Application of Machine Learning Technology in Classical Music Education

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ABSTRACT

The goal is to promote the healthy and stable development of music education in China. The time-frequency sequence topology in frequency domain can improve the effect of convolution operation. Therefore, this paper applies the above algorithms to classical music education, including the recognition of classical instruments, the feature extraction and recognition of classical music, and the quality evaluation of classical music education. The quality of the music quality evaluation system can be judged according to the correlation between the output results and the subjective evaluation. The higher the correlation, the better the music quality evaluation method. Through relevant experiments, it is proved that DTW score alignment and end-to-end are more successful in extracting the features of classical music, and more accurate in identifying classical instruments. The objective evaluation method of pronunciation teaching quality is more objective and accurate than P.563 music teaching quality evaluation.

KEYWORDS

classical music, feature extraction, machine learning, musical instrument recognition, teaching quality evaluation

INTRODUCTION

In machine learning, 'data mining' and 'data analysis' are similar terms that connote a process of recognizing meaningful, effective, special, and valuable facts from abundant data (Gupta et al., 2021). Before the application of information technology, people could only mine and analyze data manually. In the era of data, information has seen extraordinary growth. Individuals are continuously generating and leveraging data to function and thrive in their day-to-day lives. Through a combination of data storage technology and advanced machine learning algorithms, the field of data mining and analysis has been greatly expanded (Domashova & Zabelina, 2021). Data can be read and written efficiently through the current efficient data storage technology (Gupta et al., 2012). Afterward, data mining and analysis are optimized through the deployment of knowledge discovery, data statistics, and machine learning technology. The utilization of such technology brings forth undeniable advantages in terms of data processing and evaluation (Islam et al., 2021).

Machine learning plays a crucial role in music education, primarily as follows. First, recent developments in machine learning and artificial intelligence (AI) have the potential to optimize the aptitude of music teachers (Walker, 2021). AI offers a viable solution for replacing staff members who do not specialize in music education, thereby elevating the capabilities of existing music educators. By utilizing AI, music teachers acquire the advantage of an effective supplementary aid, resulting in an improved standard of expertise across the board. Students and parents will continue to improve their

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recognition of intelligent machines. In addition, with the help of artificial intelligence, music teachers can carry out self-study more efficiently and conveniently, thus continuously optimizing the teachers' level. Second, it can promote the improvement of teachers' teaching quality and efficiency. Relying on AI and big data analysis, teachers can quickly understand issues such as the students' learning level or background. In this way, teachers can quickly become effective carry out effective teaching for students. Meeting each student's educational needs can improve teaching quality and efficiency. Third, it can enhance students' learning efficiency. Music learning is not always fun and to master certain music skills, learners must invest considerable time and energy; however, not every learner persists. The introduction of artificial intelligence can mobilize the students' subjective initiative in learning music, help them realize the shortcomings in their own learning, urge them to learn, and effectively improve their learning efficiency.

Machine learning is an interdisciplinary field, comprising elements of science, psychology, biology, systems science, cognitive science, and information science. Through incorporating robotic technology, classical music education can be advanced with features such as recognition of instruments, feature extraction, and recognizing classical tunes. Consequently, intelligent instruments gain additional useful features, creating a personalized learning environment. Furthermore, machine learning technology enables observation of classroom instruction, analysis of melody and rhythm, making evaluations of teaching proficiency more precise and accurate, ultimately creating an atmosphere to enhance instructors' creativity while they use artificial intelligence to innovatively present the discipline through modern means.

Musical instruments are important tools for learning music. The instrument is embedded with machine learning technology, forming an intelligent instrument. It can store many music data of various industrial instruments. Especially when it is used in the music keyboard, the function of the music keyboard has been improved significantly, which has triggered a variety of teaching modes in music teaching. After relevant experiments, it is proved that the score alignment and the end-to-end neural network used in this paper are relatively successful in extracting the features of classical music. The two-level classification model used in this paper is more accurate in identifying classical musical instruments. The objective evaluation method of pronunciation teaching quality is more objective and accurate than P.563 music teaching quality evaluation. The deep network can learn high-level features that are beneficial for classification from the input primary features; on the other hand, there is only one playing instrument in monophonic music, using efficient preprocessing. After relevant experiments, such a neural network as we used in this paper can be relatively successful in extracting the features of classical music. The two-level classification model used in this paper is more accurate in identifying classical musical instruments. It is easy to extract accurate harmonic structure from the spectrogram with mean value and time-frequency transformation. Analyzing the energy distribution of the harmonic can effectively distinguish various musical instruments.

MATERIALS AND METHODS

The Development and Research Status of Machine Learning in Classical Music Education

Using synthesizers in music teaching of machine learning has become one of the foundational teaching methods in today's primary and secondary school classrooms. Music is one subject with the highest informatization in the primary and secondary school classroom. The multifarious multimedia courseware and music video make the music classroom eliminate the limitation of the old recorder plus tape mode, and improve classroom efficiency (Ariza-Colpas et al., 2021). It is not uncommon to replace the audio with video in today's high school music classes, and video editing and processing have become one teaching skills for music teachers besides professional skills. Video technology has the potential to render abstract music tangible and comprehensible for students (Abdelkader et al., 2021).

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