HW2: how to use magenta rnn model for your music sequence generation

Stella Koh, 10/18/2018

Google Magenta’s RNN model

https://github.com/tensorflow/magenta

https://github.com/tensorflow/magenta/tree/master/magenta/models/melody_rnn

https://github.com/tensorflow/magenta/tree/master/magenta/models/polyphony_rnn

How to use

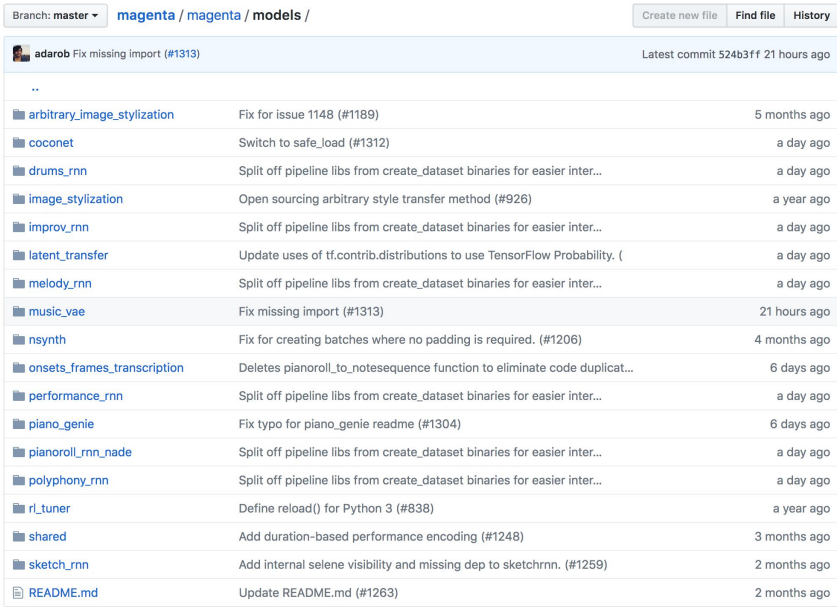
1. Git clone magenta git repository
2. Choose dataset what you want to use for your training dataset
3. Build your own dataset in .tfrecord format
4. Create Sequence examples
5. Choose the models (e.g., basic_rnn) and parameters (e.g., batch size, layer size, training steps)
6. Start training
7. Start generation after training

Magenta git repository

```
>> git clone https://github.com/tensorflow/magenta

>> cd magenta/models
```

>>



Branch: master ▾ magenta / magenta / models / Create new file | Find file | History

adarob Fix missing import (#1313) Latest commit 524b3ff 21 hours ago

..		
arbitrary_image_stylization	Fix for issue 1148 (#1189)	5 months ago
coconet	Switch to safe_load (#1312)	a day ago
drums_rnn	Split off pipeline libs from create_dataset binaries for easier inter...	a day ago
image_stylization	Open sourcing arbitrary style transfer method (#926)	a year ago
improv_rnn	Split off pipeline libs from create_dataset binaries for easier inter...	a day ago
latent_transfer	Update uses of tf.contrib.distributions to use TensorFlow Probability. (	a day ago
melody_rnn	Split off pipeline libs from create_dataset binaries for easier inter...	a day ago
music_vae	Fix missing import (#1313)	21 hours ago
nsynth	Fix for creating batches where no padding is required. (#1206)	4 months ago
onsets_frames_transcription	Deletes pianoroll_to_notesequence function to eliminate code duplicat...	6 days ago
performance_rnn	Split off pipeline libs from create_dataset binaries for easier inter...	a day ago
piano_genie	Fix typo for piano_genie readme (#1304)	6 days ago
pianoroll_rnn_nade	Split off pipeline libs from create_dataset binaries for easier inter...	a day ago
polyphony_rnn	Split off pipeline libs from create_dataset binaries for easier inter...	a day ago
rl_tuner	Define reload() for Python 3 (#838)	a year ago
shared	Add duration-based performance encoding (#1248)	3 months ago
sketch_rnn	Add internal selene visibility and missing dep to sketchrnn. (#1259)	2 months ago
README.md	Update README.md (#1263)	2 months ago

Build your own dataset

1. Follow instructions in this page

   https://github.com/tensorflow/magenta/blob/master/magenta/scripts/README.md

2. >> cd magenta/scripts/
3. Find “convert_dir_to_note_sequences.py”
4. Run command

e.g.,
./bazel-bin/magenta/scripts/convert_dir_to_note_sequences \
--input_dir=/home/eko/Nottingham/train \
--output_file=nottingham_test.tfrecord \
--num_threads=4 \
--log=INFO

Dataset example

https://vgmusic.com/music/console/nintendo/gameboy/

- How to download?

  https://github.com/dwright37/node-vgmusic-downloader

http://www-etud.iro.umontreal.ca/~boulanni/icml2012

Possible bug

Some midi dataset might have encoding problems..

But, if not..!

```
eko@kokoh-lab:~/winter2018/magenta/tmp$ ls
a001.tfrecord  bach.tfrecord  banjotest.tfrecord  banjo_ttcove.tfrecord  jsb_test.tfrecord  nottingham_valid.tfrecord  sonic.tfrecord  xmas.tfrecord
```

Create Sequence examples and choose RNN model

- SequenceExamples are fed into the model during training and evaluation.

```
./bazel-bin/magenta/models/melody_rnn/melody_rnn_create_dataset
--config='attention_rnn'
--input=nottingham_test.tfrecord
--output_dir=magenta/models/melody_rnn/tmp/atten/0412
--eval_ratio=0.1
```

Melody-RNN

./bazel-bin/magenta/models/melody_rnn/melody_rnn_train
--config=attention_rnn
--run_dir=magenta/models/melody_rnn/tmp/atten/nottingham/run3
--sequence_example_file=magenta/models/melody_rnn/tmp/training_melodies.tfrecord
--hparams="batch_size=64,rnn_layer_sizes=[256,256]"
--num_training_steps=200

If you make a success, you can see these logs..

INFO:tensorflow:global_step/sec: 0.0250781
INFO:tensorflow:Saving checkpoints for 956 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 958 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 960 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 962 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 964 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Perplexity = 5.19469, Loss = 1.647637, Global Step = 964, Accuracy = 0.5324142 (398.514 sec)
INFO:tensorflow:global_step/sec: 0.0250932
INFO:tensorflow:Saving checkpoints for 966 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 968 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 970 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 972 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:global_step/sec: 0.0250896
INFO:tensorflow:Saving checkpoints for 974 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Perplexity = 5.1886277, Loss = 1.6464692, Global Step = 974, Accuracy = 0.5330882 (398.586 sec)
INFO:tensorflow:global_step/sec: 0.0250887
INFO:tensorflow:Saving checkpoints for 976 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 978 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 980 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 982 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Saving checkpoints for 984 into magenta/models/melody_rnn/tmp/atten/train/model.ckpt.
INFO:tensorflow:Perplexity = 5.177978, Loss = 1.6444147, Global Step = 984, Accuracy = 0.5332721 (398.609 sec)

Training tips..

- Use **nohup** or **tmux** during training (background processing)
  - E.g., "**nohup** *command* **>** *output.out*"

- Try 1 midi file first for your training, check the result
- Try 10 midi file for your training, check the result
- Try maximum # of midi file for your machine, check the result

Melody-RNN

./bazel-bin/magenta/models/melody_rnn/melody_rnn_generate
--config=attention_rnn
--run_dir=magenta/models/melody_rnn/tmp/atten/nottingham/run3
--output_dir=magenta/models/melody_rnn/tmp/generated0412/
--num_outputs=20
--num_steps=128
--hparams="batch_size=64,rnn_layer_sizes=[256,256]"
--primer_melody="[60]"

Tensorboard

eko@kokoh-lab:~/anaconda2/lib/python2.7/site-packages/tensorboard$ python main.py --logdir=/home/eko/Downloads/mus206-project/notebooks/tf_logs/

TensorBoard SCALARS IMAGES AUDIO GRAPHS INACTIVE

Show data download links

Ignore outliers in chart scaling

Tooltip sorting method: default

Smoothing

0.6

Horizontal Axis

STEP RELATIVE WALL

Runs

Write a regex to filter runs

LargerDataset_LowerLR

powerCNN_DatasetSize1200

powerCNN_DatasetSize1200/images

powerCNN_DatasetSize1800

powerCNN_DatasetSize1800/images

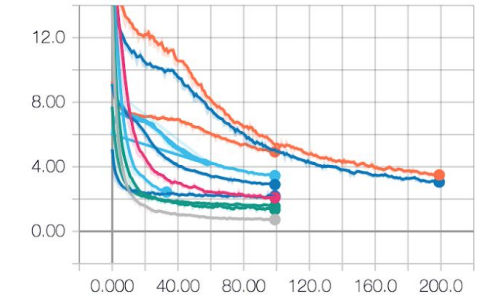
powerCNN_DatasetSize100

TOGGLE ALL RUNS

/home/ec2-user/test/

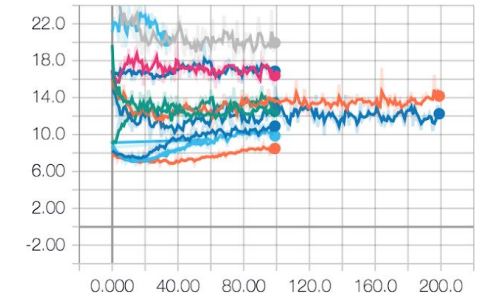
loss

loss

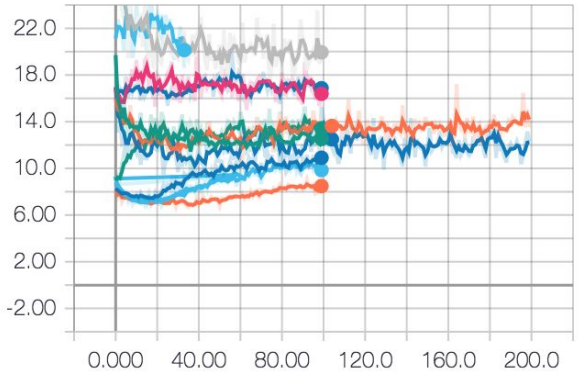


val_loss

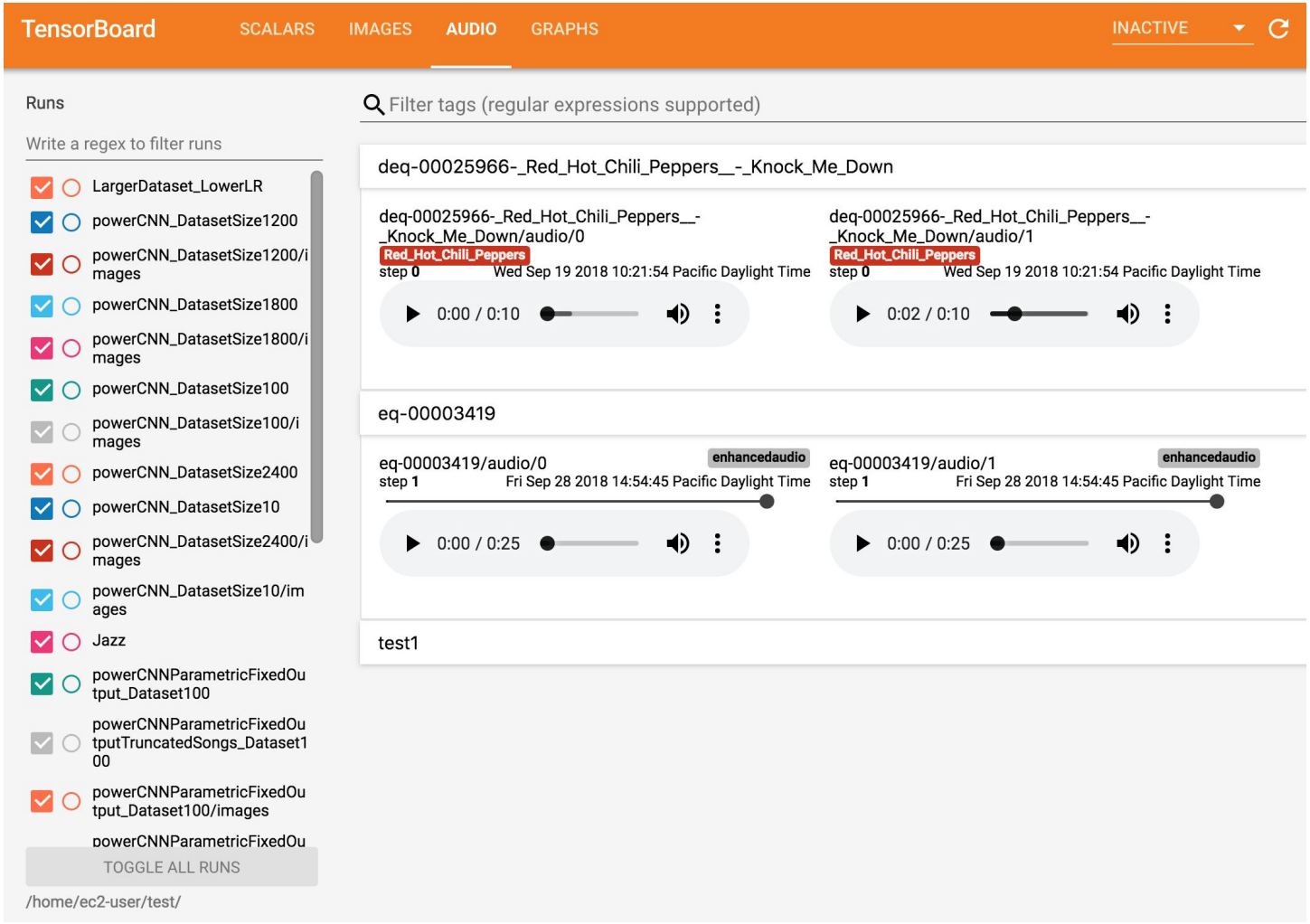
val_loss



val_loss



Name	Smoothed	Value	Step	Time	Relative
powerCNNParametricFixedOutputTruncatedSongs_Dataset100	19.95	19.45	99.00	Wed Sep 19, 01:26:34	8h 7m 15s
powerCNNParametricFixedOutput_Dataset100	12.52	12.72	99.00	Tue Sep 18, 20:32:34	3h 39m 34s
powerCNNParametricFixedOutput_Dataset200	20.14	18.61	33.00	Wed Sep 19, 14:25:27	3h 25m 27s
powerCNNParametricFixedOutput_Dataset3600WithSpeech	13.64	13.70	104.0	Tue Oct 9, 23:44:53	6h 33m 32s
powerCNNParametricFixedOutput_Dataset400	16.39	16.57	99.00	Wed Sep 19, 14:23:55	3h 17m 17s
powerCNNParametrixFixedOutputNormGain_Dataset3600WithSpeech	12.49	11.79	104.0	Wed Oct 10, 03:15:51	9h 29m 38s
powerCNN_DatasetSize10	16.87	16.79	99.00	Mon Sep 10, 19:44:22	6h 40m 28s
powerCNN_DatasetSize100	13.43	13.51	99.00	Mon Sep 10, 04:42:32	6h 2m 9s
powerCNN_DatasetSize1200	10.91	11.42	99.00	Sat Sep 8, 01:40:39	6h 7m 7s
powerCNN_DatasetSize1800	9.848	9.609	99.00	Sat Sep 8, 20:07:40	6h 40m 18s
powerCNN_DatasetSize2400	8.486	8.611	99.00	Mon Sep 10, 17:02:59	6h 44m 53s


TensorBoard
SCALARS
IMAGES
AUDIO
GRAPHS
INACTIVE
Runs
Write a regex to filter runs
LargerDataset_LowerLR
powerCNN_DatasetSize1200
powerCNN_DatasetSize1200/images
powerCNN_DatasetSize1800
powerCNN_DatasetSize1800/images
powerCNN_DatasetSize100
powerCNN_DatasetSize100/images
powerCNN_DatasetSize2400
powerCNN_DatasetSize10
powerCNN_DatasetSize2400/images
powerCNN_DatasetSize10/images
Jazz
powerCNNParametricFixedOutput_Dataset100
powerCNNParametricFixedOutputTruncatedSongs_Dataset100
powerCNNParametricFixedOutput_Dataset100/images
TOGGLE ALL RUNS
/home/ec2-user/test/
Filter tags (regular expressions supported)
deq-00025966-_Red_Hot_Chili_Peppers__-_Knock_Me_Down
deq-00025966-_Red_Hot_Chili_Peppers__-_Knock_Me_Down/audio/0
Red_Hot_Chili_Peppers
step 0 Wed Sep 19 2018 10:21:54 Pacific Daylight Time
0:00 / 0:10
deq-00025966-_Red_Hot_Chili_Peppers__-_Knock_Me_Down/audio/1
Red_Hot_Chili_Peppers
step 0 Wed Sep 19 2018 10:21:54 Pacific Daylight Time
0:02 / 0:10
eq-00003419
eq-00003419/audio/0
enhancedaudio
step 1 Fri Sep 28 2018 14:54:45 Pacific Daylight Time
0:00 / 0:25
eq-00003419/audio/1
enhancedaudio
step 1 Fri Sep 28 2018 14:54:45 Pacific Daylight Time
0:00 / 0:25
test1

Assignment 2

1. Choose your dataset which you want to use for training
2. Generate tfrecord file format
3. Create sequence example
4. Training with MelodyRNN
5. Training with PolyphonyRNN
6. (Optional) Training with other NN models
7. Briefly describe the difference in results from different NN models
8. Briefly describe the difference in results from different datasize
9. Share your music result! Post your music generation output via soundcloud or youtube

Music generation output

https://soundcloud.com/user-431911640/sets

Your potential music generation demo

- Piano-genie: A participant performs on eight buttons, and their performance is translated into a piano performance by a neural network running in a web browser in real-time.

https://magenta.tensorflow.org/pianogenie

https://tensorflow.github.io/magenta-demos/piano-genie/

https://drive.google.com/file/d/1oJTUg4UtSlhBGLZgdsMfTUuAkBPkBe_J/view

https://www.youtube.com/watch?v=YRb0XAnUpIk&list=PLBUMAYA6kvGVOmhAwLRP4i_L15D7AoWDJ