Personalized Music Psychological Intervention Based on Artificial Intelligence: The Role of Real-time Emotion Recognition and Feedback in Students' Emotional Expression and Skill Acquisition

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Abstract: This article focuses on the field of personalized music psychological intervention based on artificial intelligence, delving deeply into the role of real-time emotion recognition and feedback in students' emotional expression and skill acquisition. This paper expounds the technical basis and implementation methods of artificial intelligence in music psychological intervention, and analyzes the positive impact of real-time emotion recognition and feedback on students' emotional expression, including enhancing emotional perception and enriching expression methods, etc. At the same time, it discusses its promoting effect on students' skill acquisition, such as enhancing learning motivation and optimizing learning strategies. Finally, the future development direction is prospected, aiming to provide theoretical references for the application of artificial intelligence in personalized music psychological intervention in the field of education.

Keywords: Artificial Intelligence; Personalized Music Psychological Intervention; Real-time Emotion Recognition; Emotional Expression; Skill Acquisition

1. Introduction

1.1 Research Background and Significance

In today's educational environment, students' mental health and all-round development are receiving increasing attention. Emotional expression and skill acquisition, as key elements in students' growth process [1], have a profound impact on students' academic achievements, interpersonal relationships, and future social adaptability. Traditional educational intervention methods have certain limitations in meeting students' individualized needs and providing real-time feedback [2].

With the rapid development of artificial intelligence technology, its application in the field of education has provided a new approach for personalized psychological intervention. Personalized music psychological intervention based on artificial intelligence can more accurately understand students' emotional states through real-time emotion recognition and feedback, and provide targeted music intervention, thereby effectively promoting students' emotional expression and skill acquisition [3]. This research holds significant theoretical and practical significance for enriching educational intervention methods and enhancing educational quality.

1.2 Review of Current Research Status at Home and Abroad

In terms of emotion recognition technology, there have been studies on various models. Multimodal emotion detection and sentiment analysis have attracted attention because applications can use specific subsets of available patterns based on the available data. Although current systems handling multimodal functions have not fully utilized and captured the dependencies between the dialogue background, the emotional states of the listener and speaker, and the correlations and relationships among available modalities through all modalities, relevant research has proposed an end-to-end RNN architecture, attempting to take these shortcomings into account and achieve various accuracy and regression metrics. The performance on the benchmark dataset is superior to the current technical level [4].

In terms of the application of music psychological intervention, some studies have explored the use of artificial intelligence technology for emotion recognition and its application in music therapy to improve patients' emotional states. For instance, some studies identify emotions by analyzing speech features

and select appropriate music for intervention based on the recognition results [5]. There are also studies that describe conceptual evidence for the formation of emotion acquisition and control, aiming to establish functional, non-invasive and emotionally sensitive systems that detect and distinguish emotions through facial expressions or speech recognition to make music recommendations and emotion color processing [6].

In recent years, China has gradually paid attention to this field. Some scholars have begun to study the application of artificial intelligence in music education, but most of them have focused on assisting music teaching. There are relatively few studies on personalized music psychological intervention based on artificial intelligence, especially the impact of real-time emotion recognition and feedback on students' emotional expression and skill acquisition. Therefore, conducting this research is both innovative and necessary.

2. Overview of Personalized Music Psychological Intervention Based on Artificial Intelligence

2.1 The Application Principle of Artificial Intelligence Technology in Music Psychological Intervention

Artificial intelligence mainly relies on multiple technologies in music psychological intervention. Natural language processing technology can analyze the text information of students during their interaction with the system to understand their emotional tendencies and needs. For instance, the words and sentences that students use when describing their feelings can be semantically analyzed through natural language processing technology to determine their emotional states. Speech recognition technology can capture the voice features of students' speech, such as pitch, speaking speed and volume, which are closely related to emotional states. Research shows that people's speech features vary significantly under different emotional states. Through speech recognition technology, students' emotions can be accurately identified [7].

Machine learning algorithms are used to train on a large amount of emotion data and music data, establishing emotion recognition models and music recommendation models. Through continuous learning and optimization, the model can more accurately identify students' emotions and recommend the most suitable music intervention plan for them. For instance, deep learning algorithms perform well in emotion recognition and music classification, capable of learning and analyzing complex emotion and music features [8]. Computer vision technology can also be applied to analyze students' facial expressions, further assisting in emotion recognition. Facial expressions are one of the important ways to express emotions. Through computer vision technology, students' smiles, frowns and other expressions can be recognized to determine their emotional states [9].

2.2 Implementation Methods of Personalized Music Psychological Intervention

The realization of personalized music psychological intervention requires a comprehensive consideration of individual differences among students. First of all, through the initial assessment, understand the student's basic information, emotional characteristics, music preferences, etc. Then, artificial intelligence technology is utilized to monitor students' emotional states in real time. When a specific emotion is detected in a student, the system selects the corresponding music from the music library for playback based on preset rules and models.

Meanwhile, the system will constantly adjust the music intervention plan based on students' feedback. For instance, if a student responds positively to a certain piece of music, the system will increase the recommendation frequency of music of a similar style. Conversely, if students do not respond well, the system will try other types of music. This personalized intervention approach can better meet the needs of students and enhance the intervention effect.

3. The Role of Real-time Emotion Recognition and Feedback in Students' Emotional Expression

3.1 Enhance Students' Emotional Perception Ability

Real-time emotion recognition and feedback can help students understand their emotions more clearly. By accurately identifying students' emotions through artificial intelligence systems and providing feedback to them in an intuitive way, such as through text prompts and chart displays, students can understand their emotional

changes in different situations.

For instance, when students feel anxious during the learning process, the system can promptly identify and inform them, "You are currently in an anxious state." This kind of feedback makes students aware of their emotions, thereby prompting them to think about the causes of anxiety. By receiving such feedback over a long period of time, students can gradually enhance their sensitivity to their own emotions and perceive their emotional states more accurately.

3.2 Enrich Students' Ways of Expressing Emotions

Music is a powerful medium for emotional expression. Personalized music psychological intervention based on artificial intelligence provides students with more ways to express their emotions. The system recommends different types of music based on students' emotional states. Students can release and express their emotions by listening to, singing or playing this music.

For introverted students who are not good at expressing their emotions in words, musical intervention is particularly important. They can convey their inner feelings by immersing themselves in music. For instance, when students feel sad, listening to a soothing sad piece of music can help them vent their emotions better. When students feel excited, choosing a lively piece of music can further enhance their positive emotional experience and express it in the form of music.

3.3 Promote the Accuracy of Students' Emotional Expression

Real-time emotion recognition and feedback help students express their emotions more accurately. While identifying students' emotions, the system will guide them to think about the causes of their emotions and the ways to express them. For instance, when the system recognizes a student's angry mood, it will prompt the student, "What has caused your current anger?" You can try to express your dissatisfaction in a more peaceful way.

Through such guidance, students can gradually learn to distinguish different emotions and choose appropriate language and behaviors to express them. Meanwhile, elements such as lyrics and melodies in music intervention can also provide students with examples to express their emotions, helping them improve the accuracy and richness of their emotional expression.

4. The Role of Real-time Emotion Recognition and Feedback in Students' Skill Acquisition

4.1 Enhance Students' Motivation to Learn

A positive emotional state is closely related to learning motivation. Real-time emotion recognition and feedback can promptly identify students' negative emotions and adjust them through music intervention, enabling students to maintain a positive mindset. When students are in a positive mood, they are more willing to engage in their studies and are full of enthusiasm for learning tasks.

For instance, when students encounter difficulties and feel frustrated during their studies, the system, upon recognizing this emotion, will play some inspiring music, such as songs with uplifting lyrics or passionate symphonies. These pieces of music can inspire students' inner motivation, enabling them to pick themselves up again, overcome difficulties and keep on studying hard. Students who are in a positive emotional state for a long time will have their learning motivation continuously enhanced, and thus acquire various skills more effectively.

4.2 Optimize Students' Learning Strategies

Emotional states can influence students' choices of learning strategies. Real-time emotion recognition and feedback can help students understand their learning characteristics under different emotions, thereby adjusting their learning strategies. For instance, when the system detects that a student is in a state of anxiety, it may prompt the student to adopt some relaxing learning methods, such as deep breathing and short breaks, to relieve anxiety and enhance learning efficiency.

Meanwhile, the rhythm and cadence in music intervention can also influence students' learning pace. For some skills that require concentrated learning, the system can recommend music with a stable and soothing rhythm to help students enter a focused learning state. For some learning tasks that require creative thinking, music with diverse rhythms and vitality may be more helpful in stimulating students' inspiration and optimizing their learning strategies.

4.3 Promote the Transfer of Students' Skills

Skill transfer refers to the ability to apply the

skills learned in one situation to other situations. Real-time emotion recognition and feedback, by creating a positive emotional atmosphere, help students better understand and master the skills they have learned, thereby promoting skill transfer. When students maintain a positive mood during the learning process, they are more capable of deeply contemplating the essence and laws of skills and integrating the knowledge they have learned.

For instance, in music learning, through personalized music psychological intervention, students not only learn to play a piece of music but also understand the structure and expression techniques of music in a positive emotional experience. This understanding helps them transfer the musical skills they have learned to the performance of other pieces and even apply them to the study of other art fields, thereby enhancing students' comprehensive skill levels.

5. Challenges and Countermeasures of Personalized Music Psychological Intervention Based on Artificial Intelligence

5.1 Challenges Faced

Personalized music psychological intervention based on artificial intelligence faces some challenges in practical applications. First of all, the accuracy of emotion recognition needs to be improved. Although artificial intelligence technology has made certain progress in emotion recognition, due to the complexity and diversity of human emotions, the current recognition models still have certain errors.

Secondly, the construction and management of the music library are facing difficulties. To achieve personalized music recommendations, it is necessary to have a rich and diverse music library with accurate classification. However, collecting and organizing a large amount of music resources and effectively classifying and labeling them is a huge project. In addition, how to protect students' privacy and data security is also an important issue. When collecting and using students' emotional data and music preference data, it is necessary to ensure the confidentiality and security of the data.

5.2 Countermeasures and Suggestions

To enhance the accuracy of emotion recognition, machine learning algorithms can be further optimized, and the diversity and quantity of training data can be increased. At the same time, by integrating multiple emotion recognition technologies, such as speech recognition, facial expression recognition and text analysis, multimodal emotion recognition is carried out to improve the accuracy of recognition.

In terms of music library construction, it is possible to collaborate with professional music institutions to obtain high-quality music resources and organize and label them using professional music classification methods. Establish a strict data management system, adopt encryption technology to protect students' privacy and data security, and ensure that data is only used for legitimate educational intervention purposes.

6. Conclusion

This study explores the role of real-time emotion recognition and feedback in personalized music psychological intervention based on artificial intelligence in students' emotional expression and skill acquisition. The research results show that real-time emotion recognition and feedback can enhance students' emotion perception ability, enrich the ways of emotion expression, and improve the accuracy of emotion expression. At the same time, it can enhance students' learning motivation, optimize learning strategies, and promote skill transfer. Personalized music psychological intervention based on artificial intelligence provides an effective intervention method for the field of education, which is conducive to the all-round development of students.

In the future, personalized music psychological intervention based on artificial intelligence is expected to be more widely applied and developed. With the continuous advancement of artificial intelligence technology, the accuracy of emotion recognition will be further enhanced, and music recommendations will become more precise and personalized. Meanwhile, it is possible to explore the combination of virtual reality, augmented reality and other technologies with music psychological intervention to create a more immersive learning and emotional experience environment for students.

In addition, more empirical research should be conducted to deeply explore the responses and effects of different student groups in personalized music psychological intervention based on artificial intelligence, providing more targeted guidance for educational practice. It is believed that in the near future, personalized

music psychological intervention based on artificial intelligence will become an indispensable part of the education field and play a greater role in the growth and development of students.

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