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MAIS 202 - PROJECT DELIVERABLE 1

Team Name: MelodifAI

Project Idea:
We want to create a model that, given music samples from a particular piano composer, should generate music with a similar style.

Dataset Choice:
We will primarily use a Kaggle dataset of classical MIDI files:
https://www.kaggle.com/soumikrakshit/classical-music-midi
We plan to start with only pieces from Chopin (around 40 scores). If that proves insufficient, we will add more composers to the training dataset.

Methodology:
-   Data Processing: We'll use the python library music21 to convert MIDI files into Note and Chord objects we can feed the ML model. It can also convert back to a playable file once the new music is generated.

-   Machine Learning Model: We are planning on using the Keras library to implement a Long-Short-Term Memory (LSTM) neural network that not only remembers what the style of the composer as a whole sounds like (Long-Term memory), but also doesn't sound too random since it keeps the consecutive notes close in pitch. Our approach would be to find all possible combinations of pitch, octave, offset, chords, and rest intervals between notes, and find which of them would have the highest probability of coming next in an actual piece from the composer. Furthermore, to prevent overfitting (ie just matching one of the pieces we passed as input), we decided to set some fraction of the inputted notes to zero / null. This way, the model has to think for itself.

-   Evaluation Metric:
    We plan to use categorical cross entropy as an evaluation metric for our model. Our goal for the project is that a human can listen to the music without thinking it's too bad. We would like the generated pieces to have some form of recognizable musical structure.

Application:
We will make a website using Flask and PyTorch following the steps of the recording posted. Furthermore, even though the model won't be trained on the server since that requires too much computational power, we would like the user to input a few notes and for the generation phase to happen in real time based on that input.