

MUSIC GENERATION

Ricardo Alexander Fernandez Benavidez
Juan Diego Garcia Vargas
Diego Alejandro Rosazza Merida
Brami Atmani Prudencio Rodriguez



NES MUSIC DATABASE

Used 2 datasets, both containing MIDI files from NES games music

<https://github.com/chrisdonahue/nesmdb>

https://drive.google.com/file/d/14e0MCJD7RH_m7CpsFZWPlp00WgQrwi64

Source: https://unsplash.com/photos/4GWI7PW9_44

MAGENTA

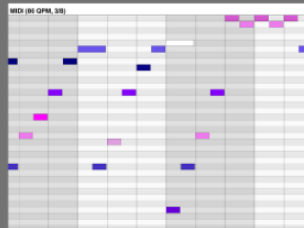
Magenta was developed by Google AI as a tool to help with the creative process, it works with images and sounds, has multiple tools, and can be used with pretrained or self-trained models.



Source: <https://magenta.tensorflow.org/>

POLYPHONY RNN

LSTM based musical generation tool, based on a batch bot proposed in the "AUTOMATIC STYLISTIC COMPOSITION OF BACH CHORALEs WITH DEEP LSTM" paper, is basic in nature and easy to use.



Source: <https://static.packt-cdn.com/products/9781838824419/graphics/assets/43e96a60-efdf-4491-a206-d2d18b43ae20.png>

PERFORMANCE RNN

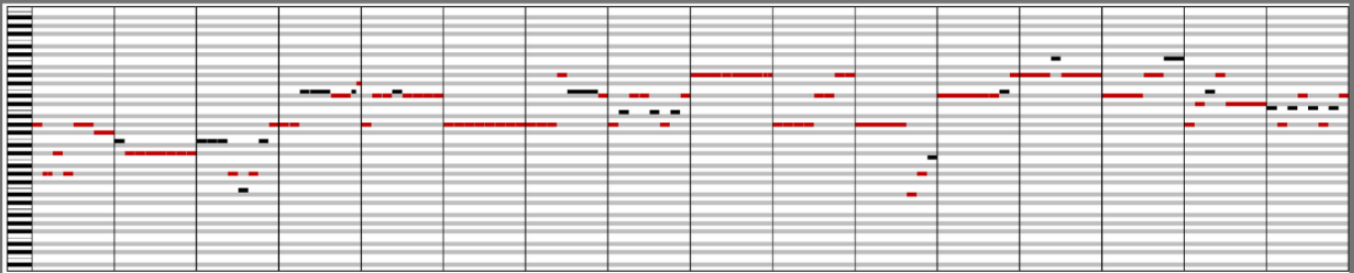
LSTM based musical generation tool, improved upon polyphony RNN and other similar Magenta models, more accurately represents crucial musical concepts, but as a consequence is harder to use.



Source: https://gitcdn.link/cdn/Tony607/blog_statics/master/images/experience_page/performance_rnn.png

DATASET PREPARATION

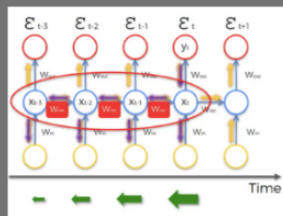
Convert MIDI dataset to Note Sequences, this is a lighter representation of a MIDI, more easily used in Magenta as an input.



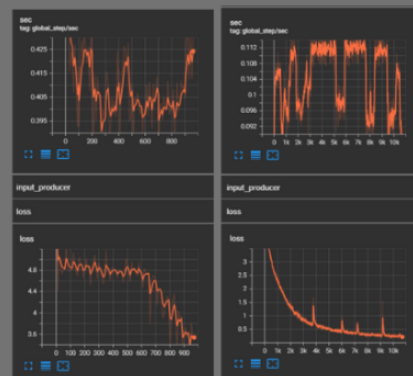
Source: <https://magenta.tensorflow.org/midi-me>

TRAINING

Both models use the same training logic, by employing backpropagation in the LSTM network, varying in the representation of the information.



Source: https://sds-platform-private.s3-us-east-2.amazonaws.com/uploads/32_blog_image_1.png



Source: Made with TensorBoard, Left is Performance_RNN and right is Polyphony_RNN

VISUALIZATION

While training the models, Tensorboard was used to generate graphs based on the information of Accuracy, Loss and Perplexity per Global Step



Source: MIDI Visualization on one of the generated files

GENERATED MUSIC

After training the models after ~14000 steps, MIDI files were generated giving freedom to use any note it desires, it can also be set to use a defined set of notes at start of generation or in the middle of the generation.



Source: <https://www.deviantart.com/tjd1337/art/NES-Minimalist-205452242>