



Music Creation: From Zero to Hero

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Final Project : INFO 7374 Neural Networks and Artificial Intelligence

Group 6

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Overview

Humans have mastered the skill to create unique visual and audio experiences through composing of both art and music. For the truly successful artists both in the art world and the music world, each one has his or her own unique 'style'. Style is uniquely human trait and one artist's style is usually different from the next artist's style, even though both artists might be

creating work under the same genre. This is true for visual artists and musicians. With advances in information technology, and for the first time in history, a number of tools exist that can enable machines to be to learn and create art with the same feel as the original composer. The current technological advancements have transformed the way we produce music, listen, and work with music. With the advent of deep learning, it has now become possible to generate music without the need for working with instruments artists may not have had access to or the skills to use previously. This offers artists more creative freedom and ability to explore different domains of music. In this project we will attempt to create new music using neural networks and under the keras platform.

Project Setup

LSTM

We will use an LSTM model to recognise and encode long-term patterns in music files. LSTMs are extremely useful applicable in this case because they are ‘memory’ networks and can remember information for a longer period of time compared to other models.

Music21

We use Music21 to extract the contents of the dataset, and helps us translate the outputs of a neural networks into music notation.

Keras

Keras is a high-level neural networks API that simplifies interactions with Tensorflow. It was developed with a focus on enabling fast experimentation. We use Keras to train the LSTM model that we use for music generation.

Goals

This project was inspired by the paper Deep Learning for Music

The major goals of the project are;

1. To use deep learning techniques to learn the long-term structure and possessing the ability to build off a melody from a music
2. Create new music from the model trained in 1 above.

Data

The dataset includes piano tunes stored in the MIDI format. MIDI (Musical Instrument Digital Interface) is a protocol which allows electronic instruments and other digital musical tools to communicate with each other. Since a MIDI file only represents player information, i.e., a series

of messages like ‘note on’, ‘note off’, it is more compact, easy to modify, and can be adapted to any instrument.

The dataset we propose to use can be found here: <http://opihi.cs.uvic.ca/sound/genres.tar.gz>

Process Outline

1. Data Preprocessing
2. Exploratory Data Analysis and data cleaning.
3. Using transfer learning and fine tuning to build the best model for prediction.
4. Build model to randomly create piece of music and combine it with the previous model.
5. Design of a pipeline and system to implement this approach and discussion on the system’s capabilities
6. Deploy the Model on AWS

Timetable

Timeframe	Delivery
Day 1-2	Data Preprocessing and Exploratory Data Analysis
Day 3-9	Models Building, Training and Tuning
Day 10-11	Music creation using the model
Day 12-13	System integration and documentation

Deployment Details

- 1) Language: Python, Java
- 2) Music21
- 3) Keras
- 4) Cloud Tools/Platforms: AWS (Amazon WEb Services) EC2
- 5) Other Considerations: Flask

Source: <https://magenta.tensorflow.org/nsynth-instrument>

Reference and Sources

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