# An Introduction to Deep Learning With Python

## [7.3] Text-classification model to use with TensorBoard

Prof. Yuzo Iano

pgs: 253 - 252

### Text-classification model to use with TensorBoard ¶

In [1]:
```
import keras
from keras.layers import Embedding, Conv1D, MaxPooling1D, GlobalMaxPooling1D, Dense
from keras.models import Sequential
from keras.datasets import imdb
from keras.preprocessing import sequence
```

```
Using TensorFlow backend.
```

In [2]:
```
max_features = 2000
max_len = 500

(x_train, y_train), (x_test, y_test) = imdb.load_data(num_words=max_features)
x_train = sequence.pad_sequences(x_train, maxlen=max_len)
x_test = sequence.pad_sequences(x_test, maxlen=max_len)
```

In [3]:
```
model = Sequential()
model.add(Embedding(max_features, 128,input_length=max_len,name='embed'))
model.add(Conv1D(32, 7, activation='relu'))
model.add(MaxPooling1D(5))
model.add(Conv1D(32, 7, activation='relu'))
model.add(GlobalMaxPooling1D())
model.add(Dense(1))
model.summary()

model.compile(optimizer='rmsprop',
              loss='binary_crossentropy',
              metrics=['acc'])
```

```
WARNING:tensorflow:From C:\Users\pablo\AppData\Roaming\Python\Python36\site-packages\tensorflow\python\framework\o
p_def_library.py:263: colocate_with (from tensorflow.python.framework.ops) is deprecated and will be removed in a
future version.
Instructions for updating:
Colocations handled automatically by placer.
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
embed (Embedding)            (None, 500, 128)          256000    
_________________________________________________________________
conv1d_1 (Conv1D)            (None, 494, 32)           28704     
_________________________________________________________________
max_pooling1d_1 (MaxPooling1 (None, 98, 32)            0         
_________________________________________________________________
conv1d_2 (Conv1D)            (None, 92, 32)            7200      
_________________________________________________________________
global_max_pooling1d_1 (Glob (None, 32)                0         
_________________________________________________________________
dense_1 (Dense)              (None, 1)                 33        
=================================================================
Total params: 291,937
Trainable params: 291,937
Non-trainable params: 0
_________________________________________________________________
```

### Creating a directory for TensorBoard log files

Create a folder with the name which we will call in log_dir of function callbacks, the folder should in the same directory where you save your works.

### Training the model with a TensorBoard callback

In [4]:

```
callbacks = [keras.callbacks.TensorBoard(log_dir='./my_log_dir',
                                         histogram_freq=1,
                                         embeddings_freq=1,
                                         embeddings_data = x_train[:100],
                                         )
            ]
```

In [5]:
```
history = model.fit(x_train, y_train,
                    epochs=20,
                    batch_size=128,
                    validation_split=0.2,
                    callbacks=callbacks)
```

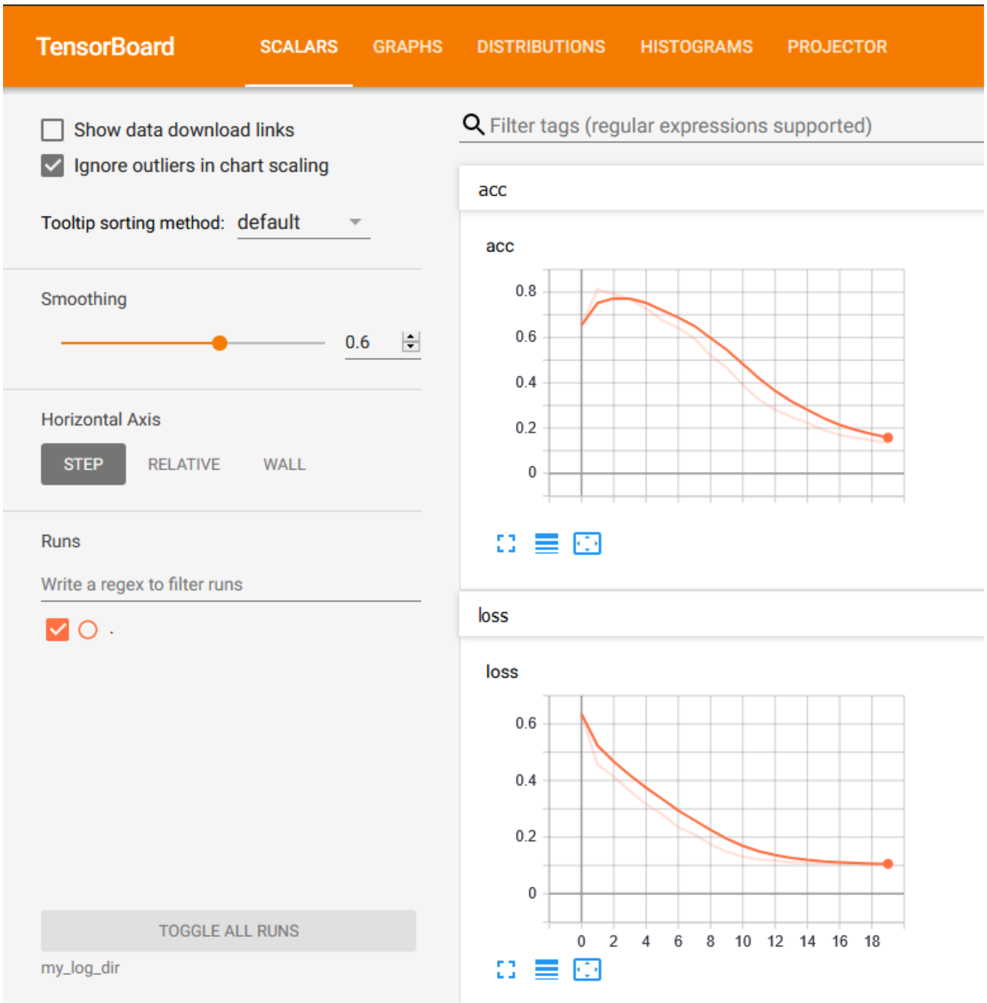
```
WARNING:tensorflow:From C:\Users\pablo\AppData\Roaming\Python\Python36\site-packages\tensorflow\python\ops\math_op
s.py:3066: to_int32 (from tensorflow.python.ops.math_ops) is deprecated and will be removed in a future version.
Instructions for updating:
Use tf.cast instead.
WARNING:tensorflow:From C:\Users\pablo\AppData\Roaming\Python\Python36\site-packages\tensorflow\python\ops\math_gr
ad.py:102: div (from tensorflow.python.ops.math_ops) is deprecated and will be removed in a future version.
Instructions for updating:
Deprecated in favor of operator or tf.math.divide.
Train on 20000 samples, validate on 5000 samples
Epoch 1/20
20000/20000 [==============================] - 43s 2ms/step - loss: 0.6495 - acc: 0.6492 - val_loss: 0.4255 - val_
acc: 0.8214
Epoch 2/20
20000/20000 [==============================] - 39s 2ms/step - loss: 0.4609 - acc: 0.8235 - val_loss: 0.4317 - val_
acc: 0.8216
Epoch 3/20
20000/20000 [==============================] - 38s 2ms/step - loss: 0.4198 - acc: 0.7986 - val_loss: 0.5078 - val_
acc: 0.7836
Epoch 4/20
20000/20000 [==============================] - 39s 2ms/step - loss: 0.3518 - acc: 0.8038 - val_loss: 0.5808 - val_
acc: 0.7338
Epoch 5/20
20000/20000 [==============================] - 39s 2ms/step - loss: 0.3266 - acc: 0.7459 - val_loss: 0.6988 - val_
acc: 0.6388
Epoch 6/20
20000/20000 [==============================] - 40s 2ms/step - loss: 0.2771 - acc: 0.7104 - val_loss: 0.5898 - val_
acc: 0.6642
WARNING:tensorflow:From C:\Users\pablo\AppData\Roaming\Python\Python36\site-packages\tensorflow\python\training\sa
ver.py:966: remove_checkpoint (from tensorflow.python.training.checkpoint_management) is deprecated and will be re
moved in a future version.
Instructions for updating:
Use standard file APIs to delete files with this prefix.
Epoch 7/20
20000/20000 [==============================] - 43s 2ms/step - loss: 0.2289 - acc: 0.6552 - val_loss: 0.6305 - val_
acc: 0.6034
Epoch 8/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.2024 - acc: 0.5992 - val_loss: 0.6972 - val_
acc: 0.5636
Epoch 9/20
20000/20000 [==============================] - 40s 2ms/step - loss: 0.1677 - acc: 0.5520 - val_loss: 1.1121 - val_
acc: 0.4348
Epoch 10/20
20000/20000 [==============================] - 47s 2ms/step - loss: 0.1369 - acc: 0.4923 - val_loss: 1.0831 - val_
acc: 0.4038
Epoch 11/20
20000/20000 [==============================] - 43s 2ms/step - loss: 0.1373 - acc: 0.4344 - val_loss: 1.7690 - val_
acc: 0.3044
Epoch 12/20
20000/20000 [==============================] - 41s 2ms/step - loss: 0.1108 - acc: 0.3681 - val_loss: 1.1081 - val_
acc: 0.3216
Epoch 13/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.1028 - acc: 0.3057 - val_loss: 1.0641 - val_
acc: 0.3172
Epoch 14/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.0987 - acc: 0.2578 - val_loss: 1.2195 - val_
acc: 0.2862
Epoch 15/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.1003 - acc: 0.2339 - val_loss: 1.1325 - val_
acc: 0.2848
Epoch 16/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.0942 - acc: 0.2046 - val_loss: 1.1868 - val_
acc: 0.2678
Epoch 17/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.0968 - acc: 0.1804 - val_loss: 1.2012 - val_
acc: 0.2450
Epoch 18/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.0974 - acc: 0.1590 - val_loss: 1.2752 - val_
acc: 0.2404
Epoch 19/20
20000/20000 [==============================] - 44s 2ms/step - loss: 0.0930 - acc: 0.1499 - val_loss: 1.2856 - val_
acc: 0.2152
Epoch 20/20
20000/20000 [==============================] - 42s 2ms/step - loss: 0.0977 - acc: 0.1326 - val_loss: 1.2260 - val_
acc: 0.2282
```

After training the model, you should have some files in the folder created, now you open the Anaconda prompt and activate the environment and come in for the address of the folder. For add folders in the command prompt (cd name of the folder), finally, you put the next code for active the TensorBoar.

- tensorboard --logdir=my_log_dir

In [6]:
```
from IPython.display import Image
Image(filename='scalars.PNG', width=700, height=800)
```

Out[6]:



☐ Show data download links

☑ Ignore outliers in chart scaling

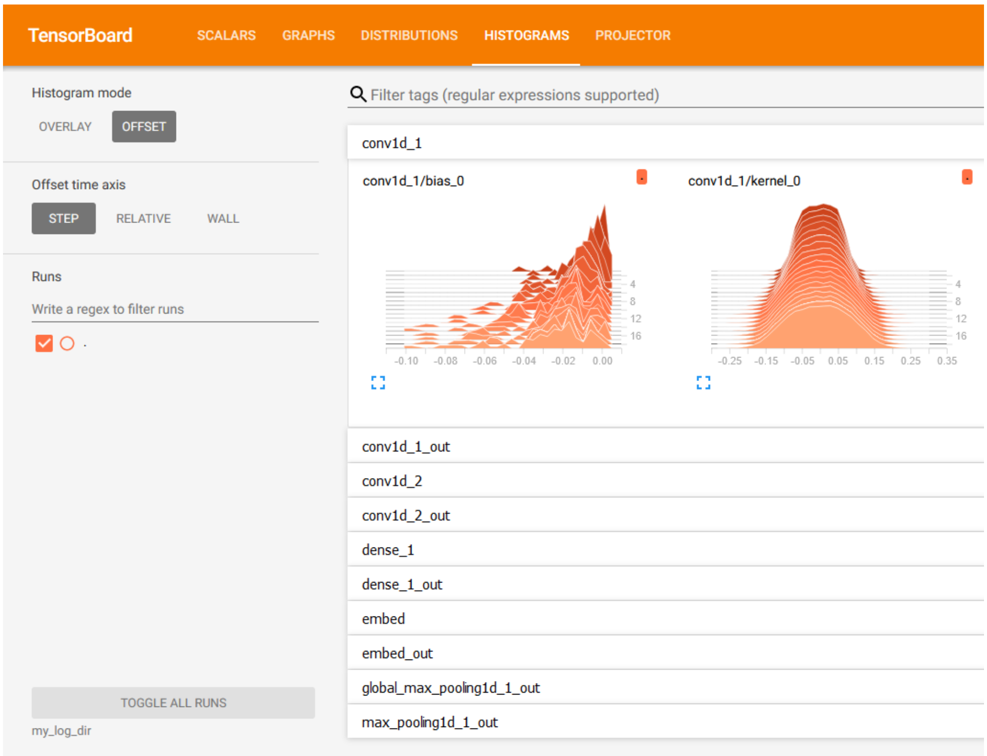
Tooltip sorting method: default

Smoothing 0.6

Horizontal Axis: STEP

In [7]:
```
Image(filename='histograms.PNG', width=700, height=800)
```

Out[7]:

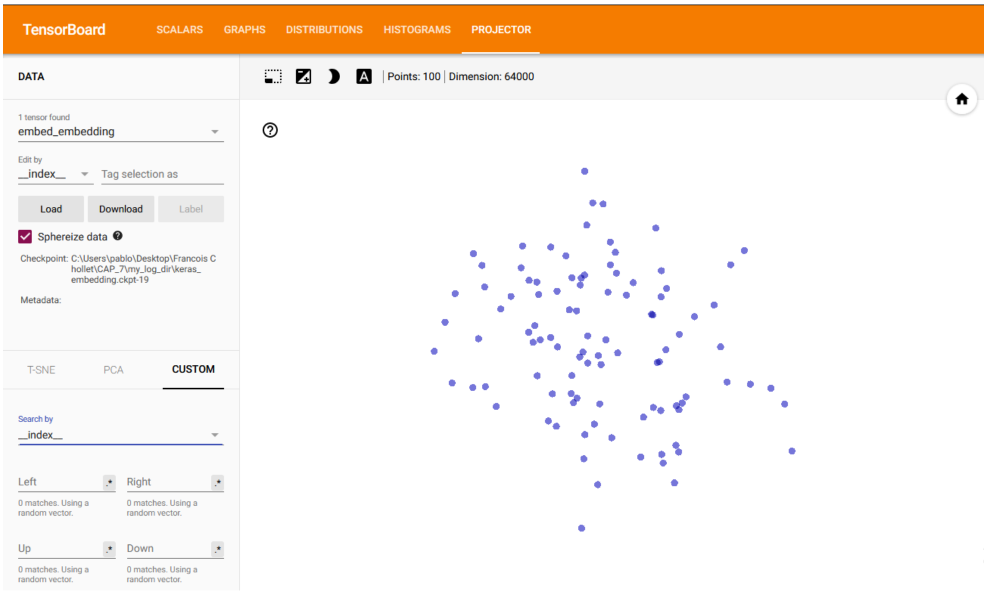


Histogram mode: OFFSET

Offset time axis: STEP

```
In [8]: Image(filename='embeddings.PNG', width=700, height=800)
```

Out[8]:



Points: 100 | Dimension: 64000

1 tensor found
embed_embedding

Edit by
__index__ Tag selection as

☑ Sphereize data

Checkpoint: C:\Users\pablo\Desktop\Francois Chollet\CAP_7\my_log_dir\keras_embedding.ckpt-19

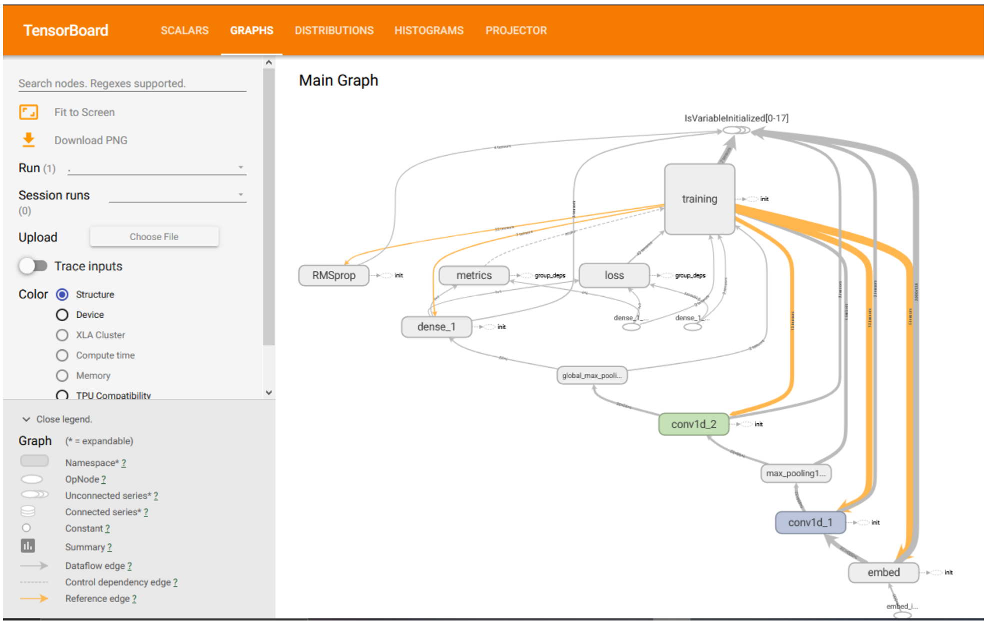
Metadata:

Search by
__index__

Left: 0 matches. Using a random vector.
Right: 0 matches. Using a random vector.
Up: 0 matches. Using a random vector.
Down: 0 matches. Using a random vector.

```
In [9]: Image(filename='graphs.PNG', width=700, height=800)
```

Out[9]:



***Pablo Minango***

- pablodavid218@gmail.com