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**Music GAN Report**

**Introduction**

           In my project, I am addressing the need for exploring new forms of music. Due to the rising popularity in general adversarial networks, I decided to use this form of network to produce new music. To create new music, I have used a .wav file and converted it into a .png to put in my network. I used two networks one is the generator and the other is the discriminator. I used deconvolution network as my generator and convolutional network as my discriminator.

           Regarding the overall results, I could not develop any good results. Some of the limitations included my laptop’s processing power(not it was bad, but the network required much more power than I excepted). The first time I tried to expand my network to handle larger parts of the .wav file, I lost my all epoch’s and code. After reconstructing for the last 24 hours, I was able to achieve similar results in creating 1-sec .wav files.

**Problem Definition and Algorithm**

I am trying to address creating a “new” music-based of current music. Due to the limited time and computing power, I was only able to use one song and within that only 30 small partitions of it.

           To begin with, I first convert the .wav to .png using an algorithm I found online. I will try to fix this because I believe that some of the information coming out the network is being lost/overwritten due to the algorithm. Then I use a method called crop by taking out 56x56x3 images (the third dimension is color). Using this method, I crop 30 smaller images and use that as my input. I would love to have used way, but the processing power gets to be too much. I had an alternate method of splitting the whole song, but I had some trouble using it in my network. The next step is to convert the image array into a numpy array and reshape it to fit my network. I start training the network with this data and set the epochs to 20 just in enough so the computer doesn’t burn out.

           In the training part of code, I use a loop for the epochs and the batches. Then I train the data to use the generator and discriminator. I also have multiple methods that save iterations through the epochs and save the images. Finally, I use the last epoch.png to create a .wav file at the end.

**Related Works**

Through some of the research I did, I came across a paper on Music Composition from Santa Clara. In this paper, they used midi files instead and worked with an RNNs instead. I also looked at the tutorial by TensorFlow for GAN with the new TensorFlow 2.0 beta. I also looked into Magenta and Wave net, but those algorithms were too complex for to both understand and run. I also found an article on Medium that uses an RNN-GAN to create piano audio files.

**Future Works**

           Currently, I have hardcoded paths to where I would receive, and store files and I would like to change that so that I would be able to run the code smoothly on my pc. I would eventually love to move this entire project to run on my pc. As of now, I having trouble running the new updated version of TensorFlow on my pc due I have to update and override a lot. I would also try to use GPU on pc to run this instead because my laptop had the hardest time just to produce one sec.

**Conclusion**

           Overall, I was able to work with creating a GAN and using it to create some music, rather a small snippet of one. This project was able to use a Bach song to create a second of using a DCGAN with deconvoluted and convoluted neural net.

**Link to Code**

<https://github.com/ViggyV/AI-Music-Generator>

**Bibliography**

“Music Generation with Neural Networks - GAN of the Week.” *Medium*, Cindicator, 27 Aug. 2018, medium.com/cindicator/music-generation-with-neural-networks-gan-of-the-week-b66d01e28200.

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Wang, Shao-Fan, et al. *Music Composition with Deep Learning*. 2018.