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MAIS 202 - PROJECT DELIVERABLE 1

Art Classifier: Piece-Composer Identifier

Dataset

I plan to mainly use Magenta Maestro Dataset[1] It has over 200 hours of piano audio and MIDI files. MIDIs also include features like key strike velocities and pedal positions, since they are recorded from live performances. I think they may serve as valuable features for my model. The dataset also has train/validation/test split prepared. I also found two datasets from Kaggle. They also include MIDI piano files, and one includes note representations in piano roll format, which can be helpful for feeding in the data: Classical Music MIDI, Classical Music ML Format

Methodology

From what I have read, using audio files in ML is not optimal. Therefore, I plan to either use MIDI files directly in their symbolic form, or first express the audio in an image-like way, then perform the model. I will probably use the symbolic files directly because I feel there are more tools available for them. To apply a machine learning model, I have to extract some features of the pieces that I can use. In a chapter from a Springer book "Computational Music Analysis" I have found [2], it is said that jSymbolic software can be used to extract several musical features from MIDI files, so I will look into that. To decide what is relevant and what is not, I believe I will have to do some more research and look at some research papers, however, my intuition says that key changes, chord progressions, repeated melodic intervals may be some relevant features. This is a classification problem, so I have to use a model appropriate for it. In the "Computational Music Analysis" chapter, they are trying several models (Decision Tree, RIPPER ruleset, Logistic Regression, Naive Bayes, support vector machines) and they all perform relatively close to each other. Since I only know Naive Bayes and Logistic Regression among them so far, I will probably go with either one of them and later on may decide against it if it does not perform well. For my error analysis, I plan to use accuracy-precision recall and confusion matrix. I think analyzing the error will also yield with important insights, because for example if the model is confusing composers from the same era, that means it is still doing relatively well, but if it is confusing a modern composer and a baroque composer, it is not.

Application

I plan to create a webapp. The user will listen to a piece and will be prompted to select a composer from a list (I will probably include the top performing 7-8 composers from the test set). The computer will also make its prediction, and correct guesses will get points. I plan to use Flask for the webapp.

References

[1] Curtis Hawthorne, Andriy Stasyuk, Adam Roberts, Ian Simon, Cheng-Zhi Anna Huang, Sander Dieleman, Erich Elsen, Jesse Engel, and Douglas Eck. "Enabling Factorized Piano Music Modeling and Generation with the MAESTRO Dataset." In International Conference on Learning Representations, 2019.

[2] Herremans, Dorien, et al. *Computational Music Analysis*, Springer, pp. 369–391.