Improved Random Forest Method for Mental Health Education

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Abstract—There are serious hidden dangers in the mental health of contemporary higher vocational colleges. In order to solve this situation, an improved random forest method for mental health education is proposed. According to the psychological characteristics of higher vocational colleges, this paper briefly introduces the mental health status of Higher Vocational Colleges in school. Message entropy is a concept in message theory. As the leading organization of vocational education, colleges and universities have absolute responsibility for cultural psychology teaching. Put forward corresponding effective methods for mental health education in higher vocational colleges.

Keywords—Contemporary vocational colleges, health education methods, mental health.

I. Introduction

AMONG ordinary students, vocational colleges are the oldest and most experienced branch group. In the life of colleges, the improvement of colleges on the learning stage is basically fixed, and most of them focus on the scope of postgraduate study, internship employment, independent choice of career, independent entrepreneurship and so on [1]. At the same time, contemporary vocational colleges belong to the post-90s group, which is basically the only child in the family structure due to the promotion of national policies, and lacks the communication feelings with peers in the family. However, the lack of necessary communication and companionship in the growth stage will lead to hidden psychological sensitive points at different degrees and different psychological levels. Once the pressure of university graduation, admission and employment is around, vocational colleges are likely to have serious psychological diseases under the promotion of pressure.

Literature [2] used symptom checklist 90 (SCL-90) to investigate and analyze the mental health status and characteristics of 260 aerobics lovers in different universities. The results show that aerobics is an activity conducive to students' mental health. Qualified colleges and universities should effectively promote aerobics. Literature [3] used EPQ and CESS-D to select freshmen and sophomores of Shanxi Normal University. The experimental results show that there is a significant correlation between students' depression and personality. Exercise can reduce the tendency to depression. Literature [4] discusses the content of exercise prescription, the psychological exercise effect of exercise prescription, the psychological measurement tools for formulating exercise prescription and the item selection of psychological defects. Due to the great pressure on students in contemporary higher vocational colleges, they are prone to serious mental diseases. This paper puts forward the improved random forest method of mental health education to improve students' mental health.

II. Judgment Standard

The judgment standard elaboration of mental health condition of common vocational college.

(1) Necessity of standard elaboration

No matter physiological function or psychological level, people will produce some inevitable changes with the growth of age. If the article wants to take the contemporary vocational college as the research background of mental health education

method, then the demonstration and elaboration of relevant content must be judged according to the psychological characteristics of vocational college. The following will briefly describe the mental health status of vocational colleges in the immediate age stage.

(2) Judgment of intelligence

Intelligence is the most important measure of whether a person's overall health is within the normal range. Be in commonly university level, enter the student of same through the university entrance exam, its intelligence level should be basically in balanced state, except an exception fluctuation won't be too big. And specific intelligence judgment does not refer to specific intelligence value, but intelligence can reflect the general standard of life habits, normal learning, body movements. When a person has psychological problems, the content of the questioner's questions is often irrelevant answer, and the learning process is also unable to concentrate. In life, students whose mental abilities are reduced by psychological factors cannot afford complex physical or behavioral actions. Therefore, when judging the mental health status of vocational colleges and universities, educational personnel can take the lead from the degree of intelligence, and focus on the students whose intellectual efficiency plummets.

Entropy is a message theory concept, which is an assess of the doubt of a random variable [5]. Let R_{am} be a discrete random variable, r_i is a variable function of discrete random variables, and its viability distribution is:

$$P(R_{am} = r_i) = p_i, \quad i = 1, 2, ..., n \tag{1}$$

Then the definition of variable Xram is entropy of random:

$$H(X_{ram}) = -\sum_{j=1}^{n} p_j \log p_j \tag{2}$$

where p_j is a variable function of continuous random variables, The joint probability distribution with the random variable (Xram, Yram), is:

$$P(X_{ram} = x_k, Y_{ram} = y_l) = p_{kl}, k = 1, 2, ..., n; l = 1, 2, ...m \tag{3}$$

So the uncertainty of Yram with conditional entropy H of Yram|Xram is given Xram of the random variable. It is defined as with respect to variable Xram given by Xram of entropy of conditional probability distribution of Yram the mathematical expectation [6] [7].

$$H(Y_{ram} | X_{ram}) = \sum_{k=1}^{n} p_i H(Y_{ram} | X_{ram} = x_k) \tag{4}$$

When the value of conditional entropy and probability in entropy is estimated through the actual data set, conditional entropy and the corresponding entropy are called empirical entropy and empirical conditional entropy respectively. The basis represented by message gain is the reduction of Yram-like uncertainty that property Xram is known under the condition.

The message gain of property A is g (D, A) on data set D, defined as follows:

$$H(Y_{ram} | X_{ram}) = \sum_{k=1}^{n} p_i H(Y_{ram} | X_{ram} = x_k) \tag{5}$$

Difference between entropy (Yram) and conditional entropy

(Yram|Xram) is called mutual message. The message gain in the decision tree is the mutual message between classes and properities in the training data set.

Given the data set D, the property selection of the decision tree is to select the property with the maximum message gain, so that the uncertainty of category Yram is reduced the most after knowing the property.

(3) Emotional judgment

Although the judgement of the mood is not standard to judge content from mental health level, but consider the mood is the first embodiment when vocational college produces psychological fluctuation, also define it to judge a standard here. In a state of health, for example, vocational colleges for regular life is in a state of optimism or smooth, and once in the same incident, individual students produced completely different emotions, such as nuts, roars, throwing things, etc., so the students can produce reverse psychological fluctuations, also is the popular of "abnormal reaction". Students who are mentally normal, on the other hand, will respond to different events in accordance with the "normal reaction" in the conventional state of consciousness.

The specific structure of weighted random forest is as follows [6] [7]:

$$\{Tr_1(x), Tr_2(x), ..., Tr_t(x), x \in X\} \tag{6}$$

As a series of decision trees in a random forest, then:

$$f(x) = \sum_{i=1}^{t} weight_i * Tr_i(x) \tag{7}$$

$$Tr_i(x) = P(c | x) \tag{8}$$

The probability of the class given by the decision tree $Tr_i(x)$ represents the corresponding $weight_i$ and $f(x)$ represents the final voting decision of the random forest.

In this paper, a new strategy of calculating weight is proposed. The details are as follows:

$$weight_j = \sum_{i=1}^{n} \left[(p_{cit} - (1 - p_{cit})) * I(p_{cit} > (1 - p_{cit})) \right]$$
$$+ \alpha * \sum_{i=1}^{n} \left[(p_{cit} - (1 - p_{cit})) * I(p_{cit} < (1 - p_{cit})) \right] \tag{9}$$

(4) Judgment of interpersonal relationship

In the living environment of vocational colleges, communication is an inevitable social activity. Under normal circumstances, vocational colleges will have a fixed circle of friends and friends, and will maintain a long-term and close communication with friends. At the same time in the communication process, students and friends or classmates to maintain the status should be equal and normal [8] [9]. But in the judgement of interpersonal relationship, often appears because individual personality or disposition may thereby appear "unequal" condition, for example one person is dominant, another person is submissive wait, when the submissive person is in completely voluntary circumstance below this kind of circumstance, also belong to normal

phenomenon commonly. Once the individual student appears to distrust anyone and block the way and process of communication with others, it indicates that the student may have psychological problems.

$$weight_j = \sum_{k=1}^{n}\left[\left(p_k - (1-p_k)\right)*I\left(p_k > (1-p_k)\right)*I\left(c_k = 0\right)\right]$$
$$+ \alpha*\sum_{k=1}^{n}\left[\left(p_k - (1-p_k)\right)*I\left(p_k < (1-p_k)\right)*I\left(c_k = 0\right)\right]$$
$$+ \sum_{k=1}^{n}\left[\left(p_k - (1-p_k)\right)*I\left(p_k > (1-p_k)\right)*I\left(c_k = 1\right)\right]*\beta$$
$$+ \alpha*\sum_{k=1}^{n}\left[\left(p_k - (1-p_k)\right)*I\left(p_k < (1-p_k)\right)*I\left(c_k = 1\right)\right]*\beta \qquad (10)$$

Among im_weight_j them, the $weight_j$ calculated for unbalanced data is the weight in formula 3.2 c_i is the category of the sample, β is the ratio of the weight of the minority sample and the majority sample I is an indicator function defined as follows:

$$I(cond) = \begin{cases} 1 & if\ condition\ is\ true \\ 0 & otherwise \end{cases} \qquad (11)$$

(5) Self-evaluation and judgment

Contemporary vocational colleges are in the stage of the final formation of overall personality, in which absorbing others' evaluation of oneself and self-evaluation of oneself are the key factors that constitute the main personality [2]. General mental health vocational colleges and universities are able to accumulate in the experience of their own ability, character, the correct judgment of social style. Swing is generally nothing more than two aspects of narcissism and inferiority, and the two kinds of biased content can be basically attributed to the normal range. In general, students with mental illness are not only unable to have a correct evaluation and judgment of themselves, but also the evaluation content will be out of line with normal cognition. For example, patients with depression will think that they are a burden of the world, and patients with mental illness will think that they are apples, bananas and other species completely out of line with cognition.

According to the confusion matrix, the indicators we use are defined as follows [6] [7]:

$$accuracy = \frac{Tn\text{-}Pn + Tn\text{-}Nn}{Tn\text{-}Pn + Fn\text{-}Pn + Tn\text{-}Nn + Fn\text{-}Nn} \qquad (12)$$

$$precision = \frac{Tn\text{-}Pn}{Tn\text{-}Pn + Fn\text{-}Pn} \qquad (13)$$

$$recall = \frac{Tn\text{-}Pn}{Tn\text{-}Pn + Fn\text{-}Nn} \qquad (14)$$

$$F - measure = \frac{2 \times precision \times recallback}{precision + recallback} \qquad (15)$$

Accuracy is the accuracy, which measures the ratio of all the samples predicted correctly. Precision is the accuracy rate, which measures the ratio of the actual reverse samples to the samples judged as reverse samples Recall represents the ratio of reverse samples in all reverse samples. F-measure is the weighted sound medium of precision and recall.

(6) Psychological performance corresponds to the medium age of vocational colleges

In different stages, people view things at a certain degree of height, depth and breadth, so psychological behavior, as an indirect reaction to the outside world, is the best matching index to measure the degree of mental health of vocational colleges. In the first year of college, for example, most students engage in a mix of learning and pleasure. In the fourth year, their mental behavior activity pattern has been relatively mature and their horizon is much broader than when they first entered the university.

III. EFFECTIVE METHODS

Several studies on effective methods of mental health education in vocational colleges.

(1) Maintenance stage of healthy psychology in vocational colleges: courses + lectures

Different from students of other ages, most of them are adults. Therefore, in the process of psychological education, teachers need to play a certain role, and students themselves need to clarify the important properties and methods of their education under the guidance of teachers and other psychological teaching staff. In the psychological teaching course, the general students will have some resistance to the psychological education course. For this reason, teachers need to use meditation and other means to make students open their hearts in a quiet and absolutely safe environmental, and speak out their thoughts about the world, feelings about things around them, and evaluation and judgment of themselves with half autonomy and half guidance. Teachers can start from students' real experience and carry out targeted guidance education on mental health level. Although this method is effective, when the number of students who need to receive mental health education is too large, the school can use lectures to carry out unified education. The content of the lecture can be collected through questionnaire survey or direct observation by psychological teachers. For example, when the employment pressure caused by employment inequality is widespread among female students in universities, the university can give special lectures on this point in order to

eliminate the employment pressure of female students.

(2) Prevention stage of healthy psychology in vocational colleges: intervention mechanism

In fact, the intervention mechanism is an emergency mechanism, which directly or indirectly intervenes in students' life to effectively supervise the activities of students' surrounding environment fluctuations and psychological fluctuations [3]. Behavior condition of the fixed rules, for example, if a student within the scope of the regulation for more than a week is not normal, the school education, counselors, and psychological treatment should be timely to confirm the basic condition of students, and then imposing direct sexual psychological measurement, when found the students' psychological health status of uncontrollable state dropped to the school, are sent to external professional psychological treatment in a timely manner. This coherent processing structure is a practical emergency mechanism, and this kind of intervention is the best way for students to prevent them from developing mental illness and control their illness in the early stage.

(3) Protection stage of healthy psychology in vocational colleges: psychological consultation

Psychological consultation is an active mental health education activity, which is essentially different from compulsory class and special psychological lectures. Psychological counseling is usually a distress signal used by the school psychological staff at the initial moment when students find that they have generated psychological pressure that cannot be resolved or have to know under certain circumstances that they have developed symptoms of mental illness. For teachers, psychological counseling is a communication process in which students have a direct understanding of their basic condition, long-term psychological condition and deep psychological fluctuation in a specific communication environment. In this process, students are the guide, teachers are the guide and corrector of discourse. Psychological counseling in universities and colleges is generally split into two classes, one is to play a soothing effect, the other is direct therapeutic effect. Guidance effect to heavy face is only the pressure or mood swings, the psychological counseling staff to find out the pressure source, using the psychological education of professional skills to bear on the problem of the heart and comfort, the process must be targeted, words to soothe, focused, to ensure the train of thought of every node can't bear the thought of content. For students with obvious characteristics of mental illness, such as suicidal tendency, depression, manic depression, etc. Teachers should choose different treatment plans according to different situations. Students and teachers who are suicidal should sort out their passive and reverse emotions, try their best to change the thought process in their mind that causes suicidal behavior, or deny the correlation between their behavior and other people's behavior and cut off the "rationality" of their suicide directly. For students who have depressive symptoms but still have the psychology of asking for help, the teacher should timely channel their mood, and discuss with the school whether

to transfer the depressed students to a special mental hospital to obtain more professional drugs and treatment. However, the symptoms of bipolar disorder are often violent. Therefore, when the psychological teaching staff in the school cannot carry out effective treatment education, they should cooperate with professional psychological treatment institutions outside the school to provide students with more effective drugs and counseling in a timely manner.

(4) The construction stage of healthy psychology in vocational colleges: positive advocacy of social practice

In view of the general phenomenon that the psychological pressure of vocational colleges comes from employment, it is necessary for the schools to adopt a unified way of education and carry out organizational psychological counseling. Social practice, as an important activity stage that leads students to face the society, the setting of its teaching content plays a decisive role in the degree of students' psychological intervention. For example, when school authorities ask students to go to the position of their major in practice, it is true that some reverse message about jobs and working status will appear. In this regard, school authorities and counselors should remove all direct and indirect reverse reactions and associated events in the practice environment in the early preparation. Unable to handle clearance for the short term, with a team of instructors or psychological teachers shall timely to explain of unhealthy phenomenon, to focus on the subject around the working conditions are balanced and unified mostly, as far as possible to student's emotions into positive working environment and conditions, such as the compensation situation in the professional, choosing a career direction in the future more period. Use an extremely optimistic thinking direction to stimulate the positive emotions in students' minds.

(5) Strengthening stage of healthy psychology in vocational colleges: campus environment

Vocational colleges with a normal state of mind will not resist social contact, social activities, school activities and other extensive modes of communication, while those with mental illness will actively resist direct communication with others. But for the whole, the campus environment is a subjective place which cannot escape completely. So the psychological education in colleges and universities personnel should firmly grasp the environment of students' psychological state of indirect intervention effect, use of positive, friendly and actively the construction of campus psychological environment, for the psychological pressure is too large or invisible mental illness is a classmate to provide a safe and harmonious living places, from the heart to make it rain on the preparedness of the society, involuntary to positive thoughts with the world. Such a healthy psychological campus environment requires supervisors to play an educational role on the whole campus at the level of behavior, administration or condition restriction [4]. For example, in the propaganda of behavior slogan and campus culture, positive psychological knowledge and ideological direction should be carried out, and the ideological level inside the campus should be transferred to the same level as possible,

so as to build a harmonious and strengthened healthy psychological environment for students. This kind of holistic education can also be carried out day by day, leaving a subconscious impression in each student's mind, which will also play a certain role in strengthening and promoting psychological educators to carry out unified positive psychological intervention.

(6) Strengthening the mental health stage of Vocational Colleges: Establishing Students' mental health files

College students in higher vocational colleges come from rural areas, and students with family difficulties account for a certain proportion. Coupled with the increase of single parent families, the vulnerable groups in higher vocational colleges are also increasing. Therefore, we should do a good job on the psychological work of these students, establish mental health files, especially for vulnerable groups, carry out follow-up investigation, do a good job in psychological counseling, let them experience care, help them analyze the current situation, change their life and learning attitude, and enhance their self-confidence.

IV. EXPERIMENT

The vocational college mental health education process of several behavior and ideological points.

(1) We should pay attention to students' mental health awareness

Vocational colleges have acquired adult ability and character, and mental health teachers cannot complete the means of absolute single-minded and absolute supervision in the university environment. Therefore, teachers and school authorities should be in the condition of approval, cultivate students independent mental health audit, to predict the state of mental illness in advance. Only when students have a normative and standard awareness of mental health and mental illness, can

they truly discover their own fluctuating status from the "first time" and directly improve the time of mental health education.
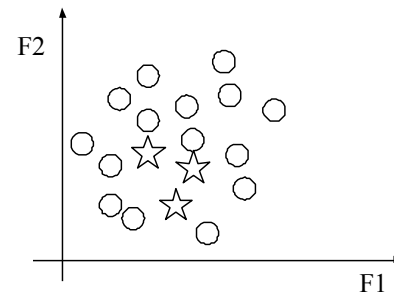

Fig. 1 data classification

(2) Correctly handle the relationship between ideological education and mental health education

Ideological education and mental health education are both different and closely related. The difference between the two is first reflected in the content of education, the former mainly solves psychological problems; The latter focuses on solving ideological problems. The connection between the two shows that mental health education is an integral part of college students' work, which, like ideological education, serves to train well-rounded socialist builders and successors. Only solve the lower level of psychological burden, psychological barriers, promote the development of the psychological, spiritual noble has a healthy psychological basis; Therefore, in the youth mental health education, vocational colleges can not only consider the mental health problems in isolation, just stay in the work to solve the psychological problems of vocational colleges, and at a higher level as much as possible to the youth vocational colleges and points out the direction of the efforts, guide them set up positive correct world outlook, the outlook on life, values, moral values.

Table I Overview of mental health data sets

Number of Data Set	Set Properties	Number of Samples	Number of Minority Class/Majority	Sample Number of Minority Class / Ratio of Majority Class	Sample Number
Nur	8	12960	Very recom / rest	328 / 12632	1: 38.5
Aba	8	4177	Age > 13 / age < = 13	490 / 3687	1: 7.5
Sati	36	6435	4 / rest	626 / 5809	1: 9.3

It can be seen from Table I that there is a large difference between the number of samples of minority class / the proportion of majority class in Nur method, there are many kinds of setting attributes in sati method, and the number of samples in Nur method is the largest.

Table II The accuracy of the three methods on different data sets

Accuracy			
Methods / Datasets	RF	SRF	SRWRF
Nur	98.99%	98.83%	99.09%
Aba	89.85%	86.71%	86.33%
Sati	93.65%	92.92%	93.20%

It can be seen from Table II that the accuracy of the three methods is high, among which Nur method has the highest accuracy, reaching 99.09%.

V. CONCLUSION

Due to the great pressure on contemporary higher vocational college students, they are prone to serious mental diseases. And there are serious hidden dangers in the mental health of contemporary higher vocational colleges. Therefore, an improved random forest mental health education method is proposed. When judging the mental health status of higher vocational colleges, educators can take the lead from the level of IQ, focusing on the students with decreased intellectual efficiency. A new weight calculation strategy is proposed. To sum up, a psychologically normal student should first have a normal and healthy state from the level of social thought and emotion management, and the judgment of these standard contents is the premise for teachers to implement mental health education. Accordingly, the teacher should be in all sorts of subtle level gradually transition to the overall level, not only should aware to the comprehensive training of students' psychological health standards, but also the students appeared adverse psychological state timely targeted or directly to a specific group of psychological education, in the process of education, must give priority to with positive and positive, efforts to strengthen and build students' psychological health, relieve students various aspects pressure method, realize effective education of psychological health of vocational colleges. Experiments show that the accuracy of the three methods is high, among which Nur method has the highest accuracy, reaching 99.09%. In the future development, increase the methods and standards for the evaluation of students' normal health status, so as to accurately determine whether students have mental diseases.

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Qiang Zhong conceived the idea. Xiaoming Liu conducted the analyses. Authors contributed to the writing and revisions.