Automatic Guitar Tablature Transciption

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1 Introduction

The purpose of this project was to create a program that converts audio recordings of songs into guitar and drum tablature. The process involves multiple stages: converting mp3 songs to individual instrument tracks using Demucs, converting the isolated tracks into MIDI using Basic-Pitch, and finally generating guitar tabs from the MIDI files using Music21. The goal of this project was to make it easier to learn how to play your parts of your favorite songs, though the focus was on guitar given time constraints.

2 Challenges

2.1 Python Environment

The first challenge was figuring out how to use the python modules. Demucs and Basic-Pitch were made to be run from the console, so the documentation for coding with each of them was very light. Additionally, Music21 is a very comprehensive music analysis module with many more features than were needed for this project. As such, the documentation was cumbersome to work through.

2.2 WAV-to-MIDI conversion

Arguably the most frustrating challenge was converting the separated WAV files to MIDI files with Basic-Pitch, a deceptively simple-sounding goal. Since documentation for using Basic-Pitch mostly focuses on running it in the command console, which lead to some seemingly major coding issues that, after several hours, turned out to be extremely minor. Additionally, the MIDI file of the test track that was returned by Basic-Pitch had fragmented notes and random off-key pitches inserted. On reflection, using a Nirvana song played by a guitar player who was known for being sloppy, was probably not an ideal choice.

2.3 Music21

Music21 is a large, complex module. A lot of time was spent reading the documentation before ultimately giving up and enlisting the help of ChatGPT. Ultimately, I was unable to get Music21 to convert the MIDI files to tablature within the project timeframe.

3 Results

3.1 Milestone 1: Source Separation with Demucs

The first milestone involved using Demucs to separate the original audio files into constituent parts such as vocals, drums, bass, and other instruments. This allowed for the isolation of each instrument track to prevent ending up with e.g. bass parts bleeding into guitar tablature. After the initial struggle of getting all the necessary modules installed, this part was fairly straightforward.

3.2 Milestone 2: MIDI Conversion with Basic-Pitch

Next, the separated tracks were run through Basic-Pitch to convert them to MIDI files. While this task should have also been very straightforward, quite a bit of time was spent troubleshooting a syntax error (over two hours and combing through source code required to fix this issue).

3.3 Highlight: Toward Tablature Generation

Honestly, the highlight of this project was fixing the ~~minor~~ ~~major~~ minor syntax error. After spending two hours troubleshooting, consulting with ~~my colleague~~ ChatGPT, and finally opening the source code for the module in use, I was finally able to figure out that the function was expecting a list as input, and was slicing my file path string. A quick insertion of square brackets fixed this headache.

4 Conclusions

While the stated goal of the project was not achieved, I was able to successfully convert from mp3 to WAV files of individual instrument tracks, and then to MIDI files. More work is needed in cleaning up the MIDI files, creating some tab rules (e.g. if there are fewer than 'x' frets between notes, stay on the current string, else move to the next higher/lower string), and successfully implementing the tablature module of Music21. However, the ultimate goal of the project, learning more about how to implement AI solutions, was successful.