

## **Final Project Documentation Submission**

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### **Description of the Project Process:**

#### **Materials and Techniques:**

Since I was already aware that the flow would either be an existing model fine-tuned on Indian Ragas dataset or create a model from scratch. Since the beginning, I was leaning towards creating the model from scratch but the existing models had to be explored. I tried using Jukebox, WaveRNN, Magenta and other models from HuggingFace but none of them worked out because the dataset format was not matching and converting data into the required format would require a considerable amount of research which seemed out of the scope of the project. Hence, I found a model on github which could be transformed into the required format and which could generate a melody while being trained on the Indian Ragas dataset. This was an LSTM model that used midi files as input and output a newly generated melody in the form of a midi file.

#### **Iteration 1:**

This iteration was mainly tweaking the inspiration model to suit it for my requirements. Changes like the loss function, number of epochs etc were made to get the initial result. This process was a painstaking effort as the result was just a melody with a stuck note. There were no patterns in the melody, just one repetitive note. But atleast I was able to generate an output with my training data.

#### **Iteration 2:**

In this iteration, I had to look into the issue with the stuck melody note. For this, I looked into the dataset files to see if any pattern was affecting the output from them but to my surprise, there was none. Then I increased the number of epochs so that the training loss decreases further. The training went on overnight and after 100 epochs, I was able to generate a proper melody pattern.

#### **Iteration 3:**

Next step was to modify the output to reduce the pitches to match with the influence files and make it sound more like a Raga by introducing some constraints. I mapped the pitches according to the nearby note which shall be present in the group of notes of the Raga and removed some from the output which were not needed. This was done using the mido library in Python. The final result was then tuned with the influence files.

## Self Evaluation:

### Project Retrospective:

In my opinion, there was definitely a learning curve. From the beginning of the course, Prof Casey had hinted that I could make something out of the Indian Classical Music System which was my inspiration all along to make a model which could generate Indian music. This is not a perfect model but the melody definitely has those Indian components. The fact that the final project was an extension of the past two assignments is another intriguing aspect of the project. I did not know what I would make for this project then, but I was able to build over the course of these 10 weeks. This helped me grow a lot.

### Hurdles:

I think the main hurdle was the dataset because Indian music is not traditionally represented in the form of Midi, hence the dataset obtained was small but enough to carry on with the training process. There were definitely challenging times when I was divided as to what model to choose or if I should train one from scratch but I was able to take the challenge of training a model from scratch. Personally, this was another important achievement as I could control the parameters on which the model output was dependent upon.

## References:

### Model and Dataset

- <https://github.com/Skuldur/Classical-Piano-Composer>
- [https://figshare.com/articles/dataset/Music\\_Traditional\\_HinduRaga\\_MIDI/5436025](https://figshare.com/articles/dataset/Music_Traditional_HinduRaga_MIDI/5436025)

### Influence Files:

- <https://www.looperman.com/loops/detail/19690/rupek-taal-1-by-ssingh-free-160bpm-e-thnic-tabla-loop>
- <https://freesound.org/search/?q=tanpura>

### Others

- <https://discussions.apple.com/thread/3839190>
- <https://support.apple.com/guide/terminal/make-a-file-executable-apdd100908f-06b3-4e63-8a87-32e71241bab4/mac>

- [https://library.bowdoin.edu/media-commons/tutorials/garageband/editing-your-podcast.shtml#:~:text=Trim%20Or%20Loop%20An%20Audio%20Region&text=Move%20your%20cursor%20over%20the,the%20audio%20region%20\(2\)](https://library.bowdoin.edu/media-commons/tutorials/garageband/editing-your-podcast.shtml#:~:text=Trim%20Or%20Loop%20An%20Audio%20Region&text=Move%20your%20cursor%20over%20the,the%20audio%20region%20(2))
- <https://chat.openai.com/>
- <https://mido.readthedocs.io/en/latest/>

**Note:** The final recording is same as Technigala