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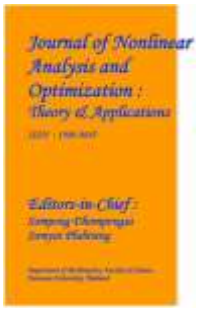

MUSIC EMOTION RECOGNITION BASED ON DEEP LEARNING

K. UDAY KIRAN[1], K. SRIMANNARAYANA[2]

[1]Assistant Professor, Dept. of MCA, QIS College of Engineering and Technology, Ongole, Andhra Pradesh.

[2]PG Scholar, Dept. of MCA, QIS College of Engineering and Technology, Ongole, Andhra Pradesh.

ABSTRACT— In recent years, with the development of the digital era, music emotion recognition technology has been widely used in the fields of music recommendation system, music classification, psychotherapy, music visualization, background music generation, smart home, and other applications of music emotion recognition, and has received attention from all walks of life. Especially the rapid development of artificial intelligence and deep learning, the music emotion recognition model using efficient deep neural network composition has become the mainstream model. This paper provides a more detailed overview of music emotion recognition, first introducing the background of music and emotion, and briefly summarizing the content of related works as well as the content framework. In the process, we also compare the similarities and differences in the content of other researchers' reviews of related research areas. And in the middle section, we provide a detailed account of datasets, emotion models, feature extraction, and emotion recognition algorithms. Finally, we discuss the current challenges in music emotion recognition and explore future research priorities.

Index Terms— Music emotion recognition, deep learning, artificial intelligence, music emotion datasets.

I. INTRODUCTION

Music is another vehicle for transferring emotions between people after speech. Perlovsky argued that in primitive societies human vocalizations fell into two types: those that were less emotional but more semantically specific, and thus evolved into the language today; and those that retained

an emotional connection with accompanying semantic ambiguity, and thus evolved into the music we have today. As a result, music tends to be more capable of conveying emotion and creating emotional resonance between the listener and the creator. Emotional expression in music has a certain universality, for example, opera in the West and drama in the East, both of which convey emotions vividly and imaginatively in the form of musical backgrounds and character performances. Music has a long history and is one of the most important representatives of human civilization. Western music can be traced back to the ancient Greek and Roman periods, and the ancient Greek philosophers believed that the human mind is very susceptible to negative emotions and that appropriate music can alleviate the effects of such negative emotions which also confirms the feasibility of music therapy. Oriental music has a long history as well. According to the ancient civilizations studied, oriental music can be traced back to the Yellow River Valley of China in the early Neolithic period 8,000 years ago, and took shape in the late Neolithic period 5,000 years ago. Fang believed that music civilization belongs to the category of spiritual civilization, music has become the emotional support, the story of ancient Chinese Boyas string is a vivid example, and music civilization has become an important part of the Chinese civilization and the main spiritual mark. Music emotion recognition is an interdisciplinary field of research that incorporates knowledge and techniques from disciplines such as musicology, psychology, computer science, and neuroscience. Music is a derivative of speech, and music emotion recognition has certain similarities to speech emotion recognition.

II. LITERATURE SURVEY

A. Machine recognition of music emotion: A review

The proliferation of MP3 players and the exploding amount of digital music content call for novel ways of music organization and retrieval to meet the ever-increasing demand for easy and effective information access. As almost every music piece is created to convey emotion, music organization and retrieval by emotion is a reasonable way of accessing music information. A good deal of effort has been made in the music information retrieval community to train a machine to automatically recognize the emotion of a music signal. A central issue of machine recognition of music emotion is the conceptualization of emotion and the associated emotion taxonomy. Different

viewpoints on this issue have led to the proposal of different ways of emotion annotation, model training, and result visualization. This article provides a comprehensive review of the methods that have been proposed for music emotion recognition. Moreover, as music emotion recognition is still in its infancy, there are many open issues. We review the solutions that have been proposed to address these issues and conclude with suggestions for further research.

B. Review of data features-based music emotion recognition methods

The ability of music to induce or convey emotions ensures the importance of its role in human life. Consequently, research on methods for identifying the high-level emotion states of a music segment from its low-level features has attracted attention. This paper offers new insights on music emotion recognition methods based on different combinations of data features that they use during the modeling phase from three aspects, music features only, ground-truth data only, and their combination, and provides a comprehensive review of them. Then, focusing on the relatively popular methods in which the two types of data, music features and ground-truth data, are combined, we further subdivide the methods in the literature according to the label- and numerical-type ground-truth data, and analyze the development of music emotion recognition with the cue of modeling methods and time sequence. Three current important research directions are then summarized. Although much has been achieved in the area of music emotion recognition, many issues remain. We review these issues and put forward some suggestions for future work.

C. Audio features for music emotion recognition: A survey

The design of meaningful audio features is a key need to advance the state-of-the-art in music emotion recognition (MER). This article presents a survey on the existing emotionally-relevant computational audio features, supported by the music psychology literature on the relations between eight musical dimensions (melody, harmony, rhythm, dynamics, tone color, expressivity, texture and form) and specific emotions. Based on this review, current gaps and needs are identified and strategies for future research on feature engineering for MER are proposed, namely ideas for computational audio features that capture elements of musical form, texture and expressivity that should be further researched. Previous MER surveys offered broad reviews, covering

topics such as emotion paradigms, approaches for the collection of ground-truth data, types of MER problems and overviewing different MER systems. On the contrary, our approach is to offer a deep and specific review on one key MER problem: the design of emotionally-relevant audio features.

III. PROPOSED SYSTEM

The overview of our proposed system is shown in the below figure.

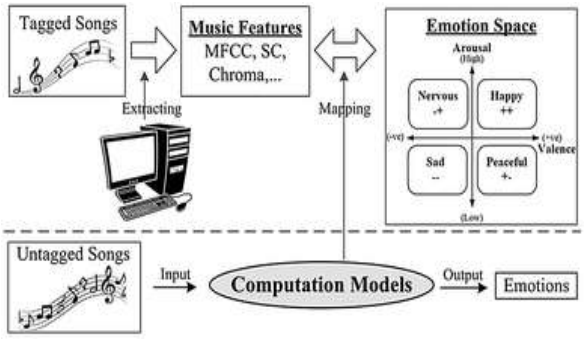

Fig. 1: System Overview

Implementation Modules

Upload

- In this module, can upload music file.

Feature extraction

- Feature extraction is a critical step in Music based Emotion Recognition, where the goal is to analyze music and classify or predict the emotions it evokes. Music emotion can be categorized in various models, like Valence-Arousal, discrete emotion categories (happy, sad, angry, etc.), or even multi-label approaches.

Train and Test Model

- In this module, after spilt data as train and test data in the ratio of 80% and 20% respectively. The train data can be used for train the model and the test data can be used for test the model performance. In this project we applied CNN Model and to train the model we are using fit() method in python programming.

Prediction

- In this module implementing deep learning techniques and predict the emotion.

IV. RESULTS

Fig. 2: Login page

Fig.3: Register page

Fig.4: Upload the data

Fig.5: Music Emotion Recognition

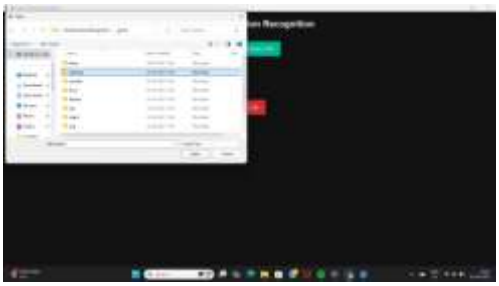

Fig.6: Upload the Classical

Fig.7:Music Emotion Recognition

V. CONCLUSION

Music emotion recognition is inter-disciplinary research with a wide range of applications in various fields. Although the performance of music emotion recognition has continued to improve with the development of deep learning, it is generally in the rising stage and still faces many challenges at present: 1) Unlike speech emotion recognition datasets, music emotion recognition datasets, despite the increase in recent years, are still deficient due to music copyrights, the difficulty of creating homemade datasets, and the diversity of experiments. In multi-modal music emotion recognition research, it is also due to the lack of datasets based on visual and physiological features that fewer studies have been done on music emotion recognition using these multi-modal features. How to access to high quality music datasets and how to fill the gaps in music datasets with multi-modal features are still among the problems to be solved. 2) The current common approach to music feature extraction is still to extract the underlying physical features of the music and to analyze and process these features, but the connection between the underlying features and the higher-level emotions is still limited. 3) Due to cultural and linguistic differences in music, the models, datasets, and emotion categorization criteria used by researchers for music emotion recognition vary among different geographic regions.

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AUTHORS Profile

Mr. K. Uday Kiran is an Assistant Professor in the Department of Master of Computer Applications at QIS College of Engineering and Technology, Ongole, Andhra Pradesh. He earned his Master of Computer Applications (MCA) from Bapatla Engineering College, Bapatla. His research interests include Machine Learning, Programming Languages. He is committed to advancing research and fostering innovation while mentoring students to excel in both academic and professional pursuits.

Mr. K. Srimannarayana has received his B.Com (Computers) and degree from ANU 2023 and pursuing MCA in QIS College of Engineering and Technology affiliated to JNTUK in 2023-2025