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Automatic Music Transcription To Music Notes Using Artificial Intelligence

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Abstract: The art of music transcription, transforming fleeting audio recordings into the permanence of sheet music, holds immense potential for musicians, educators, and historical preservationists. This project embarks on an exploration of Recurrent Neural Networks (RNNs) as a powerful tool for automated music transcription. The focus here is on meticulously converting MP3 audio files into MIDI files, subsequently translating them into comprehensive and expressive musical notations.

The proposed RNN model aspires to achieve groundbreaking accuracy in capturing the very essence of music – pitch, rhythm, and duration – directly from audio recordings. This feat, if achieved, would transcend mere note recognition and delve into the heart of what makes music so captivating. By effectively translating the intricate language of audio into the symbolic language of musical notation, the model paves the way for a more profound understanding and appreciation of music.

Keywords: Music notes classification,Artificial intelligence,Deep learning,Musical Transcription ,Frequency based analysis, Machine learning,Pitch identification.

I. INTRODUCTION

From the echoing music of ancient flutes to the complex symphonies of modern orchestras, music has become a universal language that transcends culture and time. The tradition, knowledge and beauty of music have been carefully preserved in the form of music, carefully written by hand, and passed on from generation to generation. However, the process of capturing the essence of music in writing requires a lot of time and skill, especially for the harmonious playing of complex works containing music.

The digital age has changed the way music is used and recording has become indispensable. Format is important. This puts music at your fingertips with unprecedented ease. We began exploring automated music, a technology that has the potential to revolutionize the way we interact with music. Our vision is to create a system that overcomes the limitations of traditional systems by reducing recorded data.

The system is not limited to decoding simple music. He will have the unique ability to decipher complex music by playing multiple instruments simultaneously; this is a feat currently achieved only by talented musicians with dedication and practice in later years. The applications of the project can extend far beyond the simple. Think of the musician who wants to learn the composition by examining the score obtained from the recording. Teachers can create a more immersive learning experience by connecting sounds and music to deepen musical patterns and compositional ideas. Moreover, this machine can also play an important role in preserving our musical instruments. By automatically recording rare or endangered music, we can preserve this valuable asset for future generations.

Finally, this project not only seeks to bridge the gap between music and musical form, but also aims to encourage musicians, improve music education, and encourage appreciation of the power of music. We imagine a future where the timeless magic of music can be accessed quickly and easily with the permanent notes created by this new technology. This will not only provide free access to musical knowledge, but also ensure the transfer of cultural assets to future generations.

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II. LITERATURE SURVEY

In [1] A method called “Automatic music transcription of monophonic and polyphonic audio files using Fourier transform” is presented in Kelvin A. Minor and Iman H. Kartowisastro (August 6, 2022).
In this study, an automatic transcription system is presented. Create music on mono and polyphonic audio files with simple solutions that include value analysis using threshold detection and audio detection using fast Fourier transform.

In [2] Josh Gardner, Ian Simon, Ethan Manilow, Curtis Hawthorne, Brain Team (March 15, 2022) Research on "MT3: Multi-task, multi-track music transcription". This research shows that it is possible to create some level of tokens (like a word in a language) that represent written play and related devices.

In [3] Vaishali Ingale, Anush Mohan, Divot Adlakha, Krishna Kumar, Mohit Gupta (2020) presented "Music Generation Using Deep Learning". It was in ABC characters and later merged into MP3 (create monophonic music).

In [4] "Electronic system for adults using deep learning" proposed by Phisetpho Suthaphan, Vich Boonrod, Nattapon Kumyaito, the result will be the same between the songs created using the XOR function and the original musical sounds. Each bar line Position is metered differently from the original music.

III. SCOPE AND METHODOLOGY

Aim of the project

The primary aim of this project is to develop a novel automatic music transcription system that can efficiently and accurately bridge the gap between audio recordings and sheet music.

This system aspires to achieve a high degree of accuracy in capturing the musical elements (pitch and duration) from MP3 audio files, with the ultimate goal of generating both machine-readable MIDI files and human-readable musical notations.

Existing system

Traditional methods for music transcription involve:

Manual Transcription: Skilled musicians invest significant time and effort in transcribing music by ear, a process that can be laborious and time-consuming.

Specialized Software: Existing software can be expensive, cumbersome to use, and may not always deliver optimal results, especially for complex music.
These methods have limitations in terms of efficiency, accessibility, and accuracy.

Proposed system

To bridge the gap between fleeting audio recordings and the permanence of sheet music, this project proposes a novel automatic music transcription system. Unlike traditional methods that rely on manual effort or expensive software, this system leverages the power of Recurrent Neural Networks (RNNs), specifically LSTMs. In the first stage, the system trains on a dataset of paired MP3 audio files and their corresponding MIDI representations, essentially learning to translate the audio characteristics into the language of music (pitch and duration).

With this acquired knowledge, the system tackles new MP3 files, predicting the musical elements present and converting them into a machine-readable MIDI file. The ultimate goal lies in generating human-readable musical notations as well, potentially by incorporating music theory knowledge to transform the MIDI data into a format readily interpretable by musicians. This two-stage system aspires to be efficient, accurate, and comprehensive, offering a significant advancement in automatic music transcription.

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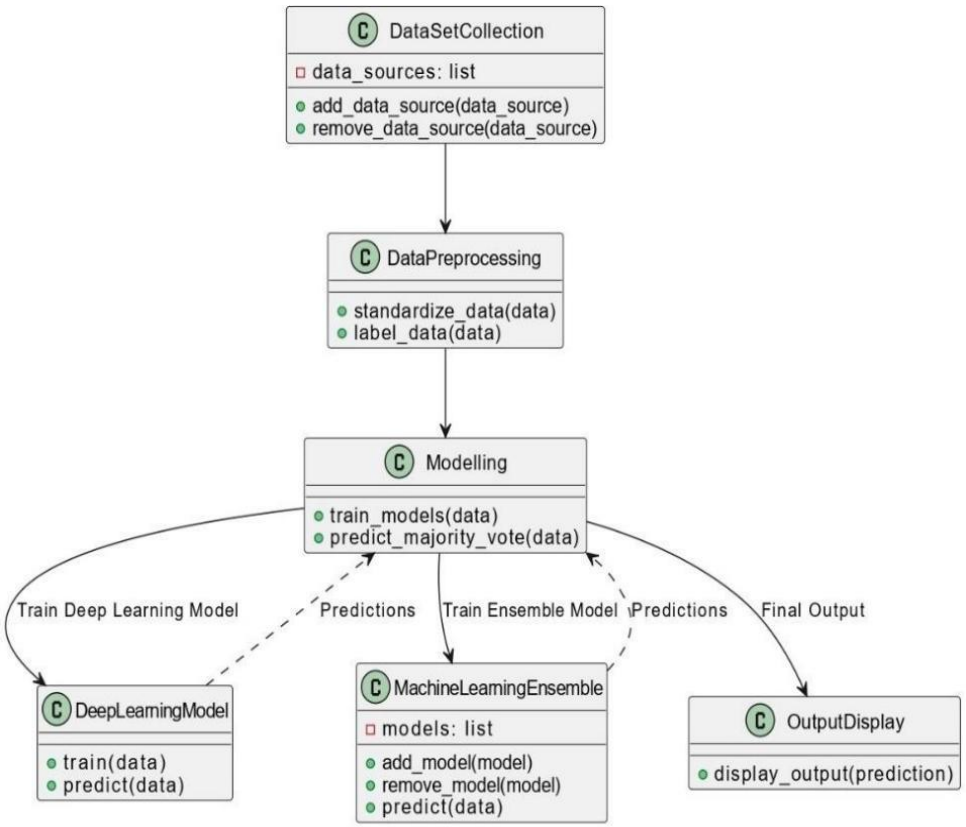

Fig1. Proposed system

System Architecture

The architecture diagram depicts a streamlined process for automated musical notes generation. It begins with inputing audio file, followed by pre-processing to standardize them. Features such as pitch and duration are extracted. A machine learning model analyzes these features to predict the note for each frequency. Final step is to use this model to predict the musical notes in an audio file.

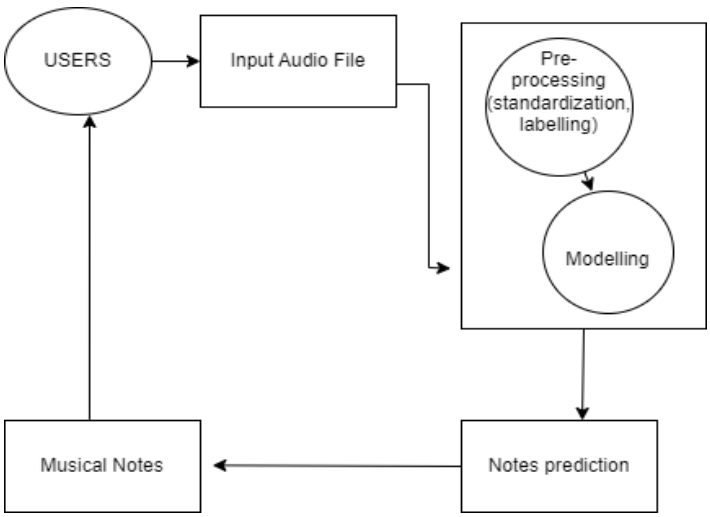

Fig2 .System Architecture

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IV. CONCLUSIONS

In conclusion, the project "Automatic Music Transcription To Music Notes Using Artificial Intelligence" signifies an innovative automatic music transcription system culminates in a two-pronged approach. Firstly, it generates a MIDI file, a machine-readable representation of the music. This digital file captures the essence of the audio – pitch and duration – in a format readily usable by music software or other digital applications. Secondly, the project strives to translate this data into human-readable sheet music.

By potentially incorporating music theory knowledge, the system aims to bridge the gap between the machine world and the traditional sheet music that musicians can directly utilize for performance, practice, or even historical preservation. This comprehensive approach to automatic music transcription offers a significant advancement, empowering musicians and music educators with a more efficient and accurate way to navigate the bridge between fleeting audio recordings and the permanence of sheet music.

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