MIT 6.S191: Mohit_Talwar_RNNMusic

This document summarizes results from Lab 1, Part 2 (Music Generation with RNNs).

Design

We choose the Sequential model suggested in the lab, with the following 3 layers:

- `Layer 0: tf.keras.layers.Embedding(vocab_size, embedding_dim),`
- `Layer 1: LSTM(rnn_units),`
- `Layer 2: tf.keras.layers.Dense(vocab_size)`

Hyperparameters

Here are **hyperparameters** for the model with the lowest loss (see Appendix)::

- `num_training_iterations: 5000`
- `batch_size: 32`
- `rnn_units: 2048`
- `embedding_dim: 128`
- `learning_rate: 0.001`
- `seq_length: 100`

The **intuition** behind this choice of these values follows:

- `num_training_iterations` & `batch_size` were increased to consider more data in training
- `rnn_units` was increased to allow the hidden state to store more context
- `embedding_dim` was decreased to nudge semantically similar tokens to have closer embeddings

Experiments and Observations

The various experiments performed were:

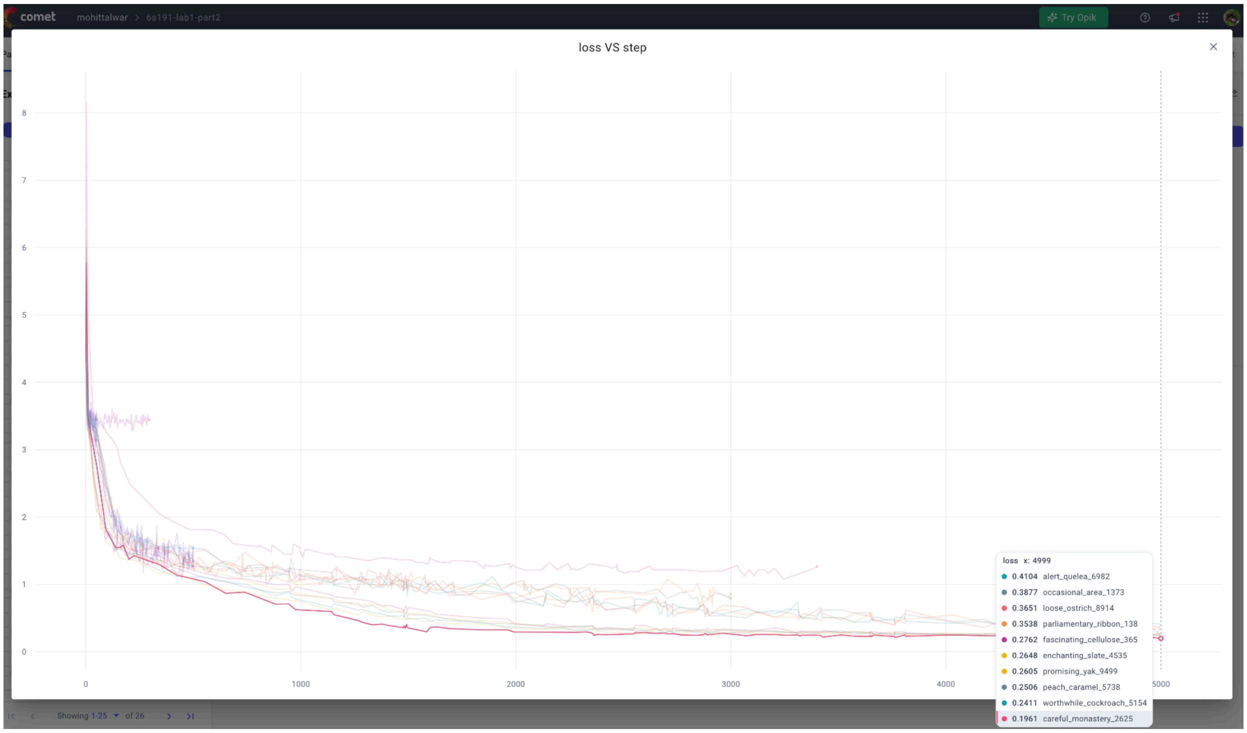
- `training_iterations`: increased to train longer
    - Larger values reduced training loss
- `batch_size`: increased to provide more training data
    - Larger values reduced training loss
- `rnn_units`: increased to store more context
    - Larger values reduced training loss
- `embedding_dim`: reduced to constraint number of dimensions
    - Smaller values reduced training loss, up to a certain degree
- `start_string`: increased to nudge generation of valid songs
    - Larger strings helped only for models trained for fewer iterations

Future Work

Here are some obvious areas of future study:

- **Evaluation**: Models were compared using loss and samples of generated music. Need more rigor.
- **Tokenization**: The tokenization algorithm is quite naive. Compare alternatives.
- **Dataset**: The dataset (817 songs) is rather small. Enrich using additional sources of target music.
- **Architecture**: Explore addition of hidden layers.

Appendix


comet
mohittalwar > 6s191-lab1-part2
Try Opik
loss VS step
×
8
7
6
5
4
3
2
1
0
0
1000
2000
3000
4000
5000
loss x: 4999
● 0.4104 alert_quelea_6982
● 0.3877 occasional_area_1373
● 0.3651 loose_ostrich_8914
● 0.3538 parliamentary_ribbon_138
● 0.2762 fascinating_cellulose_365
● 0.2648 enchanting_slate_4535
● 0.2605 promising_yak_9499
● 0.2506 peach_caramel_5738
● 0.2411 worthwhile_cockroach_5154
● 0.1961 careful_monastery_2625
Showing 1-25 of 26