Evaluate Models

March 28, 2020

[1]:
```
import numpy as np
import time

import keras

from keras.preprocessing.image import ImageDataGenerator

from keras.models import Sequential
from keras.layers import Conv2D, MaxPooling2D
from keras.layers import Activation, Dropout, Flatten, Dense
from keras.layers import Dense, UpSampling2D, GlobalAveragePooling2D, Dropout,␣
↪BatchNormalization

from keras.models import Model
from keras.layers import Input
from keras.layers import Dense
from keras.layers import Flatten
from keras.layers.merge import concatenate

from keras.models import load_model

from keras.optimizers import SGD, Adam, RMSprop

from keras.applications.vgg16 import preprocess_input

from keras.applications.vgg16 import VGG16
from keras.applications.densenet import DenseNet201

from keras.utils.vis_utils import plot_model

from vgg16_places_365 import VGG16_Places365
```

```
Using TensorFlow backend.
```

[2]:
```
test_data_dir = r'Splits/split1/test'

nb_train_samples = 19850
nb_test_samples = 19850
```

```
epochs = 10
batch_size = 32
img_width=224
img_height=224
num_classes = 397
```

[3]:
```
test_datagen = ImageDataGenerator(preprocessing_function=preprocess_input)
```

[4]:
```
validation_generator = test_datagen.flow_from_directory(
    test_data_dir,
    target_size=(224, 224),
    batch_size=batch_size,
    class_mode='categorical')
```

```
Found 19850 images belonging to 397 classes.
```

[5]:
```
model1 = load_model('Models/Run1/ft_combined_vgg_best_model')
```

```
WARNING:tensorflow:From /usr/local/lib/python3.5/dist-
packages/tensorflow_core/python/ops/resource_variable_ops.py:1630: calling
BaseResourceVariable.__init__ (from tensorflow.python.ops.resource_variable_ops)
with constraint is deprecated and will be removed in a future version.
Instructions for updating:
If using Keras pass *_constraint arguments to layers.
WARNING:tensorflow:From /usr/local/lib/python3.5/dist-
packages/keras/backend/tensorflow_backend.py:4070: The name tf.nn.max_pool is
deprecated. Please use tf.nn.max_pool2d instead.

WARNING:tensorflow:From /usr/local/lib/python3.5/dist-
packages/keras/backend/tensorflow_backend.py:422: The name tf.global_variables
is deprecated. Please use tf.compat.v1.global_variables instead.
```

[6]:
```
model2 = load_model('Models/Run2/ft_combined_vgg_best_model')
```

[7]:
```
model3 = load_model('Models/Run3/ft_combined_vgg_best_model')
```

[8]:
```
model1_score = model1.evaluate_generator(validation_generator, verbose=1)
```

```
241/621 [==========>…] - ETA: 14:06

/usr/local/lib/python3.5/dist-packages/PIL/TiffImagePlugin.py:770: UserWarning:
Possibly corrupt EXIF data.  Expecting to read 150 bytes but only got 128.
Skipping tag 37510
  " Skipping tag %s" % (size, len(data), tag)

347/621 [===============>…] - ETA: 10:06
```

```
/usr/local/lib/python3.5/dist-packages/PIL/TiffImagePlugin.py:788: UserWarning:
Corrupt EXIF data.  Expecting to read 4 bytes but only got 0.
  warnings.warn(str(msg))
621/621 [==============================] - 1376s 2s/step
```

[9]:
```
model2_score = model2.evaluate_generator(validation_generator, verbose=1)
```

```
621/621 [==============================] - 425s 684ms/step
```

[10]:
```
model3_score = model3.evaluate_generator(validation_generator, verbose=1)
```

```
621/621 [==============================] - 422s 679ms/step
```

[11]:
```
model1_score[1]
```

[11]:
```
0.6117883920669556
```

[12]:
```
model2_score[1]
```

[12]:
```
0.6123929619789124
```

[13]:
```
model3_score[1]
```

[13]:
```
0.6092694997787476
```

[14]:
```
average_accuracy = (model1_score[1] + model2_score[1] + model3_score[1])/3
```

[15]:
```
average_accuracy
```

[15]:
```
0.6111502846082052
```

[16]:
```
model_time1 = np.load('History/Run1/model_time.npy')
```

[17]:
```
ft_model_time1 = np.load('History/Run1/ft_model_time.npy')
```

[18]:
```
total_time1 = model_time1.sum() + ft_model_time1.sum()
```

[19]:
```
total_time1
```

[19]:
```
15348.508769273758
```

[20]:
```
model_time2 = np.load('History/Run2/model_time.npy')
```

[21]:
```
ft_model_time2 = np.load('History/Run2/ft_model_time.npy')
```

[22]:
```
total_time2 = model_time2.sum() + ft_model_time2.sum()
```

[23]:
```
total_time2
```

[23]:
```
16808.450441598892
```

[24]:
```
model_time3 = np.load('History/Run3/model_time.npy')
```

[25]:
```
ft_model_time3 = np.load('History/Run3/ft_model_time.npy')
```

[26]:
```
total_time3 = model_time3.sum() + ft_model_time3.sum()
```

[27]:
```
total_time3
```

[27]:
```
15863.020821094513
```

[28]:
```
total_average_time = (total_time1 + total_time2 + total_time3)/3
```

[29]:
```
total_average_time
```

[29]:
```
16006.660010655722
```

[ ]:
```

```