Research Article

Analysis of Emotional Education Infiltration in College Physical Education Based on Emotional Feature Clustering

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Integration of emotional education physical education research in colleges and universities is a topic that has both theoretical and practical implications. Teachers in physical education should pay attention not only to the development of students' physical knowledge and skills but also to their emotional education, emphasizing the positive role of emotional factors. Emotion is a type of internal experience that people have when deciding whether or not objective things can meet their needs. The diversity of emotional needs, the contradiction of emotional experience, the singleness of emotional orientation, and the universality of negative emotions are all new characteristics of contemporary college students' emotional development. A teaching feedback strategy generation algorithm based on the emotional learning ontology is designed to obtain the students' perception and understanding of the learning process without the need for question-and-answer interaction with the students. Based on "emotional triggers," a better understanding of students' learning status can be provided, as well as better cognitive and emotional support. The main measure and means to improve teaching quality and efficiency in physical education is to combine cognition, emotion, and education. This paper discusses the connotation and scope of emotional education in colleges and universities and proposes ideas for strengthening emotional education in colleges and universities in light of the new characteristics of college students' emotional development, based on the clustering of emotional features, in terms of emphasizing the emotional influence of teachers, bolstering students' aesthetic education, and exploring new avenues for college students' emotional education.

1. Introduction

"In today’s world, science and technology are advancing by leaps and bounds, the knowledge economy is beginning to take shape, and the competition in national strength is becoming increasingly fierce." An open world needs an open country [1]. China’s modernization must first realize people's modernization, which requires the Chinese nation to bravely go to the world with a vision, bearing and image marked by foresight, inclusiveness, and excellence. Emotional penetration is to integrate the emotions of teaching materials, teachers, and students in the whole teaching to make them understand. This three-dimensional teaching method is simple to incorporate into the promotion of education and cognition in order to improve teaching quality and efficiency [2]. Previous human-computer interaction provided people’s emotional information to computer equipment through individual subjective feelings to judge individual emotional state, but this method was not completely free of the influence of human subjective factors and failed to achieve successful emotional analysis. Overall, today’s college students are a group of “new people” who have grown up with the speed of national reform and opening, the process of national modernization, and television, computer, and network technology. They exhibit clear signs of the times in terms of emotional development [3]. Nowadays, the rapid development of intelligence provides a certain basis for computers to accurately judge human emotions, so that human-computer interaction can be close to the natural communication between people. Intelligent
teaching system refers to a computer system that can directly provide customized teaching and feedback to students without human intervention [4]. With the deepening of reform, the development of market economy, and the overstrenghthening of self-consciousness, it is inevitable that there will be disharmony or even dislocation among multiple interests, which will challenge the traditional values and lead to some young college students’ ideological confusion, distorted values, wavering ideals and beliefs, and sometimes even lack the moral ability to distinguish between good and evil, good and bad, and beauty and ugliness. Once encountering setbacks, they will lose self-confidence and be lonely and depressed.

The concept of “emotional computing” is based on emotion, which is to carry out the emotional state of the computer body and finally make the computer intelligently apply to the analysis of human emotional state, and the computer has perfect emotional computing. Machine learning-based methods [5] regard emotion recognition as a classification problem and use existing text classification algorithms to identify emotion categories expressed in texts. An emotion dictionary containing emotional information is constructed, and the text is represented as an emotion vector according to the dictionary; then, a convolutional neural network is used to extract the text emotional features; finally, an attention mechanism is added after the convolution operation to emphasize the contribution of different words to the text representation. The key basis of emotion computing is emotion recognition. Emotional intelligent teaching system refers to an emotional intelligent teaching system with emotional recognition ability and feedback according to students’ emotional state. This kind of system is mainly proposed for the problem of emotional lack in the traditional intelligent teaching system. At present, when we vigorously advocate quality education, on the premise that the future society requires students to have high comprehensive quality, we must advocate and integrate emotional education in teaching. The method based on behavior analysis can obtain the emotional state of learners in the unconscious state and does not infringe on learners’ body. It is more suitable for learners’ emotional modeling.

Emotion recognition does not require the computer to see people’s emotional state directly, like human beings, but refers to that the computer first guesses the emotional state through a series of information collection, such as expression, behavior, and emotional-induced environment [6]. Emotional education, while fully considering cognitive factors, permeates the educational influence into students’ emotional depths, gives full play to the positive role of emotional factors, and effectively strengthens and improves their self-awareness, self-motivation, emotional control, interpersonal communication, and ability to withstand setbacks, so as to improve educational objectives and enhance educational effects. Aiming at learner’s emotion modeling and based on text emotion analysis technology, we should focus on the expression model of learner’s emotion and the method and technology of learner’s emotion modeling based on emotion feature clustering. At present, there is a tendency in our school education to despise emotion and ignore the emotional life of students and only focus on the shaping of students’ external characteristics, such as the mastery of knowledge, the proficiency of technology, and the innocence of behavior. They pay no attention to their inner hopes, joys, or sorrows, resulting in a weakened ability to understand and control the inner world while improving their ability to recognize and control the outer world [7]. Recognizing and comprehending the emotional characteristics of this generation of college students, as well as developing positive and effective emotional education, are critical issues that college educators must address urgently [8]. It is necessary to improve teachers’ emotional intelligence and effectively implement emotional education for students in order to place a premium on the construction of students’ emotional worlds.

2. Emotional Education Penetration Method in College Physical Education Based on Emotional Feature Clustering

2.1. Generating Method of Base Sentiment Classifier. The penetration method of emotional education in college physical education based on emotional feature clustering uses different classification algorithms to train multiple basic emotion classifiers and then uses metalearning strategy to integrate the prediction results of multiple basic emotion classifiers. More and more college students emphasize the integration of self and society, demand, and dedication, take into account the national, collective, and personal interests, and pay great attention to self and reality.

In the intelligent learning system environment with emotional support, learning situations are characterized by diversity, heterogeneity, timing, and hierarchy, so we should manage them in an extensible way, organize, store, and search them, and express the situations semantically, so as to facilitate computer understanding, utilization, and processing, as well as interaction and cooperation between people and computers. In ensemble learning method, whether the result of classifier fusion is effective depends on the performance and independence of the base classifier. That is to say, emotion is a certain inner experience produced by people whether objective things can meet their own needs [9]. Teachers should establish an equal, democratic, and harmonious relationship between teachers and students from the perspective of thought and action. Emotional education is also an important goal in physical education, because physical activity itself is a kind of teaching that can develop both physical and mental aspects [10]. In the process of physical education, physical education teachers mainly teach students physical education knowledge, technology and skills through the selection of teaching content, the application of teaching methods, the form of teaching organization, and teaching evaluation. The above aspects are carried out, as shown in Figure 1.

Emotion recognition and cognitive education complement each other and cooperate closely and can promote each other. At present, emotion recognition is mainly studied from the aspects of facial changes, motion features,
speech features, text, and physiological signals [11]. Improving students’ self-motivation ability is influenced by motivation level, interest, and will in a short time [12]. The values in the mainstream state directly lead to the pluralism of college students’ emotional needs. Absolute authority worship and absolute single emotional needs have disappeared. Instead, diverse emotional needs have formed a rich, intense, and complicated structure of emotional needs, including low-level emotional needs related to physiology and material and high-level emotional needs related to psychology and spirit. From the perspective of a lifetime, it is rooted in the basic beliefs of life. The key to improve emotional control ability lies in keeping emotional balance by restraining impulse and delaying satisfaction.

After using ontology modeling to represent context semantically, context can be explicitly defined in a semantic way, context sharing can be achieved, and context reasoning can also be made possible. Therefore, ontology is an ideal choice for modeling emotional learning environments, improving interpersonal communication skills, including content at both cognitive and behavioral levels. From the cognitive level, interpersonal communication is also compassion, that is, the ability to understand the feelings of others; from the behavioral level, interpersonal communication is an interactive communication process and relationship building [13]. The theoretical and practical problems that pervade the entire field and process of educational activities are at the heart of emotional education that allow students to experience teachers’ emotional care, help, and support in addition to learning educational knowledge and basic sports skills in physical education. It is especially important for students to increase their tolerance for frustration. The key is to understand and deal with setbacks correctly, as well as to provide timely psychological treatment [14]. Students’ emotional intelligence can be developed and improved in the ways mentioned above, which is beneficial to the overall development of students’ body and mind, as well as forming a sound personality, in order to achieve the overall educational goal.

2.2. Metaemotion Classifier Training Based on Superposition Strategy. After using different classification algorithms to obtain multiple base sentiment classifiers, a certain fusion method is needed to fuse the results of multiple base sentiment classifiers, so as to obtain the final sentiment classification result. The following contradictions and conflicts generally exist in the emotional experience of college students: the contradiction between advocating rationality and strong emotionality and the contradiction between the development of self-consciousness and the ambiguity of self-image [15]. Aiming at the problems existing in the existing emotional ontology and the specific application of intelligent teaching system, an emotional learning ontology is designed. The ontology includes the description of emotional classification, emotional feedback strategy, teaching process, and cognitive state. Considering that it is necessary to comprehensively include the individual characteristics of learners and facilitate computer implementation, a learner model with learners’ knowledge state, learning style, and emotional state as the main characteristic factors is constructed, which is referred to as the learner model for short. The specific feature structure is shown in Figure 2.

The goal of emotional education finally points to the completion of the whole educational goal and the cultivation of sound personality, which is the ultimate or highest goal of emotional education.

Teaching knowledge, sports skills, and cultivating emotions are three aspects of the teaching process that are all
intertwined. Students should be allowed to teach emotional education in physical education during the teaching and training process, in order to unify the scientific and ideological content of the teaching [16]. In traditional teaching activities, a low emphasis on emotion is viewed as an extra item of instruction that is unnecessary. The fusion method of metalearning uses the output results of multiple base classifiers as intermediate features (also known as metafeatures) and then learns a metaclassifier from the training sample’s metafeature vector using a specific classification algorithm. This metaclassifier combines the output results of multiple base classifiers. The process of realizing learners’ emotion category determination is shown in Figure 3, which mainly includes four modules: feature word selection and clustering, word cluster feature representation, metafeature representation, and metalearning algorithm. The classes and methods corresponding to each module are shown in Figure 3.

Therefore, if there is no mutual penetration and cooperation of emotional education in teaching activities, many cognitive activities cannot be carried out. The standard BP neural network has better advantages in function approximation, especially nonlinearity, but it is easy to fall into local minimum. At present, facial, speech, and behavioral emotion recognition technology has been developed relatively maturely, but relatively speaking, the research on physiological signal emotion recognition is still less. The standard BP neural network [17] should be improved. Combined with the advantages of the Bayes algorithm and BP neural network algorithm, the Bayes algorithm should be used for regularization. That is, in the learning process of neural network method, the value of network link weight can be adjusted adaptively to reduce the complexity of neural network. The method of balanced neural network is used to improve the fitting degree of training samples, so as to improve the generalization ability of neural network. According to the characteristics of emotional development of contemporary college students, the focus of emotional education in colleges and universities at present is to understand students’ needs, cultivate students’ positive emotions, stimulate students’ potential, promote students’ creative learning and exploration, and enable students to experience the dignity of life in the process of learning [18]. The ontology model of affective learning can be used to infer students' learning state and generate a set of applicable cognitive feedback strategies and affective feedback strategies.

Emotional traits are at the heart of a lot of personality research. As a result, we should set practical emotional education objectives alongside the syllabus’s objectives and combine knowledge, skills, and emotional education in the classroom [19]. Teachers should combine the emotional education of imparting basic sports skills and basic sports knowledge and cultivating students’ interest in sports when teaching physical education [20]. Because current education is based on a developmental philosophy, this people-centered philosophy and teaching method is a common tool used and applied in developmental education. This concept is fully realized and embodied as emotional infiltration. This teaching method focuses on the excavation and development of the subject’s internal potential, as well as the opening and internal development of people’s hearts, rather than simply emphasizing absorption and understanding of the subject.

3. Generation and Analysis of Feedback Strategy Based on Emotional Learning Ontology

3.1. Comparative Analysis of Fusion Strategies of Base Sentiment Classifiers. In ensemble learning, there are many methods to fuse the prediction results of base classifiers. This paper uses metalearning method to fuse the prediction results of multiple base emotion classifiers. It is defined that

![Figure 2: Characteristic structure of KSA learner model.](image-url)
The number of training samples is \( L \), the weight of BP neural network is \( w_j \), and the number of neural network connection weights is 1. The neural network training function is the mean square error objective function \( F \):

\[
F = \alpha E_w + \beta E_D, \tag{1}
\]

where \( \alpha, \beta \) is the regularization coefficient.

Emotional education in colleges and universities should include respecting and satisfying the emotional needs of college students, including low-level emotions related to physiological needs and high-level emotions related to psychological and spiritual needs, and the focus of education is to meet students’ high-level emotions. High-level emotions, such as moral sense, aesthetic sense, and self-esteem, are stimulated and consolidated by emotional needs [21]. The concept and relationship of emotional learning ontology are mainly divided into two parts from the standpoint of content. The first is about learners as individuals, such as their learning abilities, personalities, emotional states, and cognitive states; the second is about the teaching process, such as teaching steps, knowledge points, and feedback. Because teaching focuses on knowledge concepts, logical reasoning, and mathematical formulas and lacks guidance for students in value, aesthetics, emotion, will, belief, responsibility, and so on, students obtain a large set of knowledge but lack a true understanding of modern life, beauty, responsibility, emotion, and so on, resulting in a lack of life experience and a one-sided life [22]. Comparing the absolute value of the signal with the specified threshold, the part less than or equal to the threshold is 0, and the part greater than the threshold is the difference from the specified threshold, that is, soft threshold denoising. The calculation formula is as follows:

\[
\omega \lambda = \begin{cases} 
\text{sign}(\omega)(|\omega| - \lambda), & |\lambda| \geq \lambda, \\
0, & |\omega| < \lambda.
\end{cases} \tag{2}
\]

In physical education teaching, because of the particularity of physical education teaching, teachers should keep abreast of students’ physiological and psychological conditions in class, especially for students with poor health and sports foundation, and give them more help, support, and encouragement while understanding, so as to provide them with a good emotional education atmosphere. The vector set based on keyword features and the vector set based on word curtain feature are used as input, respectively, and threefold cross-validation experiments are carried out. That is to say, the vector set is randomly divided into 8 equal parts, and 4 parts are taken as training data and 4 parts are used as test data each time. When the number of features is counted, the microaverage and macroaverage results of the sentiment classification experiment are shown in Figures 4 and 5.

The richness of the inner world far exceeds people’s own expectations, so in teaching, inner shaping has a huge impact on the quality of teaching, and the penetration of emotions in teaching is mostly such shaping activities [23].
Based on the Mallat algorithm, binary wavelet transform is performed on the ECG signal \( f(n) \), and the calculation formula is as follows:

\[
S_{2j}f(n) = \sum [h_k S_{2j-1}f(n - 2^{j-1}k)]. \tag{3}
\]

The clustering classification method based on emotion features mainly uses the naive Bayes, maximum entropy, and support vector machine algorithm to train three different basic emotion classifiers and uses the sorted dictionaries with emotional polarity values, including adjective dictionary, adverb dictionary, verb dictionary, and interjection dictionary [24]. Each word in each dictionary corresponds to an emotional polarity value, and the emotional polarity value of each word is calculated by using semantic positioning algorithm based on online product review set as corpus. The results of independent sample \( T \) test report that the emotional intelligence of different students in two independent samples is divided into two groups: whether they are working in social work or not. According to the results, it is considered that there are significant differences in the emotional intelligence of the students surveyed whether they are engaged in social work or not, which further shows that whether students are engaged in social work has obvious influence on their emotional intelligence. The Levine variance under different characteristic values is shown in Figure 6.

There must be differences between the emotions expressed by subjective performances and the emotions naturally revealed in the real state. Therefore, the data collection scheme of the MIT affective computing database will have defects in typicality and naturalness [25]. Regarding the cognitive state and teaching steps, due to the close connection between cognition and emotion, only by linking the cognitive process and state with the emotional state can we understand the students’ emotional state and its causes. The one-sidedness of education is contrary to the essence of people’s life and spiritual integrity. Therefore, complete education must be carried out quickly in modern college education to help students construct complete experience and spirit [26]. Through the accumulation of students’ emotional experience in physical education teaching, their emotional experience is improved and enriched, and their sentiment is constantly cultivated, so as to make them a physically and mentally healthy person, and the innovation of this activity is also very easy to cultivate and develop their practical ability. The Bayes algorithm model combines the advantages of BP neural network approaching nonlinearity, uses Bayes regularization to improve the relevant shortcomings of BP neural network algorithm, comprehensively balances the fitting degree of neural network processing data training samples, and controls the complexity of neural network. Therefore, the network generalization ability of neural network can be improved.

3.2 Heart Rate Variability Analysis Based on Wavelet Transform and Independent Variable Analysis. The ontology-based reasoning method defines the learner’s personal information, learning state, learning process, learning resources, and the relationship between these concepts and reasoning rules through the ontology description language and realizes the reasoning and analysis of the students’ learning status through the emotional reasoning engine. The commonly used principal component analysis and singular value decomposition algorithms mainly compress multidimensional data by eliminating the correlation between components [27]. Independent variable analysis can finally obtain independent components by analyzing the high-order characteristics of signals. Suppose a mixed signal \( x(k) \) is composed of \( m \)-dimensional observation signal vector:

\[
x(k) = [x_1(k), x_2(k), \ldots, x_m(k)]^T, \tag{4}
\]

where \( S(k) \) is the vector composed of source signals with unknown dimension \( n \).

Wavelet switching is a hot technology commonly used in data signal analysis [28]. The base sentiment classifier and the metasentiment classifier are used in turn to determine the sentiment category of sentiment feature clustering, and the result of the metasentiment classifier is used as the final result. Text affective feature extraction is to express the text features expressing text affective tendency into feature.
The quadratic B-spline scaling function is the first derivative of the smoothing function. The filter bank in the literature is applied, and the filter bank coefficients are as follows:

\[ H(Z) = \frac{1 + 3Z^{-1} + 3Z^{-2} + Z^{-3}}{4}. \]  

(5)

In order to extract the emotional features of the text, firstly, the text symbols should be digitized. The emotional polarity and part of speech of words in the text largely determine the emotional tendency of the whole text. Therefore, we should consider using the emotional polarity and part of speech of words to construct emotional word vectors. The correlation test between the total score of emotional intelligence and social work showed that Spearman's rho correlation coefficient of the two was 0.156, which reached a significant correlation at the 0.004 level (two-tailed test), so it was considered to have a very significant statistical significance. It can be seen that there is a certain correlation between students' emotional intelligence and social work, that is, whether students are engaged in social work has a certain impact on emotional intelligence. The comparison of degrees of freedom and mean difference Levine variance under different eigenvalues is shown in Figure 7.

Emotion education can greatly enhance the aesthetic feeling, pleasure, and happiness of college students [29]. The reasoning is based on one of the following conditions: one of them immediately thinks that the students' mastery of KDPi_pre is not ideal: First, the students' answers to the related questions of the current knowledge points are incorrect. Secondly, it can also be inferred that the students' prior knowledge points are not ideally mastered by the students' emotional state of confusion or frustration in the stage of reviewing relevant knowledge of the current knowledge points. The common development of IQ and sympathy quotient is the goal that modern education needs to pursue, and high EQ can effectively promote the development of IQ. When the wavelet coefficient is less than a certain set threshold, it means that the wavelet coefficient at this time is related to noise and is removed. On the contrary, when it is greater than the set threshold, it is considered to be caused by the signal. Therefore, retaining this part of the wavelet coefficients is called hard threshold denoising calculated as follows:

\[ \omega \lambda = \begin{cases} \omega \lambda, & |\omega| \geq \lambda, \\ 0, & |\omega| < \lambda, \end{cases} \]  

(6)

where \( \omega \) is the wavelet coefficients, \( \lambda \) is the threshold, and \( \omega \lambda \) is the wavelet coefficients after threshold.

At present, in the field of psychology, it is believed that for modern people, effectively changing and improving our psychological and emotional environment and ways can effectively stimulate the enthusiasm of study and work and greatly promote and effectively improve the efficiency [30]. Whether the origin of education should be raised to the moral level can be discussed, but at least, it can be confirmed that the emergence of education is closely related to the needs of people's belonging and love besides meeting the needs of people's survival. Wavelet switching also has constant-Q band-pass filtering performance, so the bandwidth is adjusted by adjusting the center frequency, and the higher the center frequency, the narrower the bandwidth, which changes in inverse proportion, so the wavelet transform can well analyze the characteristics of high and low frequency changes at the same time. In addition to the strong global optimization ability, the genetic algorithm is not affected by function derivation and continuity and can also adjust the search direction according to the search situation. The optimization process of the genetic algorithm is shown in Figure 8.

Different social forms have great differences in understanding and explaining the essence of education, and people can only explain the essence of education that reflects the requirements of the times when they realize the requirements of society for education. The application of emotion infiltration in teaching is undoubtedly the best explanation and time for the above theory. Through the educational guidance of emotional goals, the classroom atmosphere can be effectively relaxed and improved into a flexible, relaxed, and harmonious atmosphere. After incorporating the...
learner’s emotional characteristics into the learner model, the adaptive learning system can understand the learner’s emotional state and show certain adaptability to the learner’s emotional state.

Due to the complex relationship between cognition and emotion, students’ cognitive state and emotional state will affect the choice of emotional feedback strategy and cognitive feedback strategy, respectively. In terms of teaching structure, it advocates that teaching activities are the unity of cognition, emotion, and behavior. Constructing an educational concept with human emotional quality as the core content is not only a care for the reality of “human nature” but also a return to the origin of education. It is emphasized that physical education teaching should be a three-dimensional structure integrating knowledge, emotion, and physical development.

4. Conclusions

In order to enable the intelligent teaching system to better support learners, especially to solve the problems of emotional understanding and emotional feedback, this paper constructs an emotional learning ontology, which is used to describe the concepts related to emotions and the relationship between concepts in the learning process. This ontology can be used to analyze students’ learning situation by reasoning. In this paper, an emotional learning ontology is proposed as a subject that needs to be thoroughly researched for college teaching, including physical education. Teachers of physical education should begin by establishing an equal, democratic, and harmonious teacher-student relationship. Because most existing studies only use one classification algorithm to determine the emotional category of text, and the accuracy is low, the accuracy of clustering emotional feature determination can be improved by utilizing the complementarity of classification algorithms. The samples are transformed using the wavelet transform, with the db5 wavelet function performing 8-layer decomposition and the threshold function set to a soft threshold for better results. Physical education teaching has its own set of characteristics when compared to other disciplines. There are more opportunities for teachers and students to contact each other in the classroom, which is conducive to physical education teachers incorporating emotional education into their teaching and paying attention to developing students’ sports interests, love students, and educate people with emotion. The internal spirit of emotional education in college physical education is based on a thick foundation based on the clustering of emotional characteristics. Making some modifications and enrichment should be applied to a broader teaching practice on the premise of retaining its spiritual connotation.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors do not have any possible conflicts of interest.

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