



The Application and Research of Artificial Intelligence in The Field of Music Education

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Abstract

AI technology will be used in music teaching, bringing the easiest way to music teaching. This work aims to study the application of artificial intelligence in music teaching. On the basis of full investigation and research on intelligent piano music teaching, combined with the advantages of intelligent piano teaching, the construction of intelligent piano teaching functions complements each other to form the basic framework of intelligent piano teaching. Starting from teaching practice, this paper makes a beneficial exploration of students' piano learning, and combines teaching methods such as game teaching and situational teaching with the functional characteristics of intelligent pianos to improve students' learning efficiency. The results show that 118 students especially like intelligent piano teaching. It provides a new idea and method for educational reform and theoretical support for innovative research on piano education.

Keywords: *Artificial intelligence, music education, intelligent piano, teaching efficiency.*

1 INTRODUCTION

Wisdom music education is based on the development of wisdom education in the field of music. Although it is not yet fully developed, we can still find it different from traditional music education methods from cutting-edge concepts [1] [2]. According to school supervisors, large-scale data analysis can allow supervisors to identify gaps in existing systems and improve curriculum [3]. For teachers and students, smart education brings a new teaching method: the emergence of iPad, smart digital piano, smart piano and a large number of music learning software [4]. This combination of software and hardware has become a common phenomenon in the music education market after several years of development, followed by the trend of industrialization and specialization [5].

Artificial intelligence is already used in education, and researchers demonstrate strategies for evaluating modern artificial intelligence (AI) in education, as well as research aimed at developing students with the skills and expertise needed to transform current and future statistics. for Industry 4.0. These strategies are designed to support curriculum construction in higher education, including business intelligence summaries that demonstrate progress in AI and issues of interest to academic institutions, with a focus on human communication using machine learning machines and

projects [6] There are also scholars who experience the complex, multi-layered phenomenon of emotion through music. Drawing on research experience, a new study was conducted to examine the relationship between age, music education, and the science of fiction, and to experience emotion from music. Ask elementary students in grades 5 and 7 and high school students in grades 1 and 3 to listen to music samples and, based on each sample, choose one of six basic emotions (happy, sad, angry, fearful, excited, and calm) in On a scale of 1 (none) to 5 (exception), expresses the emotion experienced. The results show the importance of music knowledge and music education in music experience [7]. At present, these methods have not fully met the requirements of smart music education, but the future is very worth looking forward to [8].

Through the research of intelligent piano group class in public primary schools in the compulsory education stage, it is concluded that intelligent piano group class can be used as an extension of music classroom and promote the development of music education in primary schools. After investigation and research, teachers and students believe that this form of teaching has a positive effect on popularizing music, cultivating children's musical literacy, music skills, and enhancing children's interest in learning. This form of teaching can also use modern functions to improve teaching efficiency, and through the interaction between teachers, students and

classmates, to cultivate students' communication skills and teamwork skills.

2 RESEARCH ON THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF MUSIC EDUCATION

2.1 College Music Education

As an educational practice activity, music education in colleges and universities aims at improving the humanistic quality of college students and cultivating good character, aiming at the reality of college students' humanistic quality education, with aesthetic activities as the core and music teaching as the means of art education [9]. The fundamental task of music education in colleges and universities is to achieve the purpose of educating people through music teaching. Compared with professional education, music education in colleges and universities highlights the basics. The purpose is to popularize music knowledge for college students, cultivate students' interest in music, develop a love for music, so that they can learn to perceive the charm of music, understand the role of music, and be able to actively Participate in campus music events.

The essential characteristic of music education in colleges and universities is aesthetic education. It is to give the appreciator the initiative, establish the dominant position of the aesthetician, let them choose and choose according to their own intentions, gradually participate in the music, and exert their own creativity, so as to eliminate the artificial sense of authority caused by the musical works, and make the music. The work returns to its original, approachable appearance. The important feature of music education in colleges and universities is to highlight the moral education for college students, so that college students can grasp the pulse of the development of the times, feel the changes around them, strengthen their self-discipline and sense of responsibility, and promote their own healthy growth through music lessons.

2.2 The Function of Artificial Intelligence Piano in Music Education

2.2.1 Entertainment and Interactive Functions

In the era of the Internet, in order to further stimulate students' interest in learning piano, the intelligent piano software has specially added the design of the game to break through the levels. This game design can allow most students to learn piano in a relaxed and pleasant learning atmosphere. For example, the game mode of "Waterfall Flow" is shown in Figure 1. Students can freely choose to play the songs in the game. By practicing the piano according to the prompts of the LED indicators, they can easily and quickly learn the music and improve

the performance of the piano. Listening to music stimulates learning and makes piano learning easier.

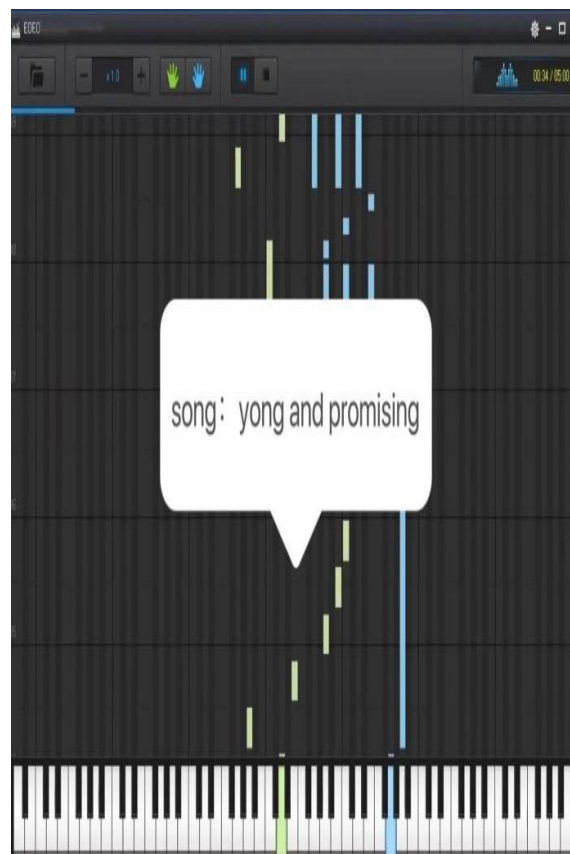


Figure 1. Entertainment interactive function

2.2.2 AI intelligent Sparring Function

AI intelligent piano sparring is based on speech recognition, semantic recognition and other technologies, helping children to carry out personal repeated practice of standard vocabulary in the system until they become proficient in intelligent interactive teaching. The AI intelligent sparring function is divided into two modes: class and practice. In the class mode, select songs according to your needs, and follow the intelligent voice prompts to carry out targeted learning step by step; AI intelligent sparring can also analyze the areas that need to be focused on according to the students' playing conditions, and use scientific methods to carry them out. In the practice mode, students can independently choose parting practice, sentence practice and fun practice. Each phrase has two parts: "reading notation" and "slow practice". "Reading notation" ensures that every note is played correctly from the beginning., There is a metronome and accompaniment music in the process of "slow practice", so that the piano practice is not boring. The intelligent evaluation function in the practice mode can intelligently correct errors in the rhythm and intonation problems of students during practice, and automatically generate evaluation reports, so that students and teachers can keep abreast of the piano

practice. The evaluation function will give students a sense of success through virtual rewards, so that students can master the piano practice method in a relaxed and pleasant atmosphere, avoid wrong notes, and fall in love with piano practice.

2.2.3 Online Piano Classroom

The intelligent piano network piano classroom is divided into two categories. It is a music classroom used by teachers and students to listen, appreciate, perform, create, rehearse and other piano teaching activities. The other category refers to the online piano classrooms used by smart pianos for remote teaching and video teaching. "Video teaching" means that users can choose to record or live broadcast according to their learning needs in the smart piano's built-in system or its own teaching application. Video teaching courses.

The recommendation function of the online piano classroom: the keyword set $w_j = \{w_0, w_1, w_2, \dots, w_m\}$ is counted from the user's course selection records. Similarly, each keyword w_0 can be classified into the clustering result R , using the "bag of words model" idea to obtain user interest characteristics, so the formula:

$$f_j^U = [M_{(cluster1)}, M_{(cluster2)}, M_{(cluster3)}, \dots, M_{(clusterk)}] \quad (1)$$

Among them, k represents the total number of clusters.

Cosine similarity measures the difference between items by calculating the cosine value of the angle between two vectors in the vector space. The larger the cosine value, the smaller the angle between the vectors, and the more similar the two vectors are. Conversely, the smaller the cosine value, the less similar the vectors are.

$$\text{cosine} \langle x, y \rangle = \frac{\sum_{i=1}^n x_i \cdot y_i}{\sqrt{\sum_{i=1}^n x_i^2} \sqrt{\sum_{i=1}^n y_i^2}} \quad (2)$$

Thus, a list of similar courses sorted by similarity and a list of courses most similar to a user's interests are formed. When recommending courses for a specific user, it is necessary to filter out the selected courses to form a Top-N recommendation list.

3 INVESTIGATION AND RESEARCH ON THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF MUSIC EDUCATION

3.1 Object of Investigation

In this survey, the author selected the undergraduates of two universities, namely, the Normal University and the Conservatory of Music in M Province, as the survey

objects, with majors including piano majors and non-piano majors. The Conservatory of Music is the only independent institution of higher music in the central region. Normal University established the School of Music in 2004. Now there are vocal music department, piano department, musicology department, instrumental music department; Music Education Experimental Teaching Center, China Choral Art Research Center, and Music Research Institute.

3.2 Data Collection

During the questionnaire delivery process, 75 students were randomly selected from two colleges and universities who had been exposed to courses related to smart piano. A total of 160 questionnaires were distributed, 160 questionnaires were returned, 160 were valid, the recovery rate was 100%, and the efficiency was 100%. There are 85 piano majors and 75 non-piano majors. In general, the distribution of various groups of people is relatively even.

3.3 Data Preprocessing

Through SPSS22.0 for data output, the Cronbach coefficient value of the total questionnaire of the current situation of the intelligent piano-assisted piano basic teaching is 0.989. This indicates that the questionnaire has high reliability and meets the research requirements. and perform a t-test. The t-test procedure used in this document is as follows:

$$t = \frac{\bar{X} - \mu}{\frac{\sigma X}{\sqrt{n}}} \quad (3)$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (4)$$

Among them, formula (1) is a single population test, s is the sample standard deviation, and n is the number of samples. Equation (2) is a double population test.

4 ANALYSIS AND RESEARCH ON THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF MUSIC EDUCATION

4.1 Descriptive Analysis

This paper surveys 160 students who are taking intelligent piano group lessons, and 118 of them particularly like this type of teaching. Most of them think that this model is very novel and can be learned together with other students. Compared with the traditional way of learning piano, they prefer to progress and communicate with their classmates, and these students

also hope to learn some music knowledge by learning piano, to improve personal music quality and basic piano skills. This also shows that the intelligent piano group class can cultivate students' ability of unity and cooperation, ability to communicate with others and improve their personal quality.

In the knowledge cognition part, most of the students have some knowledge about the smart piano, and the highest score is about the sound structure of the smart piano. In the "recognition spectrum", more than 50% of the students choose 4 points or above, as shown in Table 1. It shows that the spectrum recognition efficiency is the best point of the smart piano, as shown in Figure 2.

Table 1. Smart pianos allow me to identify charts faster

Options	number of people	Proportion (%)
1 point	5	3
2 minutes	4	2
3 points	30	18
4 points	52	32
5 points	69	43

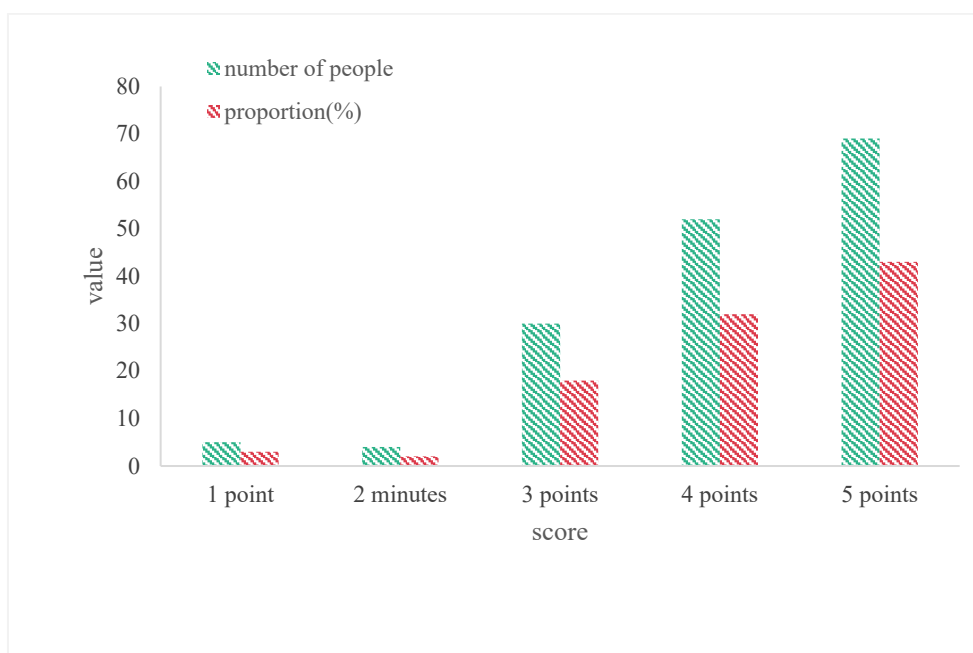


Figure 2. Scoring in the "Identify Spectrum" integration

The major is a two-part variation of the piano part and the non-piano major. Therefore, an independent samples t-test was used in the measurement. The output results are displayed in a table. The t-values of teaching knowledge, curriculum design, and specific teaching content are: -2.657, -1.301, and -2.009, respectively, and the p-value is

related to 0.05, indicating that the major has a better understanding of the major in teaching, curriculum planning and specific content. That is to say, the scores of piano classes are higher than those of non-piano classes in terms of teaching knowledge, curriculum development, and the role of specific teaching content.

5 CONCLUSIONS

The rapid development and great changes brought by artificial intelligence technology to society are no longer comparable. Whether it is smartphones, computers, Google glasses, fingerprint recognition, face scanning, or driverless cars and emotional companion robots that are widely used in our daily lives, these all mean that artificial intelligence technology will be used in the future. Similarly, artificial intelligence technology will also affect the teaching of music education. This paper uses a lot of space to explain the possibility of applying artificial intelligence technology to music education. The distribution of the survey objects in this paper is uneven, the total number of samples is small, and the survey scope is concentrated in two universities in M city, the Conservatory of Music and the Normal University. We need to go to reputable universities in multiple provinces to make the research more representative.

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