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 **Karandeep Grover** ENH: moved all the active tutorial content from py/deeplearning 

 0 contributors

749 lines (749 sloc) | 39.8 KB 

## Tensorboard demo using handwritten digits classification using neural network

In this notebook we will classify handwritten digits using a simple neural network which has only input and output layers. We will then add a hidden layer and see how the performance of the model improves

```
In [1]: import tensorflow as tf
        from tensorflow import keras
        import matplotlib.pyplot as plt
        %matplotlib inline
        import numpy as np
```

```
In [2]: (X_train, y_train) , (X_test, y_test) = keras.datasets.mnist.load_data()
```

```
In [3]: len(X_train)
```

```
Out[3]: 60000
```

```
In [4]: len(X_test)
```

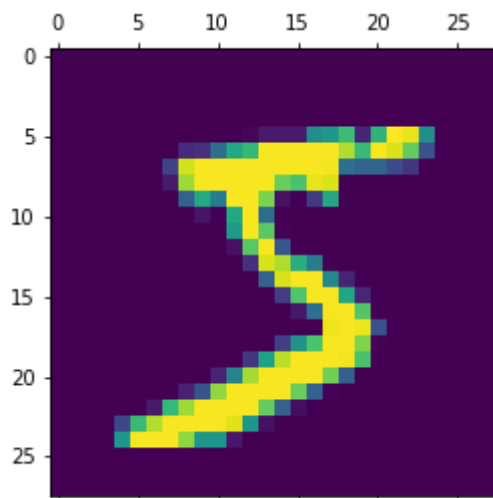
```
Out[4]: 10000
```

```
In [5]: X_train[0].shape
```

```
Out[5]: (28, 28)
```

```
In [6]: plt.matshow(X_train[0])
```

```
Out[6]:
```



```
In [7]: y_train[0]
```

```
Out[7]: 5
```

```
In [8]: X_train = X_train / 255
        X_test = X_test / 255
```

```
In [9]: X_train_flattened = X_train.reshape(len(X_train), 28*28)
        X_test_flattened = X_test.reshape(len(X_test), 28*28)
```

```
In [10]: X_train_flattened.shape
```

```
Out[10]: (60000, 784)
```

## Using Flatten layer so that we don't have to call .reshape on input dataset

```
In [12]: model = keras.Sequential([
            keras.layers.Flatten(input_shape=(28, 28)),
            keras.layers.Dense(100, activation='relu'),
            keras.layers.Dense(10, activation='sigmoid')
        ])

        model.compile(optimizer='adam',
                      loss='sparse_categorical_crossentropy',
                      metrics=['accuracy'])

        tb_callback = tf.keras.callbacks.TensorBoard(log_dir="logs/", histogram_freq=1)

        model.fit(X_train, y_train, epochs=5, callbacks=[tb_callback])
```

Epoch 1/5

```
1/1875 [.....] - ETA: 0s - loss: 2.2880 - accuracy: 0.0625
WARNING:tensorflow:From C:\Users\dhava\AppData\Roaming\Python\Python38\site-packages\tensorflow\python\ops\summary_ops_v2.py:1277: stop (from tensorflow.python.eager.profiler) is deprecated and will be removed after 2020-07-01.
```

Instructions for updating:

use `tf.profiler.experimental.stop` instead.

```
WARNING:tensorflow:Callbacks method `on_train_batch_end` is slow compared to the batch time (batch time: 0.0000s vs `on_train_batch_end` time: 0.0275s). Check your callbacks.
```

```
1875/1875 [=====] - 1s 579us/step - loss: 0.2877 - accuracy: 0.9203
```

Epoch 2/5

```
1875/1875 [=====] - 1s 555us/step - loss: 0.1335 - accuracy: 0.9610
```

Epoch 3/5

```
1875/1875 [=====] - 1s 558us/step - loss: 0.0937 - accuracy: 0.9717
```

Epoch 4/5

```
1875/1875 [=====] - 1s 561us/step - loss: 0.0726 - accuracy: 0.9781
```

Epoch 5/5

```
1875/1875 [=====] - 1s 562us/step - loss: 0.0602 - accuracy: 0.9816
```

```
Out[12]:
```

```
In [ ]: # %load_ext tensorboard
        # %tensorboard --logdir logs/fit
```

```
# %tensorboard --logdir logs/jit
```

Either run above inline magic or go to git bash or your command prompt and type below to run it, `tensorboard --logdir logs/` This will launch tensorboard at this url which you can open in your browser `http://localhost:6006/`

In [17]: `model.get_weights()`

```
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```

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