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Generative AI

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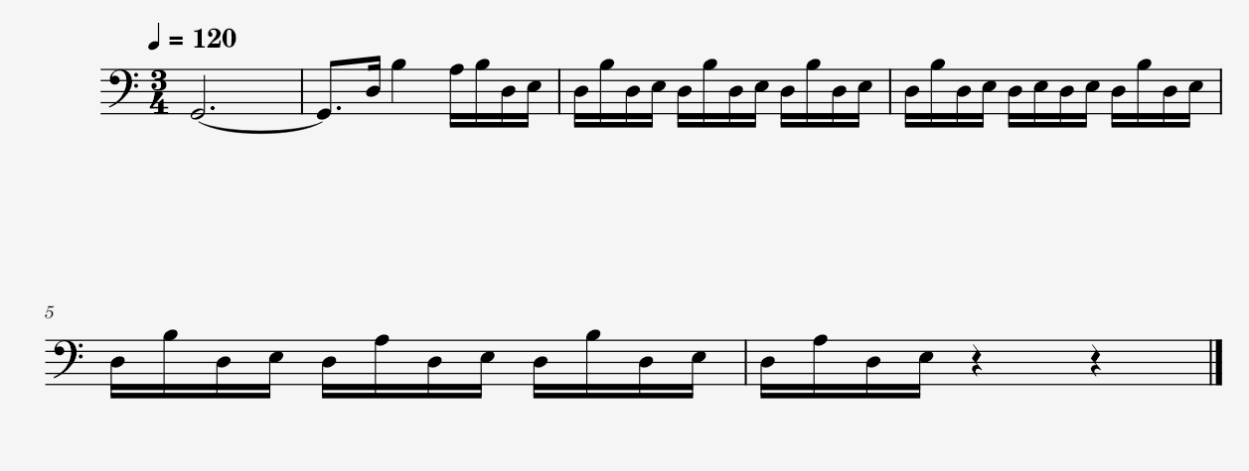
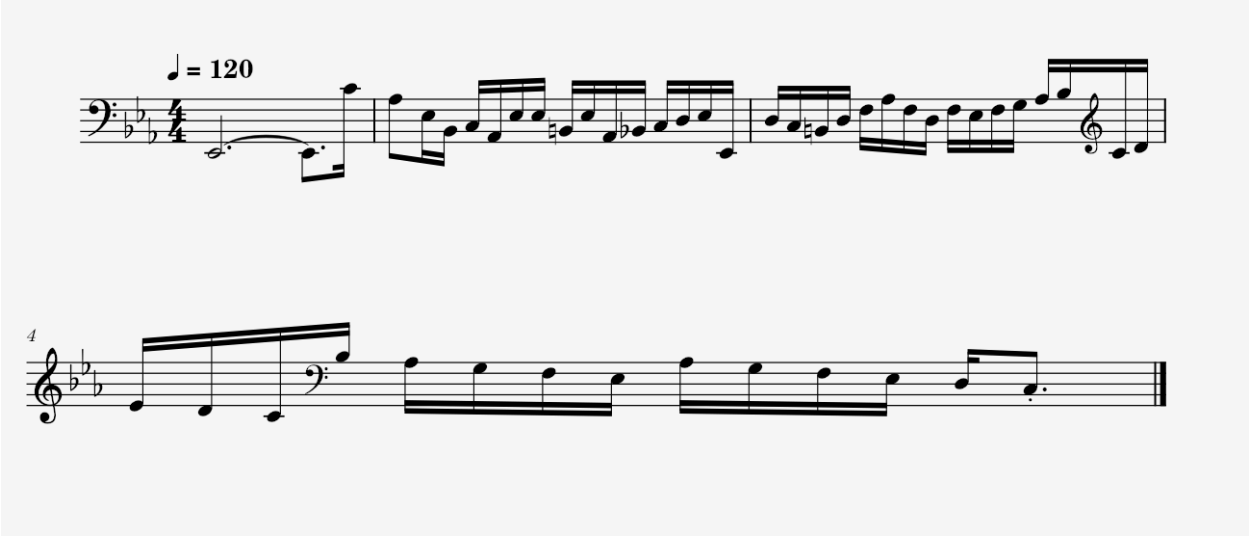
1. First I installed and imported various packages and modules. Next I mounted the google drive. I then loaded the midi files from google drive and displayed an example in text form. I used 36 midi files with cello music from Bach. Next I parsed the midi files and displayed an example of the notes. I then put them in a dataset to be used to train the model.
2. Next, I tokenized the data and displayed some of the tokens. I then displayed some of the vocab (notes). I then set up the training data.
3. Next I set up classes to create a transformer block and embeddings respectively. I then displayed the embeddings. I then created and displayed the model. The model has 2 input layers for the notes and durations, two layers of embeddings for the notes and the durations, a concatenate layer, a layer for the transformer block, and two output layers for the notes and durations.
4. Next, I trained the model for 50 epochs. After each epoch I had the model generate music and store it in the outputs folder. These are the model statistics after 50 epochs: duration_outputs_loss: 0.5054 - loss: 1.8891 - note_outputs_loss: 1.3837. I also have the music generated from epoch 50 below.

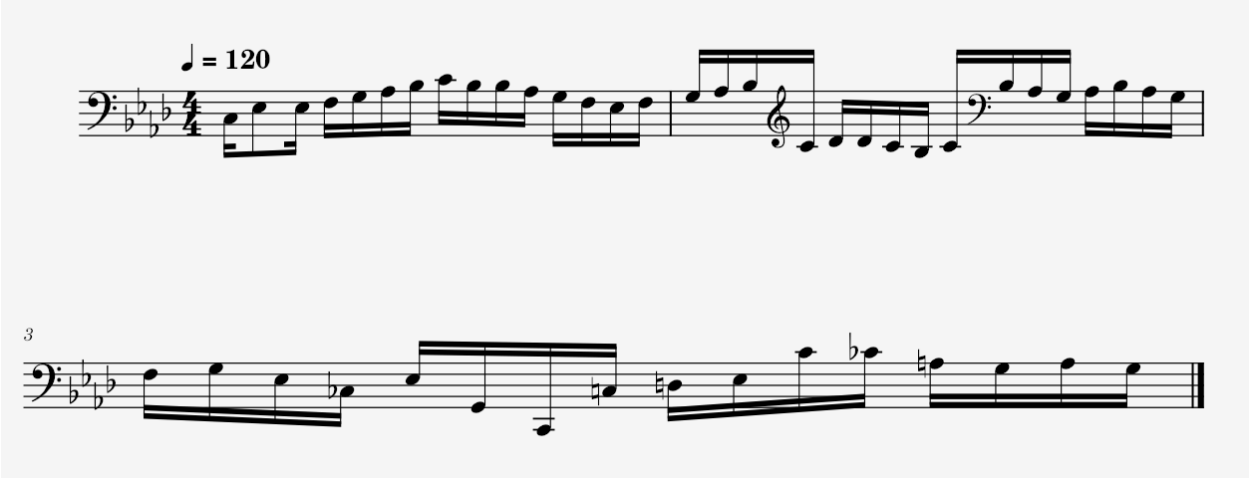


5. Finally, I used the model to generate 3 sets of music. I had it generate music with a temperature of 0.1, 0.5, and 1. I then saved the model, the training data, the training outputs, and the 3 generated sets of music.

Generated Music 1 (Temperature of 0.1):



Generated Music 2 (Temperature of 0.5):



Generated Music 3 (Temperature of 1):

Discussion Points:

Looking at the generated music, the quality of it doesn't seem the best. One thing I noticed is there are lots of large jumps between notes that sound kind of weird. For example, in the first and third generated music it goes from bass to treble clef in the middle of it. As well, the generated music doesn't have a lot of variety in the note choice or the pattern of the notes as the majority of the pieces just use 16th notes, especially towards the end of the music. It would start

out using different kinds of notes but would default to mainly just 16th notes after the beginning. Looking at temperature, it doesn't look like for the most part that changing the temperature positively or negatively affected the quality of the music. One difference that I noticed was that while the third generated music with a temperature of 1 still used a lot of 16th notes, it mixed in a lot of 8th notes as opposed to the other two where the generated music at the end was almost exclusively 16th notes. The generated music does have a slight resemblance to some of Bach's music, at least rhythmically. Some of his pieces are just strings of 16th notes so in that sense the generated music does represent Bach music. However, that is not all of his music so the model didn't capture all the aspects of his music. As well, the model doesn't capture his note choices the best, as the generated music is all over the place and has lots of big jumps, while that's not the case in Bach's music.