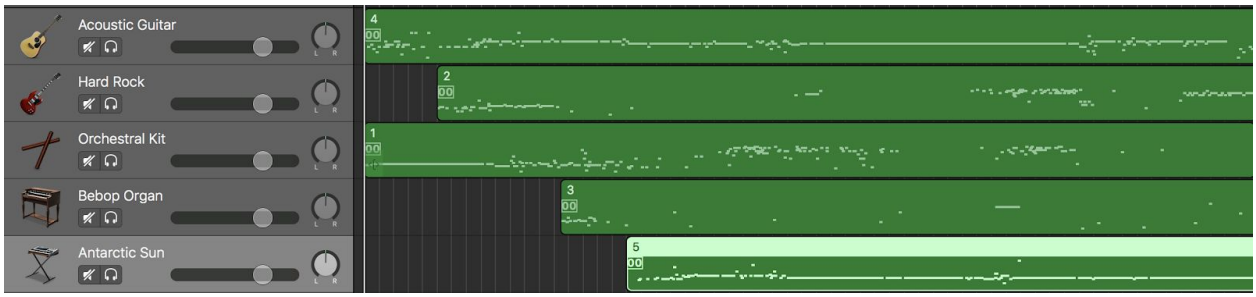
ART AND MACHINE LEARNING
CMU 2019 SPRING
PROJECT 3 Report

Yejin Can Compose!



Group 8
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DESCRIPTION

Concept:
In the beginning, we wanted to make new music with non-traditional music instruments or sound such as noise and daily conversations. However, after we collect data, we realized voice and noise have high-dimensions that are hard to capture in monophonic sound.
Therefore, instead of having a clear intention, we wanted to make an experimental music using RNN technique. With the generated sounds, we created new music rearranging and adding different instruments and realize Yejin, who has no experience in composing, can make interesting music using this technique.

Technique:
Our work is based on midi-rnn repository which uses midi editing library and recurrent neural network. This is a relatively simple neural net structure with single hidden layer with 64 nodes. It uses Adam optimizer and categorical cross entropy function for loss.

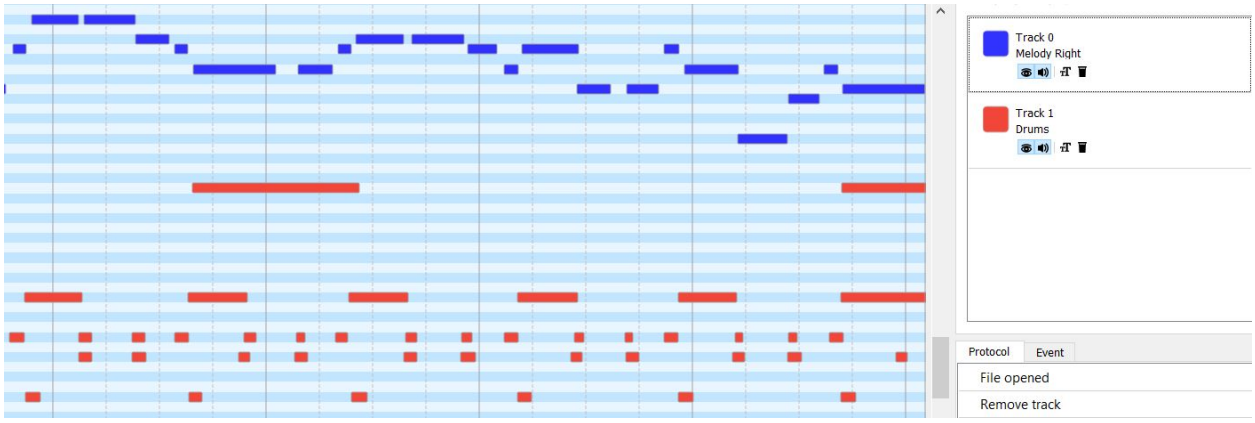
Most of the techinique we used here are manipulating the data. First we scraped kid's music and movie-ost from the web, sometimes using scraping tool. Then we used *MidiEditor* to keep only the melodies. We created around a hundred midi files using the editor. This was a rather manual labour that turned out to be really useful.

Process:
As with any project like this, we ran the original code with the original parameters and evaluated the trained model. The repository from midi-rnn uses recurrent neural net. However, this is a naive version and only reads the monophonic elements of the midi files.

```
def filter_monophonic(pm_instruments, percent_monophonic=0.99):
    return [i for i in pm_instruments if \
            get_percent_monophonic(i.get_piano_roll()) >= percent_monophonic]
```

The repository collects multiple tracks and reads them is they are at least 99 percent monophonic

With this in mind, we can think of a few ways to speed up the process of learning and generate more realistic music. First, we can simplify midi files to use only melodies as the training data. This will help because in a single midi file there are tracks that doesn't contain any melody--like drum (pitch has no meaning). We can see the blue (melody) has meaning for us.

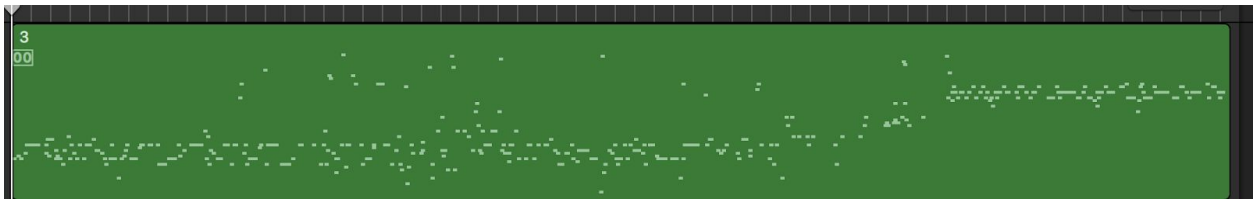


Melody and Drum track of a midi file side-by-side

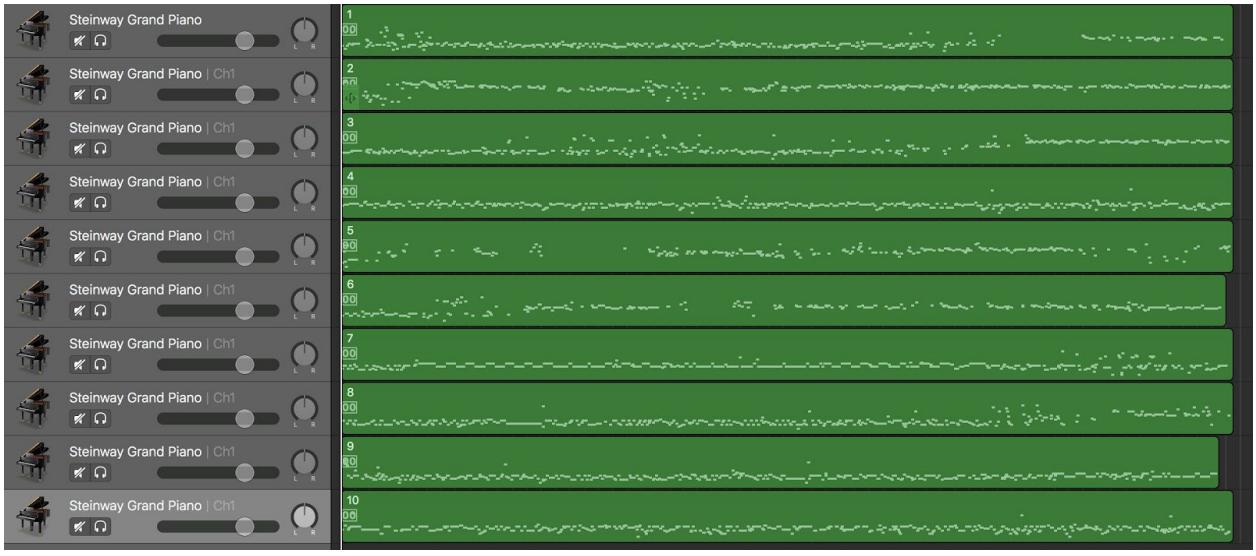
So to learn better from data, we manually removed everything except the melody. Keeping only the “interesting” ones (blue for the figure above). We also used kid’s songs (like ABCD song) because of melodies’ simplicity. We believe this will produce more realistic results.

<step1. Generated Kids music>

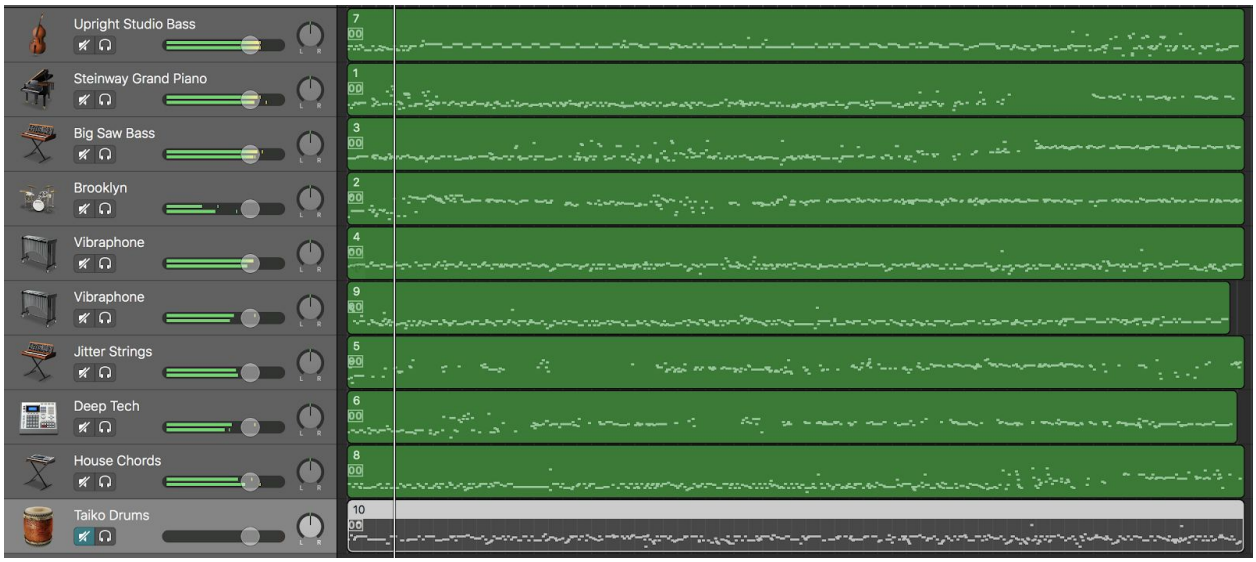
Test 1.1. We generated music with Kids music. Each music were hard to related to kids music and most pitch were relatively low.



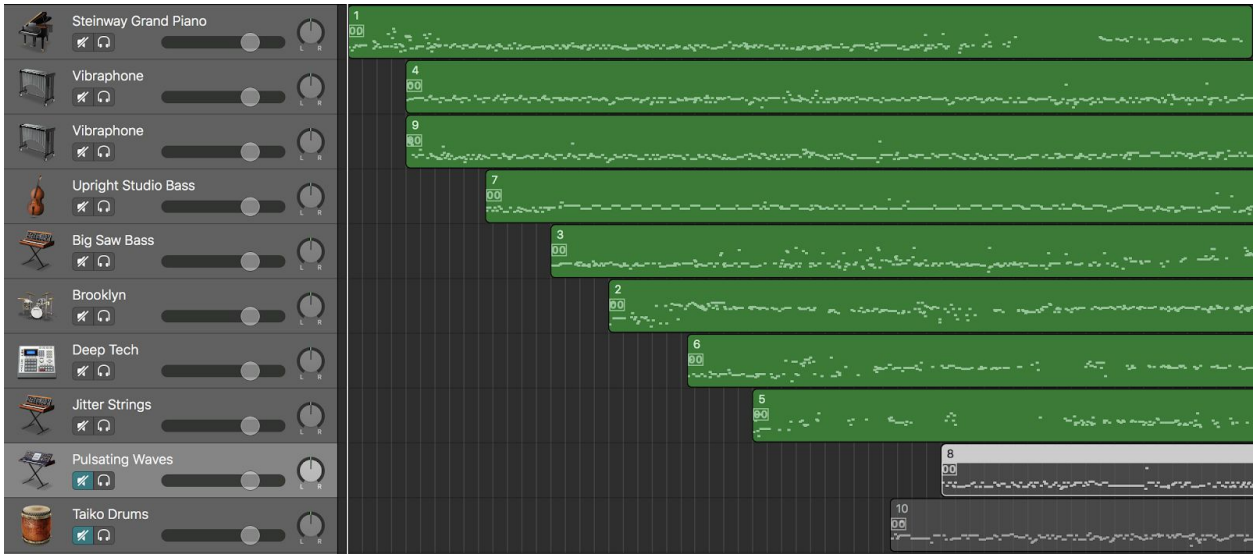
Test 1.2. We combined all of the generated music and it was to hectic.



Test 1.3. To give more variations, we played each sound with a different instrument.

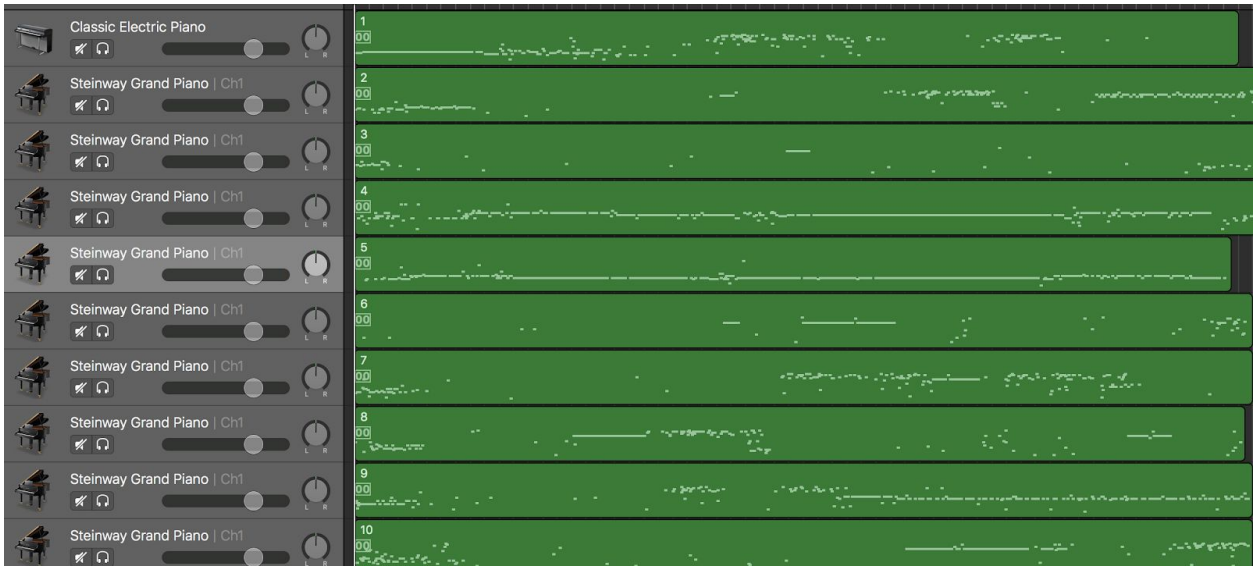


Test 1.4. We wanted to have a better sound, but still wanted to keep this unexpected strange combination. So Yejin did simple editing rearranging the order.

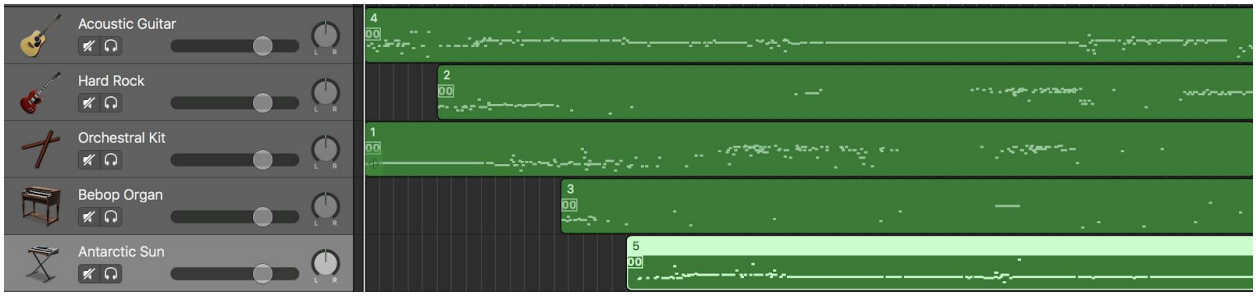


<Step2: generated movie ost music>

Test 2.1. We generated music with movie ost as well.



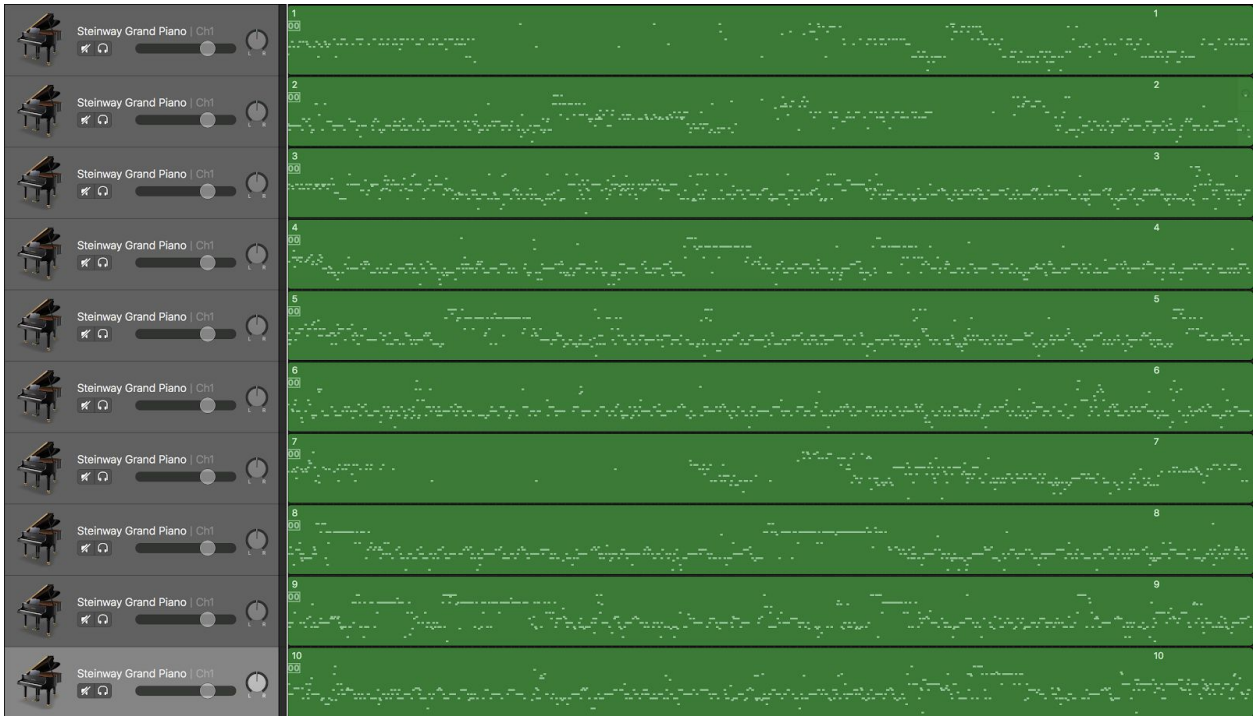
Test 2.2. We composed these sounds using different instruments and changing order.



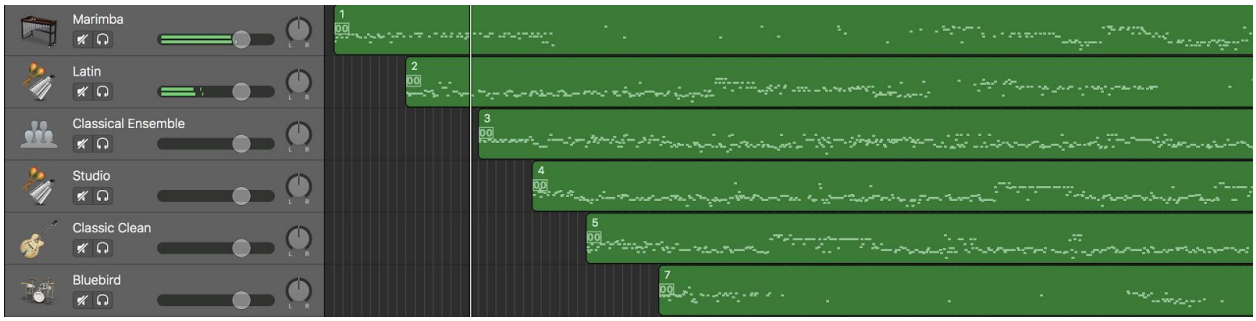
<step3: generated kids music with monophonic midi files>

Test 3.1. To make music that is more close to Kids music, we changed all polyphonic midi files to monophonic midi files. In result, each sound had more interesting sound. On the other hand, when you combined these sounds, it was less interesting because every sounds was too

similar.



Test 3.2. This was another try to create new music with different arrangements and different instruments.



Result:
Using simple melody from kids music, we composed more complex music by stacking, ,rearranging, and adding different instruments.

Reflection:
Trying both intentional and unintentional approach, we realized interesting ideas and outcomes often come from unexpected results and in the process of making. For the next step, we want to try using different repository for generating music, like the one in “melody rnn” from magenta [1].

Reference:
[1] Magenta, Tensorflow, music RNN repository
https://github.com/tensorflow/magenta/tree/master/magenta/models/melody_rnn

CODE: https://github.com/briankim13/art_ml_project3

RESULT:
Initial trial with kids music
https://drive.google.com/open?id=1E54fYN0NRDDwN6mIvxCnD6h7zvjnRJXL
Initial trial with movie ost
https://drive.google.com/open?id=1JI0OQPRWw3-_T9vcxzeXB9a_eHOeCIcG
Trial with edited kids music
https://drive.google.com/open?id=1E54fYN0NRDDwN6mIvxCnD6h7zvjnRJXL