Generating Music using a LTSM Neural Network

Business Problem

Neural Networks can take generate sequence data; how does this translate to the creation of music?

Background/History

Twitch and YouTube are popular streaming platforms where content creators interact with their audience. Content can include a variety of topics such as video gaming, playing musical instruments, product or service demonstrations, webinars and training, just chatting with the general audience, or anything else. One thing that comes up is the conflict of using copyrighted music during the live stream. This can get live streamers banned from streaming services. Machine-generated music would expand the catalog of DRM-Free music for streamers, small business owners or really anyone, to be able to leverage as their intro or stream background music.

Data Explanation (Data Prep/Data Dictionary/etc)

I will be using a sample of 11 midi files downloaded from https://bitmidi.com/. MIDI stands for musical instrument digital interface. These files can be used to train neural networks to generate/compose music.

I wanted to keep with a certain theme, so I used Disney music including the following:

1. Bippity-Boppity-Boo (from Cinderella)
2. DuckTales Theme Song
3. Hakuna Matata (from Lion King)
4. It's A Small World (from Disneyland)
5. Kill The Girl (from The Little Mermaid)
6. Main Street Electrical Parade (from Disneyland)

7. Pirates of the Caribbean (from Disneyland)
8. Tiki Room (from Disneyland)
9. Under the Sea (from the Little Mermaid)
10. Whole New World (from Aladdin)
11. Zip A Dee Doo Dah (from Disneyland)

Methods

In this project, I applied recurrent neural networks to generate sequence data to sequences of musical notes in order to generate new music. I used a LSTM Neural Network in Keras. I also leveraged Music21, a python toolkit for computer-aided musicology. I produced 100 notes using the model files produced by various epochs.

Analysis & Conclusion

The first epoch produced a single note repeated 100 times. Each epoch increased the variance of notes in the generated music. The number of epochs is the number of complete passes through the training dataset. Each epoch produced a model that could then be used to generate new music. ***I found that epochs in the mid-range (40-60), provided small jingles of repeated notes, some of them being quite catchy, while at the end of the range (80+) provided more variance to the music.***

Assumptions & Limitations

This project was limited to creating music played by a single piano.

Challenges

The time it took to run the program was the greatest challenge. Each epoch takes about 5 minutes to complete, and the # of epochs run was 100. So, this took 7-8 hours to run each time. Epoc 1 repeats the same note 100 times.

There were also some corrupt midi files that had to be removed or replaced in the training data set.

Future Uses/Additional Applications

While on this project, I used a “Disney Music” data set for the compilation of midi files, we could expand to different music including jazz, pop, classical, electronica, etc.

Recommendations

If you want to create a jingle of about 10-15 notes, use around 40-60 epochs. If you want to generate a longer piece of music, recommend higher epochs (could be up to thousands depending on the number of notes you want generated).

Implementation Plan

Interested parties could gather a catalog of music to “inspire” the bot. Music could then be catalog and shared on a website for others to use.

Ethical Assessment

It is important that credit is given where credit is due. For the creation of each song, it should be known what music was used to train the model. For example, in this project, I used Disney music, so the generated music should be listed as “inspired by Disney the following Disney music”. It should also be documented that the music is generated using neural networks, and not be passed off as composed by a human.

Acknowledgements

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References

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