[1]MingJing Zhang

Students' Mental Health Data and Construction of Feedback System Based on Ordered Variable Regression Model

Journal of Electrical Systems

Abstract: - with the continuous rise of people's living standards, more and more researchers begin to pay attention to the mental health problems of teenagers. We not only need to care about students' all-round development, but also pay attention to students' mental health development. At present, the detection and analysis of students' mental health data in most colleges and universities are in the basic stage, and there are many difficulties in data analysis and result feedback. Based on the above situation, this paper proposes to use the ordered variable regression model to analyze and construct the students' mental health data. Ordinal variable regression model can reasonably explain and predict psychological phenomena. Firstly, the parameter inspection method is used to judge the influencing factors, and then the screening function is used to classify and check the overall data. Finally, the data fusion algorithm is used to optimize the feedback function of students' mental health evaluation. The results show that the optimized regression model can solve the error of data feedback and improve the effect of data evaluation. It can accurately judge students' mental health status and provide effective services for colleges and universities to deal with students' mental health problems. Under the condition of large amount of data, the ordered variable regression model can also accurately deal with the prediction task and explain the factors affecting the changes of students' mental health.

Keywords: ordered variable; Regression model; mental health; Data analysis; Data fusion

1.INTRODUCTION

With the continuous development of society, many college students have a variety of mental health problems. Educational researchers also pay more and more attention to the changes of students' physical and mental health (Li Wenting et al. 2021) [1]. Most colleges and universities have many difficulties that are difficult to solve in the analysis of mental health data and the construction of feedback system, which are basically reflected in the influence of social factors and the influence of family environment on psychological changes (Yang Tingting et al. 2021) [2]. At present, in the process of processing students' mental health data, data analysis is complex, feedback efficiency is poor, relevance cannot be formed, privacy protection is poor, etc. (Gao jiemeng et al. 2021) [3]. Therefore, we need to explore how to effectively monitor the changes of students' mental health data in the big data environment, obtain the diversity information among different students, and get the real feedback results (Zhu Chuanjie et al. 2021) [4]. In the era of rapid development of big data, the huge amount of information data provides strong resource support for schools to participate in data analysis. As many scholars in social research still pay little attention to mental health problems, the development of mental health education in schools is also in the basic stage (Yang Mei et al. 2021) [5]. Each student is an independent individual, and personalized performance leads to unique psychological characteristics (Dong Bei et al. 2021) [6]. Most of the teachers have prejudice and stereotype on the mental health problems in Colleges and universities, which leads

[1] College of Teacher Education, PingDingShan University, PingDingShan city ,Henan province 467000

Correspondence author to MingJing Zhang,Email:mingjingyydns@126.com

to low attention to the mental health problems of students. Mental health problems, like physical health, will also have defects and changes. We need to correctly understand and treat it. If there is any deviation, we need to treat and improve it in time (Zhang Fang et al. 2021) [7].

Students' mental health will be affected by various factors, the most important of which is the influence of school and family (Zhang Di et al. 2021) [8]. The social environment will also change students' cognition in different ranges. Therefore, the normal reaction of students in daily life can be used as the basis for us to analyze their physical and mental changes (Zhan Genxi et al. 2021) [9]. At present, the acquisition of students' mental health data in Colleges and universities is still in the scope of students themselves, which is less representative and not comprehensive. In psychological data analysis, it can not be used as effective and accurate data. The storage of mental health data is also weak, and most schools have poor awareness of students' psychological changes and privacy (Tang Ning et al. 2021) [10]. Therefore, we also need to pay attention to the privacy and confidentiality of data. Based on the above situation, we mainly explore the role of ordinal variable regression model in mental health data analysis. Ordinal variable algorithm often appears in data processing. Regression model can analyze the psychological changes under various modes. And explain and predict various psychological states of students (Zhang Lin et al. 2021) [11].

This paper is mainly divided into three parts. The first part is to understand the current situation of students' mental health data analysis and the construction of feedback system, and briefly describe the background of using ordered variable regression model in various countries. The second part first studies the role of ordered variable regression model in the analysis of students' mental health data, and finally uses data fusion algorithm to analyze students' mental data, so as to provide data support for the feedback mechanism of subsequent regression models. The third part analyzes the results of the research on the application of ordinal variable regression model in the analysis of students' mental health data and the construction of data fusion feedback mechanism.

2.RELATED WORK

In the big data environment, the analysis of students' mental health data needs huge information support. Detection technology is only a means of auxiliary teaching. We not only need to pay attention to the development of technology, but also make students aware of the important role of mental health. Provide students with correct and effective data information, and use data analysis, data fusion and data feedback to help students correctly understand their own situation (Liang Chunlong et al. 2021) [12]. The nature of College Students' mental health is in the puberty stage. At this stage, they will face related problems such as entrance examination, love, family environment and so on. Students' mental health is characterized by more pressure than social personnel. Among these pressures, the more serious changes affecting students' mental health are misunderstanding and academic achievement. In the learning stage of teenagers, the interpersonal relationship is also more complex. Most students will pay more attention to whether they are close to their teachers and peers. Therefore, intimacy and achievement will cause psychological anxiety to students. Before analyzing the students' mental health data, we need to combine the different differences and actual situation of each student, establish the regression model of ordered variables, process the data, and form a scientific data fusion feedback

system.

In addition to applying ordinal variable regression model in data analysis, the United States also uses this technology as the basis for model construction in community resident evaluation system (Xu Peng et al. 2015) [13]. Through the regional division of each community, the sampling survey data are obtained, and the evaluation and feeling feedback of community residents on the improvement are collected to form an automatic resident satisfaction system. Using the ordinal variable regression model to analyze the proportional difference of the data, and find out the specific factors affecting the change of community residents' evaluation index.

British scholars first pay attention to the role of regression analysis and can conduct multivariate analysis in major research fields (Zhang Yunhua et al. 2015) [14]. Ordinal variable regression model can play the function of prediction and analysis in sports sociology. Through the quantitative analysis of data, improve the accuracy of sports social development trend prediction, and obtain the feedback data of influencing factors by regression analysis. This technology achieves the purpose of improving the accuracy and applicability of the prediction model.

Germany has found that a large number of people are unemployed in the process of social development, and these unemployed people have different levels of education and cognition of their children (Wang Dan et al. 2021) [15]. They used the ordinal variable regression model to study and analyze the influencing factors of unemployed people's cognition of children's education. It is found that the emphasis on children's education has a political and economic impact. Most of the unemployed pay more attention to their children's education, but limited by economic factors, the general success rate is not high.

In the face of consumer psychological changes, China has applied the ordered variable regression model. They build the consumer psychological prediction model according to the influencing variables that often appear in the social economy, such as customer satisfaction, product consumption grade, consumption impulse and other factors. This paper studies the relationship between consumption psychology and ordered variables, and explores the development trend of group consumption psychology. Based on the above situation, in the student mental health data analysis and feedback system, this paper also uses the ordered variable regression model to construct the system, and combines the data fusion technology to optimize the feedback efficiency.

3.METHODOLOGY

3.1 Analysis of students' mental health data based on ordered variable regression model

The purpose of obtaining students' mental health data in the big data environment is not to need a large number, but to reflect students' physical and mental quality more comprehensively. Therefore, we should mine the diversity of University databases and analyze the differences of data content in the diversity changes. Contact and verify the information obtained from various channels, fuse and supplement, delete duplicate and useless information, and truly reflect the state of students' mental health. The acquisition of mental health data in most colleges and universities is still in the stage of students themselves, which easily leads to incomplete or incorrect information. Students themselves are easily deceived by the outside world and are not easy to find their specific state, so they will not seek help independently. We need to eliminate interference information in mental health

survey and obtain correct test data.

Ordered variable is a common method in investigating random data. The data level is sorted according to the scale calculation. This kind of data has the characteristics of range size, so it can not be used to calculate variable data. In previous studies, diversified data are used as representatives to express the distribution state of data in ordered variables. Ordinal variable data are used in various social studies, especially in psychological research. For example, a person's satisfaction, love and cognition of the process after the event cannot be expressed mathematically. Therefore, it is necessary to use random implicit variables for calculation. Ordinal variable is an important basis and method for processing psychological data. Can judge whether the value is in the standard state or exceeds the threshold. This model for judging students' mental health data is the classical regression model, which mainly uses natural values in a certain range to judge the grade of the overall coefficient. In the ordered variable model, there are other statistical models in addition to the regression model. The ordinary statistical analysis model can only consider the changes of individual psychological data. It can not reflect the influencing factors of changes and differences, and then ignore the causes of health problems among different students. We randomly select a class of college students and mine them to obtain mental health data. Compare the stability of the general statistical model and the regression model, as shown in Figure 1.

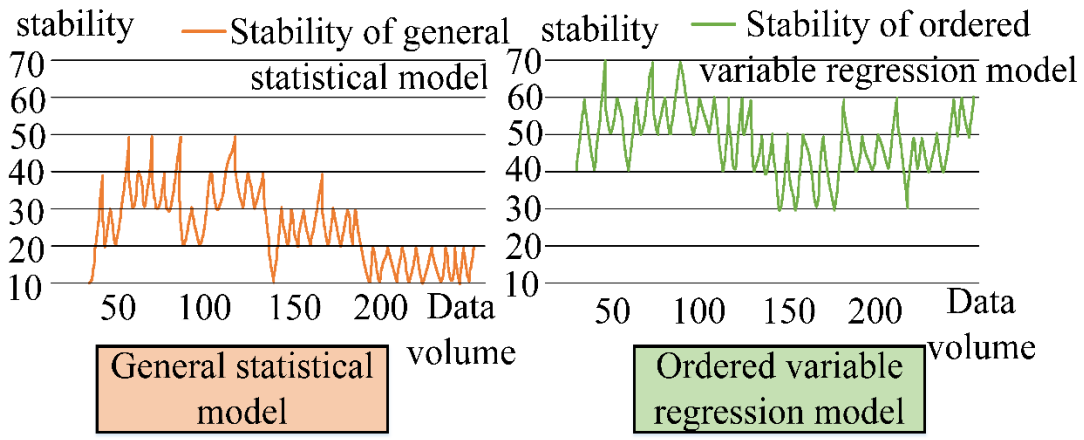

Fig 1. Comparison of stability between general statistical model and regression model

It can be seen from Figure 1 that in random phenomena, the ordered variable regression model can improve the stability of the system. With the growth of students' mental health data, the stability of ordinary statistical model has decreased significantly. This invalid permutation data is transformed into effective sequence through the optimization of regression model.

In the ordinal variable regression model, we first use nonlinear parameters to screen the algorithm, and use the influencing factors of spatial dimension to reduce the confusion caused by interfering data. Secondly, the ordered regression algorithm is used to determine the probability of the degree of influencing variables, and the screened objectives are further optimized. The uncertain variable of students' mental health data is the degree of preference, and whether there are psychological problems is judged by students' preference for things. In comparing the data samples obtained from different channels, we can make statistics on the variables that have

nothing to do with the group. In the randomly obtained student data samples, each data information is independent and does not affect each other. Define random sample variables as:

$$x(1) \le x(2) \le ... \le x(n) \quad (1)$$

The above formula is the sorted sample in the measurement data. Marking each data can calculate the data range involved in the detection. Assume that the distribution function of each independent variable is:

$$H_0 : F_1(x) = F_2(x + \theta_j) \quad (2)$$

Calculate the statistics of different independent sample data in the distribution function:

$$H = \frac{SSA}{MST} = \frac{1}{S^2} \sum_{j=1}^{K} \frac{[K_j - n_j(N+1)/2]^{-2}}{n_j} \quad (3)$$

$$H = \frac{1}{S^2} \sum_{j=1}^{K} [n_j(\bar{R}_j - \bar{R})]^2 \quad (4)$$

Where SSA is the difference in independent data and MST is the square difference in independent data. We solve the above variables respectively:

$$MST = S^2 = \frac{1}{N-1} \sum_{i=1}^{K} \sum_{j=1}^{n_j} (R_{ij} - \bar{R})^2 \quad (5)$$

If there is no duplicate information in the sample data, then:

$$S^2 = MST = \frac{1}{N-1} \left[\frac{N(N+1)(2N+1)}{6} - \frac{N(N+1)^2}{4} \right] \quad (6)$$

Generally speaking, it is assumed that the qualitative level coefficient of variables in students' mental health data is fixed. If the random range sample is the smallest, the variance analysis formula is as follows:

$$F = \frac{(N-K)H}{(K-1)(N-1-H)} \quad (7)$$

In the regression analysis of ordered variables, the function value of the regression model is an implicit variable. Since the implicit variables are also calculated by levels, the function state corresponding to each level has the following changes:

$$y = y_1 \longleftrightarrow Z < c_1 \quad (8)$$

Among them, the calculation threshold of psychological data of hidden function is uncertain, which needs to be evaluated and analyzed in specific situations. Suppose a student's academic performance can affect the change

of mental health data, and the threshold is negative when the performance is unqualified. Therefore, the ordered variable data and the addition of implicit variables can lay a good foundation for the regression calculation of random samples. We regard students' psychological data as a function of normal distribution, and the ordered variables and random data are combined as follows:

$$\prod_{i=1}^{n} p(y_i \mid x_i) = \prod_{i=1}^{n} py_i(x_i^{'}\beta; c) \quad (9)$$

$$L(\beta) = \sum_{i=1}^{n} \log(p(y_i \mid x_i)) = \sum_{i=1}^{n} \log(py(x_i^{'}\beta; c) \quad (10)$$

The above formula includes the amount of likelihood calculation after the combination of distribution functions. Be able to judge the accuracy of students' mental health data analysis. In order to test the factors affecting students' mental health in random samples, we analyzed them from multiple angles. First, understand the relationship between students' performance changes and students' emotional state. Through sampling survey, we found that the mental health curve of students showed a positive relationship with the increase of grades. Select some students with good grades and some students with poor grades for coefficient comparison, as shown in Figure 2.

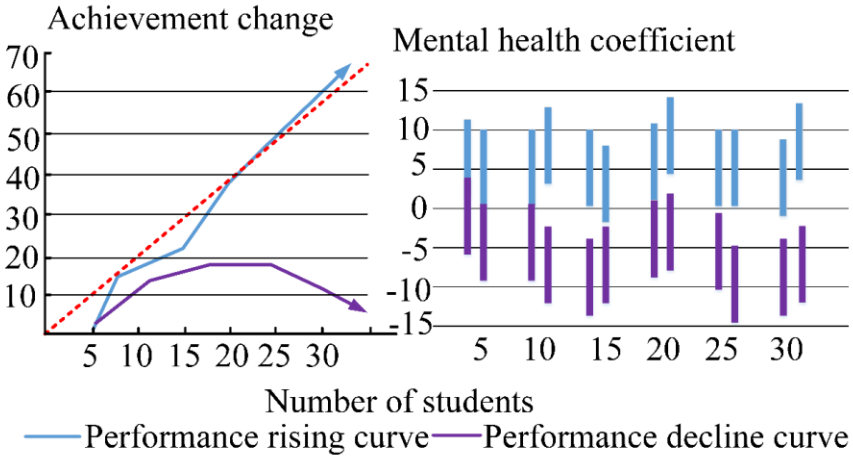

Fig 2. Comparison of mental health coefficient between good and bad grades

As can be seen from Figure 2, in the performance rising curve, students' mental health data is in a positive state. In the trend of poor performance, most students' mental health data are negative. Therefore, it can be proved that the main factor affecting the change of students' mental health lies in their academic performance. The values analyzed by the ordinal variable regression model are more accurate and can provide effective data for the student mental health analysis model.

3.2 Research on regression model of automatic evaluation feedback of students' mental health based on multimodal data fusion

The main way to obtain students' mental health data can also be the school psychological test, and the test data

results can be used as the basic information of measurement. In the process of college education, teenagers' attention direction varies according to their own personality. These different forms of performance can feed back the problems students encounter in their daily life. It is convenient for teachers to pay more attention to students' personality development and physical and mental health development. The advantage of psychological test data acquisition lies in the mandatory collection of data. Students need to fill in the test questions according to the real state. This automatic evaluation feedback model provides effective help for school mental health analysis. This self-evaluation feedback system can also choose the network platform as the carrier, and can be tested anytime and anywhere. Students can also choose appropriate questions to answer according to their acceptance. Finally, the feedback data are processed uniformly to analyze the overall state of students' choice. However, the traditional data fusion regression model has poor real-time interaction, can not have accurate evaluation effect, and is easy to have an error impact on Teachers' judgment. Therefore, on this basis, combined with data fusion algorithm, this paper optimizes the directional variable regression model. The model can accurately evaluate the process and trend of students' psychological state change, and is helpful to students' daily life and learning process.

Mental health can affect students' behavior in daily life, as well as learners' learning efficiency and learning ability. Therefore, paying attention to the changes of students' mental health data is the prerequisite to ensure good teaching. Most college students live in groups. The blind obedience of groups leads to the immature stage of students' self cognition, which is prone to anxiety and depression. The impact of enrollment rate and the pressure of future employment will change students' current psychological state. The design of feedback regression model is divided into several evaluation fans according to the theory, and four parts of structure fusion are carried out. Firstly, we need to obtain the data of students' mental health process through data mining, as well as the authentic emotion between the simulated data. Considering that students' psychological changes are dynamic, we need to focus on accuracy and real-time in building the model. The feedback model of students' mental health evaluation under data fusion is shown in Figure 3

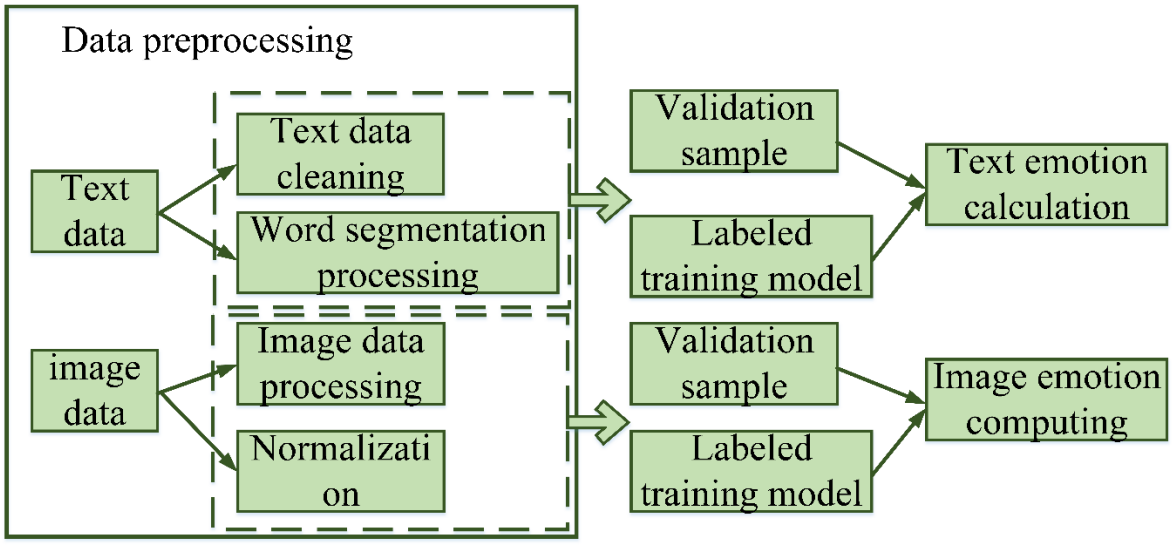

Fig 3. Feedback model of students' mental health evaluation

As can be seen from Figure 3, words and images are important ways to express emotional and psychological changes. We focus on mining the historical data of images and words retained by students in their study and life. The weight value of calculated data is expressed by nonlinear function, and the specific formula is as follows:

$$O_t = H_t \oplus H't \quad (11)$$

$$H_t = f(W \times x_t + U \times h_{t-1} + b) \quad (12)$$

$$H't = f(W' \times x_t + U \times h_t + b') \quad (13)$$

In the above formula, $H't$ represents the weight value of the function and b' represents the offset quantity of the calculation function. When visual analysis is involved in the calculation of image emotion, we need to collect a large number of students' graphic history data for feature point analysis. Only by comparing the students' psychological state with the variables of data volume can we effectively identify the psychological changes represented by the image. The data set is trained into a recognition model to represent the feature point information, and the emotion calculation task of the original image is changed. The modified model can be analyzed through local images. Because the image is abstract, it is prone to error risk in the mental health data evaluation feedback model. Therefore, we need to calculate the emotional tendency:

$$S(V_i) = \frac{\exp(V_i)}{\sum_{j=1}^{n} \exp(V_j)} \quad (14)$$

The variable V_i represents the characteristic element of the output, and $S(V_i)$ represents the probability value of emotion evaluation. In the natural state, the students' mental health data are obtained without any intervention. The data are analyzed and processed to extract the feature points of psychological changes. It is necessary to use data fusion technology to fill the defects of emotional analysis, and it is dynamic and disordered in combination with students' psychological changes. Therefore, the regression model of dynamic data fusion is adopted for calculation:

$$P'_j = \max(P_{ij}(n)), i = 1,2, j = 1,2 \quad (15)$$

The regression model of data fusion calculation can obtain the feedback information of students' mental health data changes in real time, which is convenient for teachers to make targeted solutions.

4.RESULT ANALYSIS AND DISCUSSION

4.1 Analysis of students' mental health data based on ordered variable regression model

In the ordinal variable regression model, the research on students' mental health data needs further classified calculation. We need to pay attention to how to judge the difference and threshold of psychological changes, as

well as their occurrence conditions and influencing factors. For the same event and student age, which variables lead to the deviation of mental health data analysis is also our main research direction. After defining independent sample data, the nonlinear test initial regression model is used to find out the judgment indicators, but the scale calculation of variables is still disordered. The ordinary linear regression model can not accurately judge the factors affecting the changes of students' mental health data. Students' learning environment and learning ability are the Influencing Indicators of psychological feeling. We judge the learning environment and learning ability of students respectively, and explore the efficiency of their impact on mental health, as shown in Figure 4.

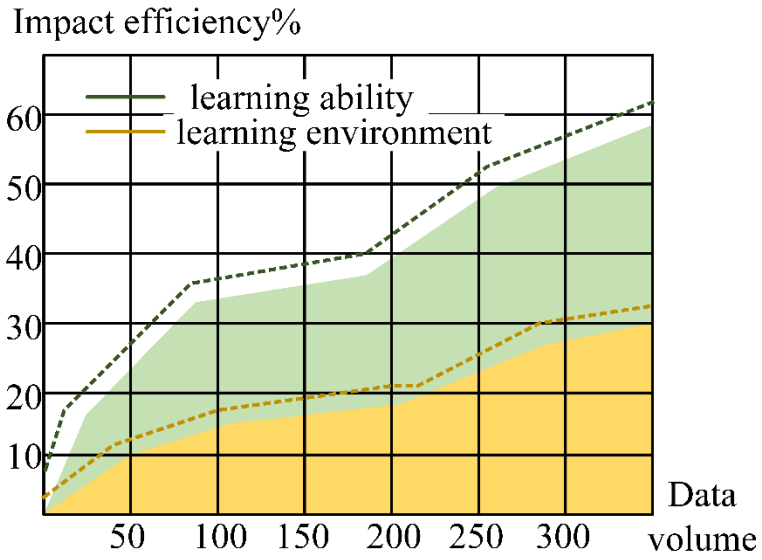

Fig 4. Comparison of the effects of learning environment and learning ability on mental health

As can be seen from Figure 4, with the increase of the amount of information in data mining, the impact of students' learning ability on mental health data is more obvious. Therefore, in students' study and life, learning methods and efficiency have an impact on mental health. In the whole research process, we also found that students' family environment, family relations and social factors will also have an impact on mental health indicators. Students' satisfaction with their own environment indirectly changes the development of their physical and mental health. In the analysis of ordered variable regression model, the data used are from random student groups in Colleges and universities. Firstly, judge the general situation of students according to the interview content, and then obtain specific data through survey interview and psychological test. Therefore, the results of this experiment are illustrative and effective.

4.2 Analysis of research results of regression model based on automatic evaluation feedback of students' mental health under multimodal data fusion

In this study, the students of the same grade in a university were used as the experimental objects to obtain the students' mental health data by means of interview, filling in the questionnaire and doing the test questions. Firstly, the obtained data are normalized, and finally the data are integrated into a subset state by data fusion. Within the scope of data fusion, the ordered variable regression model is used to study the data feedback

function of students' mental health. On the basis of data cleaning, we marked students' mental health status according to the questionnaire hierarchy. The mental health level is divided into three stages: optimism, negativity and depression. In order to verify the performance of the feedback model, we use multi-modal data test. The specific data range includes positive and negative effects of emotion. The test model data includes text data and image data. Students' mental health data were cross examined to evaluate the accuracy of model feedback. The accuracy of text data and image data in the student mental health feedback model is shown in Figure 5.

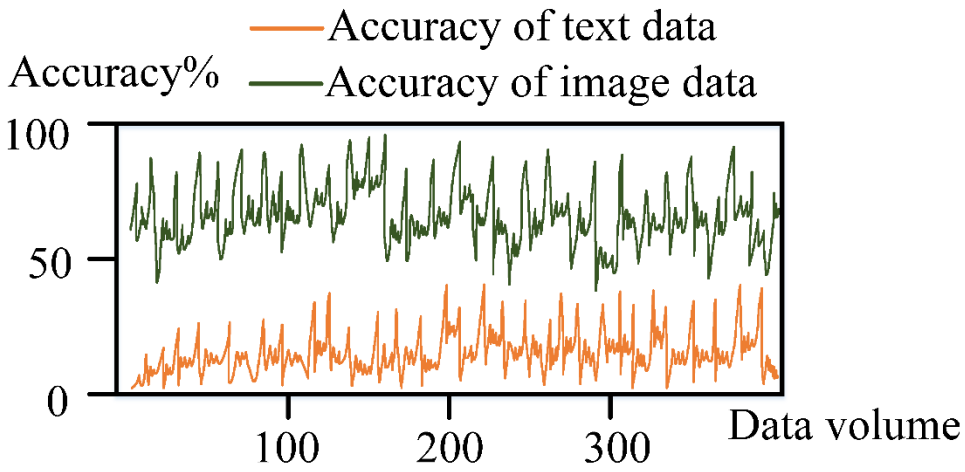

Fig 5. Comparison of accuracy between text data and image data

It can be seen from Figure 5 that the accuracy of text data is poor in the feedback results of students' mental health. Image information can better express the psychological state and emotional changes of each different student. In order to ensure the accuracy of the experiment, we will evaluate the feedback model and test it under different number of students. The verification method of bifurcation exchange is adopted to ensure the authenticity and effectiveness of group data. Experiments show that the data fusion optimized student mental health data feedback model proposed in this paper has good accuracy and can reflect students' current mental health state.

5.CONCLUSION

Students' mental health has always been the common concern of educators. The changes of teenagers' mental health can affect their normal life and learning process. Therefore, every university should pay attention to the possible psychological problems of students and make targeted solutions. The traditional analysis model can not pay attention to students' psychological changes dynamically and in real time, and its performance in feedback information efficiency is poor. This paper proposes a student mental health data analysis and feedback system based on ordered variable regression model. The system uses the ordinal variable regression algorithm to optimize the students' mental health data. After data mining, it can solve the problem of low efficiency caused by a large number of duplicate data. Ordinal variables are widely used in the analysis of mental health data. This model has certain test advantages for students' uncertain dynamic psychological changes. Then, according to the data characteristics of students in the living environment and social environment, a regression feedback model

in the state of data fusion is constructed. It realizes the function of automatic evaluation of students' mental health, and can quickly obtain the feedback information of students' psychological changes. The experimental results show that the ordinal variable regression model has significantly improved the accuracy of data calculation compared with the single regression model. The image trace information in students' daily life can be used as an important basis to judge the changes of mental health. The experimental data show that this model can accurately judge the factors affecting the changes of students' mental health and effectively control the level of mental health.

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