Summary

I created a LSTM neural network to generate song segments from classical piano pieces. To process the songs, I downloaded the Maestro dataset (midi only) to extract the midi files into a dataframe. Midi files contain the information for properties of each note, such as pitch, duration, and volume. To process the midi information, I used the music21 library, which let me turn notes and chords into objects. This made processing midi files manageable, and made this project possible. After processing all the data, I used train_test_split to separate test and validation sets. I trained my RNN from this data, and from its output, I was able to extract the note information and generate a song. I started off with a small amount of data in order to make sure everything worked, then I scaled everything up accordingly.

Challenges

The main challenge with this project was properly extracting the notes and their information. All examples I was looking at seemed to do this step improperly, as they made the length of all notes the same. I wanted to incorporate more nuances in music in my project, but the limitations of music21 made me scale back my ideas. I was able to figure out how to incorporate duration information and extract it, but it took a lot of time to figure out how music21 works. Music21's documentation isn't the easiest to follow but after much trial and error I figured it out. Another big issue I had with this project was having enough memory on my machine to get the results I wanted. Since I had data for the pitch and length of each note, I had a fairly large dataset to process. Because of this, I had to scale down the amount of songs I used, and also the amount of notes in each song. I think this stunted the development of my model and which is why it could be improved. I also had an issue with overfitting, as after fitting my model, I would notice sometimes that a bunch of the same note or chord would be played in a row, or some songs would sound very similar. I tried to fix this by increasing the amount of dropout I used, scaling down the amount of nodes I had for some layers, and increasing the volume and variety of data.

Conclusion

Overall, I had a lot of fun with this project. Music is a big passion of mine and creating a neural network capable of generating a simple piece was very satisfying. I learned a lot about midi, data preparation, overfitting, and scaling a project. I think this model can be greatly improved upon with a much larger dataset, and more care with dealing with the overfitting problem. I also in the future want to try and implement more musical nuance to the model, as I think that's an area that is lacking in a lot of music generation models.