. The purpose of data mining is to discover meaningful knowledge hidden in the database (also referred to as a model). The main functions of data mining include classification, prediction, association analysis, and classification analysis.

2.3 Data mining process

As a subject, data mining is not a simple set of independent tools, but a process of carefully planning and deciding which method is the most useful, promising and enlightening. For the same data, if someone uses some methods and tools to analyze and process one aspect of the data, he will get some results; While other people use another method and tool to process data from another aspect, they may get different results. Therefore, in reality, data mining is a process of repeated screening and optimization. The process of data mining is shown in Figure 2
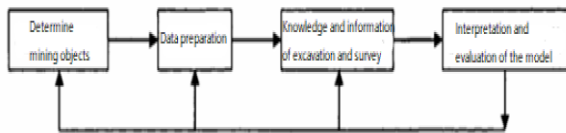

Figure 2 Data mining process diagram

3. AN OVERVIEW OF DATA MINING ALGORITHMS

3.1 Classification algorithm based on decision tree

A decision tree algorithm is an instance based inductive classification algorithm. This algorithm can construct a decision tree model for a given dataset and extract intuitive and comprehensible classification rules. The top-down recursive classification based on decision tree algorithm firstly classifies each attribute value of the classification measure data set and selects the root node. Secondly, from nodes to branches, the data set is divided into different data subsets according to different measurement attribute ranges; Then the data is partitioned recursively to all subsets belonging to the same category, and the scanning is stopped. Finally, the leaf node at the end is established.

3.2 classification algorithm based on Artificial Intelligence

The inspiration of artificial neural networks comes from biology. Artificial neural network is used to simulate the process of brain nerve source processing. The best way is that it can automatically match input data and output data through training method. The learning process does not need to be controlled, as long as the training parameters are adjusted. This provides a very useful means for our modeling.

3.3 network algorithm based on pattern recognition

Bayesian model classification is based on Bayesian formula, which calculates the posterior probability according to the prior probability of an object. In 1994, Michie et al. Compared naive Bayesian classification with decision tree algorithm and neural network algorithm, and found that the performance of Bayesian algorithm and other algorithms is equivalent in most cases, and it will be better than other algorithms in some conditions.

4. THE ESTABLISHMENT OF PSYCHOLOGICAL CRISIS PREVENTION SYSTEM BASED ON DATA MINING

Based on the above mining algorithm, the structure of the psychological risk alarm system based on three data mining methods is shown in Fig. 3. The system is divided into three layers: the data layer, the data mining layer, and the user interface. The data layer mainly stores student psychological test data. Process the original data to get the target data mining set. Data mining layers are used to mining target datasets. The user interface layer can see data mining results, mining evaluation condition analysis, and rule knowledge. As shown in Figure 3.
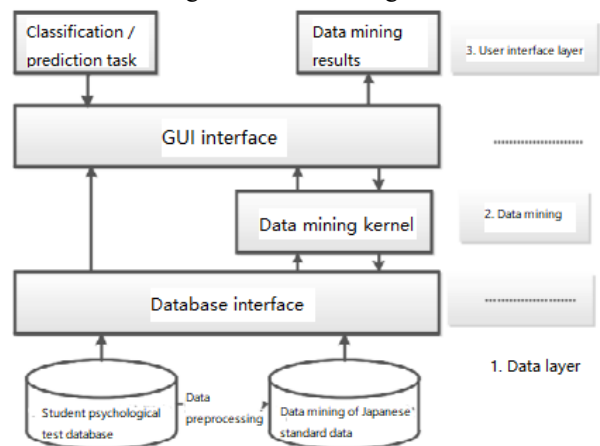

Figure 3 Structure chart of psychological crisis prevention system based on several data mining algorithms

1. Alarm method. The main way of warning is: (1) individual students (crisis individuals) actively report problems to the school psychological counseling center through self-evaluation and self-examination, school or independent evaluation problems, or cooperate with relevant social institutions to jointly evaluate problems. (2) individual students (crisis individuals) actively report problems to family members through self-evaluation and self-examination. Family members either seek help from school or relevant social institutions to analyze problems in time. (3) Through self-evaluation and self-examination, individual students (crisis individuals) take the initiative to reflect to relevant social institutions, or independently evaluate information, or cooperate with schools to jointly evaluate problem information. (4) Through the early warning network established by the school, students' peers, students' psychological associations or teachers introduce students (crisis individuals) to the psychological counseling center; Or the school will conduct a general survey of mental health through the scale test, establish a psychological file, understand the psychological status of students, accurately and quickly find the objects with high-risk psychological status through investigation, regularly analyze, focus on tracking and focus on help, and make an appointment to the psychological counseling center when necessary. In this process, the school may evaluate the problem independently or cooperate with relevant social institutions to jointly evaluate the problem information.

2. Early warning object. The early warning objects of college students can be divided into group objects and individual objects. The group objects include freshmen, poor students, excellent students, graduates, female college students, etc; Individual object refers to an unspecified individual with certain personality characteristics, family upbringing environment and abnormal behavior. The adaptation of freshmen, the inferiority complex of poor students, the collision between the expectations of excellent students and reality, the difficult problem of graduates' job selection, the self-development of female college students and the pressure of social traditional ideas make these groups more prone to bad psychology such as anxiety, worry, inferiority complex, pain, jealousy, disappointment and rebellion. In addition, we should also pay close attention to some students with poor family upbringing, individual personality characterized by depression, introversion and introspection, special way of thinking, unstable emotion and emotion, impulsive behavior and abnormal behavior. The following figure 4 shows the evaluation process of alert objects.
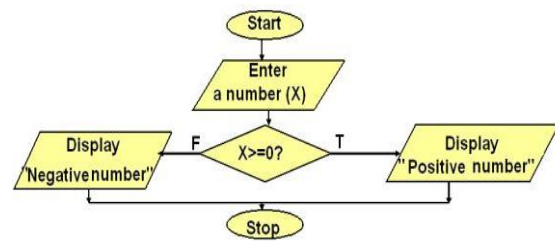

Figure 4 Early warning object evaluation process

3. Alarm indicator system. The alarm index establishes an alarm index system with monitoring function based on the situation of the alarm object (case and individual), and analyzes and cares the causal relation between the alarm object and the development of the crisis form through the alarm index and some theory and experience, so as to carry out early crisis prediction. The early warning indicators that can be selected include: (1) individual development status indicators, including learning habits, learning skills and methods, learning interest and achievement; Individual personality and temperament characteristics; Job hunting mentality, confidence in further study, individual coping style to setbacks, adaptability to society, etc. (2) Negative emotional indicators, such as depression, anxiety, boredom, emptiness, pain, etc. (3) interpersonal relationship indicators. The interpersonal relationship of college students includes two aspects: interpersonal relationship and interpersonal communication. Correspondingly, the interpersonal relationship indicators of college students also involve two types. One is whether the relationship between college students and others around them is harmonious or tense. The other is whether there are communication adaptation or communication obstacles for college students to communicate with others around them in their daily life.

5. CONCLUSION

It has an important practical value to study the application of large data technology to psychological crisis alerts and suicide prevention strategies for college students. Using the rapid, predictable, accurate, and practical application value of the big data technology, you can quickly and accurately determine the state and extent of the crisis, effectively establish a crisis plan, and reduce or eliminate the crisis. Provides a reference to the development of future big data application technologies.

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