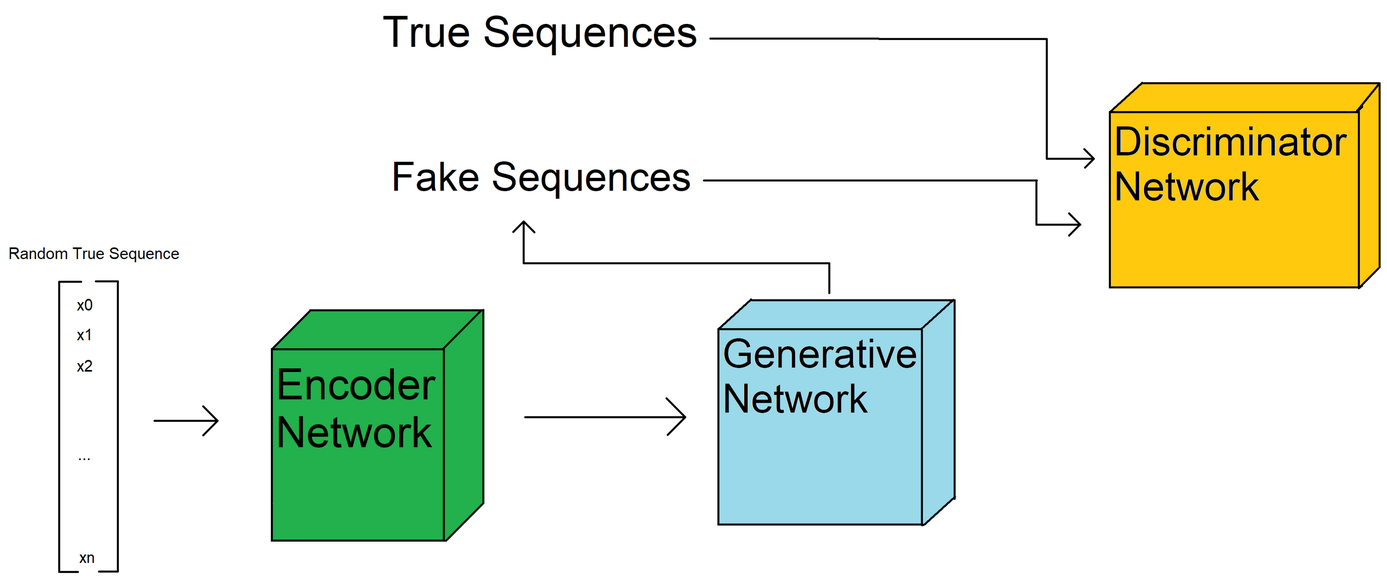
Generative Music with Sample-GAN

Michael Wisnewski

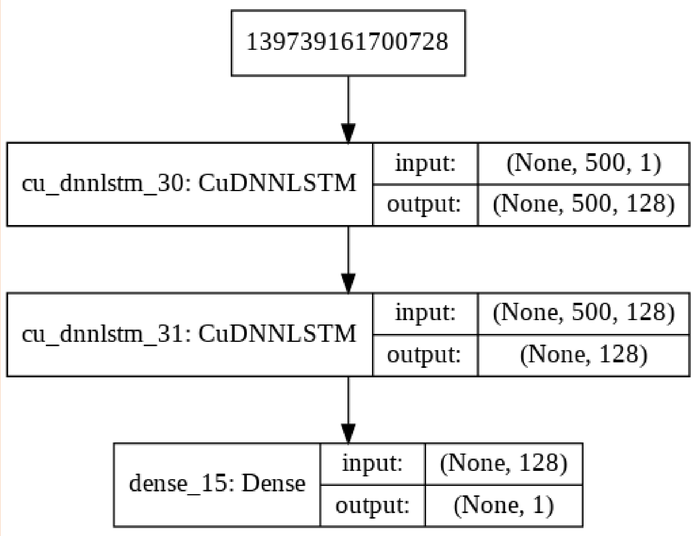
Abstract

Music is one of the few artistic domains that deep learning algorithms continue struggle to thrive in. Two paradigms largely dominate the current research: using GANs to generate midi sequences and training RNNs to generate sequences of samples. I hypothesize that combining elements of these two approaches may yield



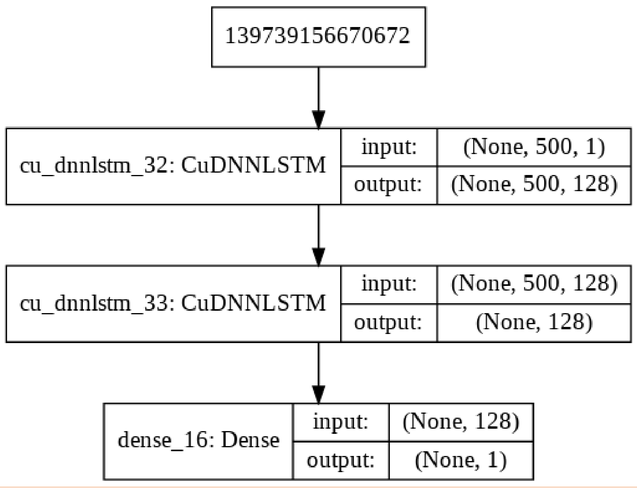
THE MODEL

This model consists of the typical discriminator and generator networks found in GAN architectures. The model is fed songs sliced into segments of 500 samples(1). Larger segments are fed into an autoencoder, whose output is used as the noise vector to seed the generator (2). This is done to decrease the amount of static noise present in the generated sequences. The generator outputs are then mixed in with the true sequences and the learning process begins.



Generator

Discriminator



RESULTS

This model suffers from the common problem that all GANs experience: it is extremely difficult to train. My early results consisted of a small transient at the beginning of the sound clip followed by a stagnant waveform. After much tweaking and optimization I was able to produce what amounted to static. There are vague traces of the training music present, but they are overpowered by the noise. Occasional tones and pitches were audible.

CONCLUSIONS

These results demonstrate to me that GAN may not be optimal for this task. Their tendency to be difficult to train was more than apparent over my experiments. I do think this model has potential, given more time and research as well as hyper-parameter optimization. In general though, it seems it is best to avoid GANs if possible.

REFERENCES

1.. CJ Carr, Zack Zukowski. Generating Black Metal and Math Rock: Beyond Bach Beethoven and Beatles. NIPS 2017

2. Huaibo Huang et al. IntroVAE: Introspective Variational Autoencoders for Photographic Image Synthesis. 27 Oct, 2018

3. Olaf Mogren. C-RNN-GAN: Continuous recurrent neural networks with adversarial training.. 29 Nov, 2016