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MPATE-GE 2623: Music Information Retrieval

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**MIR Final Project Proposal: The Jazzy CHORDictor**

Project Title

The Jazzy CHORDictor

Team Background

Brandon - guitarist, drummer, jazz amateur, Python experience

Kenny - violinist, engineer, jazz enthusiast, Python experience

Richa - low brass instrumentalist, machine learning data scientist, audio engineer

Project Stages

* Compile a literature review of recent chord progression prediction model architectures (e.g. RNNs - LSTM)
* Select a MIDI dataset of jazz chord progressions (e.g. The Real Book), preferably with the chord progressions already annotated
* Use [mido](https://mido.readthedocs.io/en/latest/) or an equivalent library to import MIDI files
* If chord progression annotations are unavailable, extract the chord names using a Python library, such as [pychord](https://pypi.org/project/pychord/) or an [equivalent](https://stackoverflow.com/questions/49339622/how-to-extract-individual-chords-rests-and-notes-from-a-midi-file)
* Select an existing chord prediction model architecture (usually trained on Western classical chords) and train it using our corpus of jazz MIDI files with annotated chord progressions
* Evaluate the performance of the model trained on jazz chord progressions using metrics learned from the literature review
* Analyze the shortcomings of the model and suggest potential improvements to alleviate its generalizability in the context of jazz music

Project Description

Western classical music is known for its strict chord structure and specific rules regarding their progressions, which are rarely broken. Jazz music, on the other hand, tends to not only have looser guidelines on progressions but also has a wider array of more “colorful” chords to improvise from. Our intent is to examine existing sequential chord predictor model architectures and see whether they generalize well enough to work with a more complex dataset of jazz chord progressions.

For this project, we will develop a machine learning model which suggests what the next chord(s) of a given jazz musical phrase should be. The input to our model will be a MIDI file of an incomplete jazz progression. We will measure how accurately the system is able to predict the remaining, true chord progression of the piece. The MIDI dataset will be downloaded from an existing database, with annotations. If the chord progressions are not labeled, we will leverage a Python package that can extract these progressions from a MIDI track. For the purposes of this project, we will focus on using the jazz piano parts of each song, as they often contain richer information about the chord structure. Based on our preliminary research, a Long Short-Term Memory (LSTM) model seems appropriate for the task given that our data is sequential. We plan to use TensorFlow Keras to train a supervised neural network on the prepared dataset.

*Why MIDI and not audio files?*

Training our model on large audio files is computationally heavy since the amount of information per MP3 file (say 50 chords in a 3MB file) reduces the cost efficiency of the system. Furthermore, even current state-of-the-art audio-based chord recognition models are still prone to errors. Since we need accurate note identification as a basis for predicting the remaining chords in the progression, it is crucial that we have the most precise and accurate data available to focus on our model’s application to jazz music.

Analyzing chords in MIDI is relatively cost-efficient since each file size is much smaller and more accurate chord information can be pulled from the file. Each note in a MIDI file is definite: there are no discrepancies in the nature of block notation. Therefore, we feel that the computational and informational complexity of using audio files is beyond the scope of this class project as it distracts from the concentration of our application. We believe that using MIDI will allow us to focus on extending an existing task to new types of data and evaluate its generalizability.