



Effectiveness Evaluation of Wechat Ideological and Political Education in College Based on Decision Tree and Neural Network algorithm

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Abstract

"Who to cultivate, what kind of people to cultivate and how to cultivate" is always the fundamental issue of education, and keeping students well educated is an important guarantee to cultivate qualified builders and successors of socialism. Nowadays, China is in the post-epidemic era of rapid development of information technology, and WeChat public number is an important platform and medium for popularizing ideological and political education in domestic colleges and universities online, and its communication effect directly affects the effectiveness of ideological and political education of students. Nowadays, there are problems such as confusion and confusion of subjects, limitation of information timeliness, applicability and popularity in college WeChat public numbers. This paper proposes and establishes the analysis system and feedback mechanism of the effect of college WeChat public number of ideological and political education based on decision tree neural network model algorithm, with the accuracy rate up to 96.85%, which has certain reference value for colleges and universities to improve the new media education platform and enhance the quality of education.

Keywords: *New media in higher education; Evaluation System; WeChat public education; neural network*

1 INTRODUCTION

According to the 49th Statistical Report on the Development Status of the Internet in China released by China Internet Network Information Center (CNNIC) in Beijing on 25 February 2022, as of December 2021, the size of China's Internet users reached 1.032 billion, an increase of 42.96 million from December 2020, and the Internet penetration rate reached 73.0%. Among them, since WeChat started to launch its public platform in August 2012, governments, media, enterprises and other types of entities have gradually used WeChat public numbers as online publicity carriers for message pushing, brand communication and cultural sharing. As the main education site for young students, universities nationwide have built "two micro-podiums" and launched the "Internet + ideological and political education" model in recent years, promoting education through online information dissemination platforms such as microblogs and WeChat public numbers. Based on the mobile AI

terminal, teaching manager or assistant can use it to guide students' learning [1]. The work is highly integrated with information technology. However, there is no scientific evaluation system for the effectiveness of the ideological and political education of microblogs and public WeChat numbers in universities. According to the communication characteristics of the new media platform, the construction of the evaluation system for the super-effectiveness of the political thought education of college WeChat public numbers is conducive to the graded play of the communication effectiveness of WeChat public numbers in campus and the strengthening of the guidance of ideological and political education of teachers and students.

The evaluation of communication effects is an important reference for the adjustment of the operation of WeChat public numbers in universities, and a key measure for improving the effectiveness of new media education. In the past ten years since the development of WeChat public numbers, 1576 articles were searched on

China Knowledge Network (CNKI) with "WeChat public number" as the keyword, among which the largest number of related articles were published in 2019, up to 328, accounting for about 20.8%. slow down. In terms of research level, most of the research related to WeChat public numbers is biased towards application and development research, with less than 5% of the research related to Ideological and political education. The existing research on WeChat public numbers in the direction of ideological education is relatively small, and the ideological education articles, videos and pictures disseminated in the form of tweets lack a reasonable and scientific evaluation system for their effectiveness. In the existing studies on the evaluation of online ideological and political education, researchers have more often explained the principles, measures and necessity of following online ideological and political work, without clear delineation and definition of measurement indicators. This paper takes one of the new media communication media--WeChat public number as a carrier, through the categorization and summary of WeChat-related indicators, and then constructs a universal ideological and political education assessment system for universities. It is necessary to provide all-round guarantee in three aspects of ideological and political education work: subject, process and result to enhance the effectiveness of ideological and political education. The correct world view, life view and values for students is linked to the development and breakthrough in the management of ideological as well as political education of students [2]. If red resources are to be more widely used in ideological and political education in colleges, its better for college students' educational effect [3]. In the case of WeChat public number, the team structure, professionalism, financial support and project participation of its object of observation..

2 DESCRIPTION OF ASSESSMENT INDICATORS

In this paper, the indicators related to the evaluation of the effectiveness of Ideological and political education of WeChat public websites in campus are obtained through the three-level index research. As shown in Table 1. Among them, the secondary indicators contain the effectiveness of the subject, process and result.

TABLE I. EVALUATION AND RECOGNITION INDEX SYSTEM FOR WECHAT PUBLIC WEALTH EDUCATION IN CAMPUS

Tier 1 Indicators	Secondary Indicators	Tertiary Indicators
		Funding ratio(A1)
		Team structure(A1)

Quantitative index system for evaluating the influence of WeChat public websites in campus	Subject validity(A)	Number of projects led(A2)
		Number of training sessions(A3)
		Number of original works(A4)
		Platform Activity(A5)
		Professionalism of the operation team(A6)
	Process validity(B)	Number of Media Reprints(B1)
		WCI Index(B2)
		Average number of shares(B3)
		Average number of likes(B4)
		Percentage of party news(B5)
		Thinking Education Tweets(B6)
		Volume of works(B7)
		Quality of work(B8)
		Number of interactive works(B9)
		Coverage of interactive communication(B10)
	Outcome validity(C)	Application rate for party membership(C1)
		Participation rate in public service activities(C2)
		Participation rate in youth learning(C3)
		Outstanding Internet Culture Studio(C4)
May Fourth Red Flag Youth League Committee(C5)		
Advanced Group of Ideological and Political Education(C6)		

2.1 Subject validity

In the validity of the main body, the funding ratio and team structure are based on the situation of the author's unit, research on sister colleges and review of relevant

literature to obtain qualitative research results. The number of projects hosted, the number of training sessions participated in, the number of original works, and the activity of the platform are based on relevant data collected by the department in charge of online culture construction in the author's unit. The professionalism of the operation team was assessed by the professional operation and maintenance staff of the WeChat public website. In the process validity, the average number of reads, average in-views, average communication index, popular tweets and other relevant indicators of each department's WeChat public number were obtained from the summary of data from the superior media of the author's unit. The proportion of party and group news, the volume of tweets on Ideological and political education, the number of interactive communication works and the coverage of interactive communication are supported by relevant data provided by the publicity department of the party and group in charge of the author's unit. The number of articles reprinted by higher-level media is based on the year-end inventory of the college where the author works.

2.2 Process validity

In the process validity, the average number of reads, average in-views, average communication index, popular tweets and other relevant indicators of each department's WeChat public number were obtained from the summary of data from the superior media of the author's unit. The proportion of party and group news, the volume of tweets on Ideological and political education, the number of interactive communication works and the coverage of interactive communication are supported by relevant data provided by the publicity department of the party and group in charge of the author's unit. The number of articles reprinted by higher-level media is based on the year-end inventory of the college where the author works. It is essential to understand college students' thinking and suggestions of using WeChat for enhancing the attractiveness and effectiveness of ideological and political education on digital platform [4].

2.3 Outcome validity

In terms of the validity of the results, they are designed to evaluate the changes in students' awareness and acceptance of the ideological level, political stance and moral quality after receiving ideological and political education from the university's WeChat. The changes in this area are mainly presented by two types of evaluation indicators: one is the moral quality indicator, which mainly examines the changes in the number of students submitting applications for party membership, the number of participants in public welfare practice activities and the participation in the Youth University Study after the involvement of WeChat in the ideological and political education work. The second is the collective

literacy index. The ideological and political education work in campus has distinctive collective characteristics, that is, the assessment of the effectiveness of education should emphasize the assessment of the effect of collective education. As all universities have formed a set of mature internal assessment system of ideological and political education work in long-term practice, mainly represented by the selection of advanced collective of ideological and political education carried out by the academic work system at the end of the year, the excellent network culture studio and the selection of May Fourth Red Flag Youth League Committee carried out by the Communist Youth League system, they can reflect the results of new media ideological and political education to a certain extent, and thus can be used as an inspection indicator.

From the perspective of assessment, the WeChat ideological and political education in campus presents several relatively obvious characteristics. Firstly, from the composition of the assessment object, WeChat ideological and political education in campus is a multi-factor system. Its multi-factor complexity is especially reflected in the education object, education environment, and education process. College students are the mainstay of Internet culture. While using the Internet culture to create an Internet culture, they are also spreading the Internet culture [5]. Secondly, in terms of access to assessment information WeChat ideological and political education system contains a large amount of semi-transparent information. Thirdly, based on the assessment scale, the assessment of WeChat ideological and political education in campus mainly relies on macroscopic standards. The existing evaluation standard is macroscopic so that experts are often required to judge and score according to their own experience against the standards in the actual evaluation process. Fourthly, in terms of the changes of the assessment factors, the WeChat ideological and political education in campus is in a non-linear movement. There are many factors involved in the micro-consciousness education and some of these factors have a linear relationship with the changes of the system, some have a curved relationship, and some relationships are not at all certain. Some of the most prominent policies in schools throughout the industrialized world today relate to the rapid introduction of computers [6]. Based on the above characteristics, this paper selects a combination of decision tree and neural network assessment methods to build an assessment model based on a comprehensive consideration of several modern comprehensive assessment methods. However, some authors conclude through regression analysis that young people use WeChat mostly for recreation and emotional contact, which poses a challenge to WeChat ideological and political education [7].

3 ASSESSMENT MODELS

3.1 Data downscaling and visualisation

This paper uses the t-SNE algorithm to downscale and visualise the data so that the point probabilities corresponding to the high and low dimensional spaces are the same. t-SNE is essentially an embedding model that maps data in the high dimensional space to the low dimensional space and retains the local characteristics of the dataset. Table 1 has 17 entries, processed as 17 dimensions, and reduced to 3 dimensions using the t-SNE algorithm, consistent with Table 1.

3.2 Pre-processing of data

In this paper, the sentiment analysis of the database text information is used to obtain the correlation degree matrix of WeChat public numbers and excellent public numbers, and the data with the highest relevance is used as clusters. Among them, the excellent public numbers are the WeChat public numbers selected by the author's unit based on the results of the last three years, which are all excellent, as the sample.

Firstly, the semantic data of the conversation related to the funding ratio and team structure will be obtained based on the interviews, and all the data will be divided into words, and the obtained divided word results will be intersected with the evaluation dictionary to obtain a new evaluation word dictionary. If there is a degree adverb before the emotion word, the value of that emotion word is multiplied by different coefficients according to the type of different adverbs. The weights of the degree adverbs: slightly, average, very, very, and extremely, were assigned values of 0.8, 1, 1.2, 1.4, and 1.6, respectively, to obtain the final vector. Table 2 below shows some of the data vectors obtained through the interview evaluation.

In order to facilitate model training, we used 14 of the 18 college WeChat public numbers of the author's unit as our training set, 2 as the validation set and the remaining 2 college WeChat public numbers as the test set. In order to solve the problem of excessive difference between the number of normal samples and abnormal samples, the special abnormal data are excluded in this paper to improve the accuracy of the model training results.

3.3 Building the model

3.3.1 Eigenvector Kmeans clustering

Firstly, Kmeans clustering was used to cluster the WeChat feature vectors, with the number of clusters set to 4. 10 clusters were performed and the results of each cluster were saved. The clustering results are shown in Figure 1. For the sake of presentation, only a portion of the WeChat feature vector is used in Figure 1.

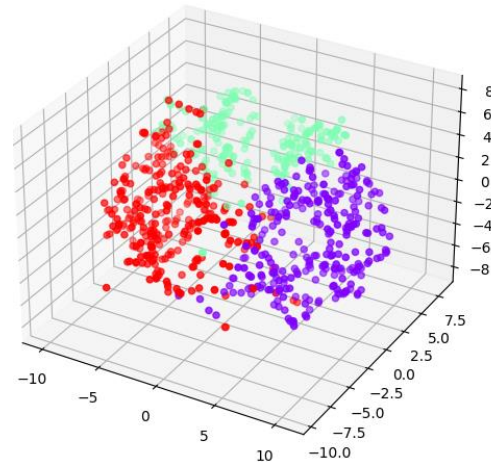


Figure 1. Illustration of feature vector clustering in 3D

3.3.2 Construction of decision tree algorithms

This paper makes use of the decision tree algorithm for machine learning, the generation algorithm chosen is ID3, which is a tree structure where each internal node represents a judgement on an attribute, each branch represents an output of a judgement result and finally each leaf node represents a classification result. Given a database of identified poor students, each sample of poor students has a set of attributes and a classification result, i.e. the classification result is known, then by learning these samples a decision tree is obtained which is able to give the correct classification for the new data. As shown in Figure 2, the decision tree algorithm has 4 levels of classification: Outstanding, Good, Pass and Fail.

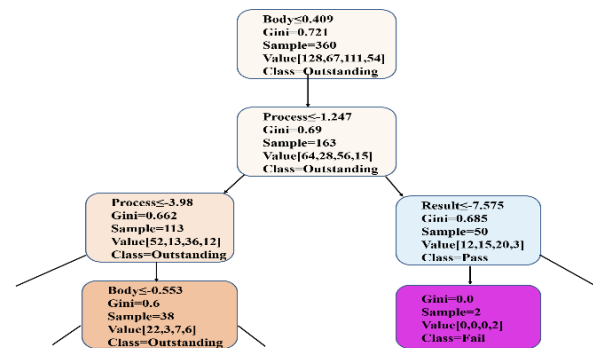


Figure 2. Diagram of the partial structure of the decision tree algorithm

3.3.3 Construction of neural network learning algorithms

We use a 4-layer fully connected BP neural network as another input model for integrated learning, where the feature values of the 3 dimensions of WeChat Public are used as input and the 4 evaluation levels of different types of WeChat Public belong to are used as output. For data with real labels, the possibility of the type corresponding to the label is 1 and the possibility of the rest of the types is 0. The ReLU function is used as the activation function. Figure 3 below shows the structure of the neural network

algorithm, the MLPClassifier is a supervised learning algorithm, the figure below shows the MLP model with only 1 hidden layer, the left side is the input layer and the right side is the output layer. Each neuron in the input layer contains four different types of features from the original data, which are input in the form of a matrix. Each neuron in the hidden layer represents the data that was updated once for the WeChat parameters, while each layer has N neurons indicating that the input data was extended to N features. Each neuron in each layer can have a different representation. Then the output of the hidden layer is:

$$f(W^{(1)}x + b^{(1)}) \quad (1)$$

Where $W^{(1)}$ is the weight (also called the connection factor), $b^{(1)}$ is the bias, and the function can be the commonly used sigmoid function or tanh function.

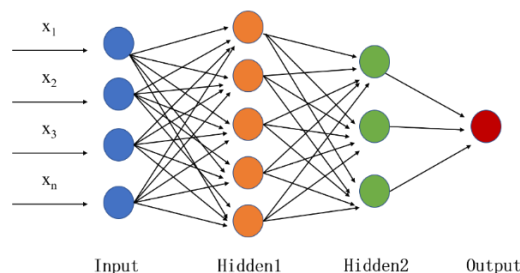


Figure 3. Neural network structure diagram

3.3.4 Analysis of results

By comparing the decision tree algorithm, the neural network algorithm and the neural network algorithm combined with the decision tree, it is seen that in the process of 10% data as the test set, the accuracy change of different prediction assessment models in the process of neural network iteration is calculated as shown in Figure 4 below. It is obvious through this figure that the accuracy rate of the decision tree-neural network integrated learning poor student identification model based on the database of this paper can be 96.85%, which is better to achieve the identification of poor students, and with the update of the database, the model can effectively complete the evaluation of the effect of the college microblogging public thinking education.

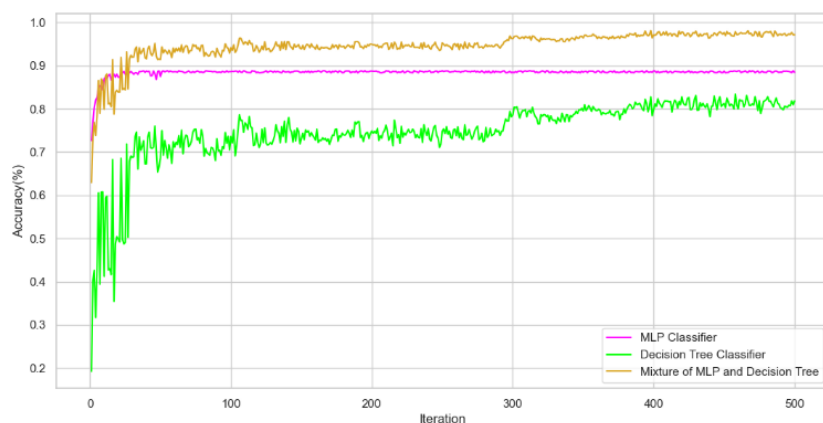


Figure 4. Assessment accuracy based on integrated learning of decision trees and neural networks

4 CONCLUSIONS

This research is based on the problems of confusing and ponderous subjects, limited information timeliness, applicability and popularity of college WeChat public numbers, etc. This paper designs and proposes an analysis system and feedback mechanism for the effect of Ideological and political education of college WeChat public numbers based on decision tree neural network model algorithm. After verification tests, it proves the effectiveness of the model applied to the evaluation and prediction of the Civic and Political Education of college WeChat public numbers. Based on the author's database, the recognition accuracy of the model can reach 96.85% at present. To a certain extent, it can assist new media

workers in universities to make certain decisions in assessing the effect of Ideological and political education on WeChat public numbers.

REFERENCES

- [1] Wang, Y. (2020). Analysis on the construction of ideological and political education system for college students based on mobile artificial intelligence terminal. *Soft Computing*, 24(11), 8365-8375.
- [2] Qin, J., Wang, Y., Zhao, Q., Tan, L., & Luo, Y. (2022). Evaluation of College Students' Ideological and Political Education Management Based on

- Wireless Network and Artificial Intelligence with Big Data Technology. *Security and Communication Networks*, 2022.
- [3] Wang, P. (2020). Research on ideological and political education of college students based on red resources. *International Journal of Social Science and Education Research*, 3(3), 74-78.
- [4] Wei, H., & Ke, L. (2014). “New Weapons” of Ideological and Political Education in Universities—WeChat. In *SHS web of conferences* (Vol. 6, p. 04001). EDP Sciences.
- [5] Xu, W., & Jingyi, C. (2019, February). Innovation and Development of College Students’ Ideological and Political Education Under the Background of Computer Development. In *International Conference on Application of Intelligent Systems in Multi-modal Information Analytics* (pp. 301-308). Springer, Cham.
- [6] Goodson, I. F., & Mangan, J. M. (1996). Computer literacy as ideology. *British journal of sociology of education*, 17(1), 65-79.
- [7] Pang, H. (2016). Understanding key factors affecting young people's WeChat usage: an empirical study from uses and gratifications perspective. *International Journal of Web Based Communities*, 12(3), 262-27

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