In [ ]:

```
# references:
# https://github.com/Kaggle/kaggle-api
# https://towardsdatascience.com/downloading-datasets-into-google-drive-via-google-colab-bcb1b30b0166
# https://www.pyimagesearch.com/2018/12/24/how-to-use-keras-fit-and-fit_generator-a-hands-on-tutorial/
```

In [7]:

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive.mount("/content/gd
rive", force_remount=True).
```

In [8]:

```
# importing necessay libraries
import tensorflow as tf
import datetime
import os
from tensorflow.keras.layers import Dense,Activation,Conv2D,Flatten,MaxPooling2D,Dropout
from tensorflow.keras import regularizers,optimizers,initializers
from tensorflow.keras.models import Model
from keras_preprocessing.image import ImageDataGenerator
import pandas as pd
import numpy as np
```

In [3]:

```
!pip install -q kaggle
from google.colab import files
files.upload()
!mkdir ~/.kaggle
!cp kaggle.json ~/.kaggle/
! chmod 600 ~/.kaggle/kaggle.json
```

Choose File No file selected

Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving kaggle.json to kaggle.json
```

In [4]:

```
!kaggle datasets download -d brahma0545/aaic-assignment-tl
```

```
Downloading aaic-assignment-tl.zip to /content
100% 4.34G/4.34G [01:25<00:00, 38.1MB/s]
100% 4.34G/4.34G [01:25<00:00, 54.3MB/s]
```

In [5]:

```
# list the files in current directory:
!ls -ltr
```

```
total 4549336
drwxr-xr-x 1 root root       4096 Feb  4 15:26 sample_data
drwx------ 5 root root       4096 Feb  7 03:53 gdrive
-rw-r--r-- 1 root root         62 Feb  7 03:54 kaggle.json
-rw-r--r-- 1 root root 4658501240 Feb  7 03:55 aaic-assignment-tl.zip
```

In [ ]:

```
!unzip "/content/aaic-assignment-tl.zip" -d "/content/TL"
```

In [7]:

```
# label data file
dir_path = "/content/TL/labels_final.csv"
```

In [8]:

```
# fetch labels_final.csv
train_df = pd.read_csv(dir_path)
```

In [9]:

```
train_df.head()
```

Out[9]:

	path	label
0	imagesv/v/o/h/voh71d00/509132755+-2755.tif	3
1	imagesl/l/x/t/lxt19d00/502213303.tif	3
2	imagesx/x/e/d/xed05a00/2075325674.tif	2
3	imageso/o/j/b/ojb60d00/517511301+-1301.tif	3
4	imagesq/q/z/k/qzk17e00/2031320195.tif	7

In [10]:

```
# replacing labels
train_df = train_df.replace({'label':
                             {0:"letter",
                             1:"form",
                             2:"email",
                             3:"handwritten",
                             4:"advertisement",
                             5:"scientifit report",
                             6:"scientific publication",
                             7:"specification",
                             8:"file folder",
                             9:"news article",
                             10:"budget",
                             11:"invoice",
                             12:"presentation",
                             13:"questionnaire",
                             14:"resume",
                             15:"memo"}})
```

In [11]:

```
# how much data for each category:
train_df['label'].value_counts()
```

Out[11]:

```
letter                  3016
questionnaire           3007
presentation            3006
resume                  3006
handwritten             3005
file folder             3003
budget                  3002
news article            3002
specification           3000
```

```
scientifit report          2999
memo                       2996
form                       2994
advertisement              2994
email                      2993
invoice                    2992
scientific publication     2985
Name: label, dtype: int64
```

Observations:

1. data is balanced

In [12]:

```
datagen = ImageDataGenerator(rotation_range=90,width_shift_range=0.25,height_shift_range=0.25,horizontal_flip=0.25,vertical_flip=0.25,
    rescale=1./255,validation_split=0.30)
```

In [13]:

```
# train data generator
train_generator = datagen.flow_from_dataframe(
    dataframe=train_df,
    directory="/content/TL/data_final/",
    x_col = "path",
    y_col = "label",
    subset = "training",
    batch_size = 96,
    seed = 39,
    shuffle = True,
    class_mode="categorical",
    target_size = (224,224)
    )
```

```
Found 33600 validated image filenames belonging to 16 classes.
```

In [14]:

```
# validation data generator
valid_generator = datagen.flow_from_dataframe(
    dataframe=train_df,
    directory="/content/TL/data_final/",
    x_col = "path",
    y_col = "label",
    subset = "validation",
    batch_size = 32,
    seed = 42,
    shuffle = True,
    class_mode="categorical",
    target_size = (224,224)
)
```

```
Found 14400 validated image filenames belonging to 16 classes.
```

In [15]:

```
%load_ext tensorboard
import tensorflow as tf
import datetime, os
```

VGG16 Pretrained model as base model

Model-2

In [16]:

```
tf.keras.backend.clear_session()

# loading vgg16 from keras
from keras.applications import VGG16
# load model
base_model = VGG16(include_top=False,input_shape = (224, 224, 3),weights='imagenet')
# no need to train the VGG-16 network
for layer in base_model.layers:
  layer.trainable  = False

# Conv layer
conv1 = Conv2D(512,kernel_size=(7,7),padding='valid',strides=1,activation='relu')(base_model.output)

# Conv layer
conv2 = Conv2D(256,kernel_size=(1,1),padding='valid',strides=1,activation='relu')(conv1)

# Flatten
flat = Flatten()(conv2)

# output layer
model2 = Dense(16,activation='softmax')(flat)
final_model2 = Model(base_model.input,model2)
final_model2.compile(optimizer= optimizers.Adam(),
                     loss="categorical_crossentropy",
                     metrics = ['accuracy'])
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/vgg16/vgg16_weights_
tf_dim_ordering_tf_kernels_notop.h5
58892288/58889256 [==============================] - 0s 0us/step
```

In [ ]:

```
final_model2.summary()
```

```
Model: "model"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
input_1 (InputLayer)         [(None, 224, 224, 3)]     0
_________________________________________________________________
block1_conv1 (Conv2D)        (None, 224, 224, 64)      1792
_________________________________________________________________
block1_conv2 (Conv2D)        (None, 224, 224, 64)      36928
_________________________________________________________________
block1_pool (MaxPooling2D)   (None, 112, 112, 64)      0
_________________________________________________________________
block2_conv1 (Conv2D)        (None, 112, 112, 128)     73856
_________________________________________________________________
block2_conv2 (Conv2D)        (None, 112, 112, 128)     147584
_________________________________________________________________
block2_pool (MaxPooling2D)   (None, 56, 56, 128)       0
_________________________________________________________________
block3_conv1 (Conv2D)        (None, 56, 56, 256)       295168
_________________________________________________________________
block3_conv2 (Conv2D)        (None, 56, 56, 256)       590080
_________________________________________________________________
block3_conv3 (Conv2D)        (None, 56, 56, 256)       590080
_________________________________________________________________
block3_pool (MaxPooling2D)   (None, 28, 28, 256)       0
_________________________________________________________________
block4_conv1 (Conv2D)        (None, 28, 28, 512)       1180160
_________________________________________________________________
block4_conv2 (Conv2D)        (None, 28, 28, 512)       2359808
_________________________________________________________________
block4_conv3 (Conv2D)        (None, 28, 28, 512)       2359808
_________________________________________________________________
block4_pool (MaxPooling2D)   (None, 14, 14, 512)       0
_________________________________________________________________
block5_conv1 (Conv2D)        (None, 14, 14, 512)       2359808
_________________________________________________________________
```

```
block5_conv2 (Conv2D)        (None, 14, 14, 512)       2359808
_________________________________________________________________
block5_conv3 (Conv2D)        (None, 14, 14, 512)       2359808
_________________________________________________________________
block5_pool (MaxPooling2D)   (None, 7, 7, 512)         0
_________________________________________________________________
conv2d (Conv2D)              (None, 1, 1, 512)         12845568
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 1, 1, 256)         131328
_________________________________________________________________
flatten (Flatten)            (None, 256)               0
_________________________________________________________________
dense (Dense)                (None, 16)                4112
=================================================================
Total params: 27,695,696
Trainable params: 12,981,008
Non-trainable params: 14,714,688
_________________________________________________________________
```

In [17]:

```
chech_path = "/content/gdrive/MyDrive/checkpoint/"
log_path   = "/content/gdrive/MyDrive/logs/"
```

In [18]:

```
# checkpoint callback:
cp_callback = tf.keras.callbacks.ModelCheckpoint(chech_path,monitor='accuracy',verbose=1,save_weights_o
nly=True,save_freq='epoch')
```

In [ ]:

```
!rm -rf /content/gdrive/MyDrive/logs/
logdir = os.path.join(log_path, datetime.datetime.now().strftime("%Y%m%d-%H%M%S"))
tensorboard_callback = tf.keras.callbacks.TensorBoard(logdir, histogram_freq=1)

vgghist = final_model2.fit(train_generator,
                           validation_data=valid_generator,
                           callbacks=[tensorboard_callback,cp_callback],
                           steps_per_epoch = 350,
                           epochs = 80
                           )
```

```
Epoch 1/80
350/350 [==============================] - 718s 2s/step - loss: 2.3782 - accuracy: 0.3037 - val_loss: 1
.7356 - val_accuracy: 0.4513

Epoch 00001: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 2/80
350/350 [==============================] - 715s 2s/step - loss: 1.7391 - accuracy: 0.4459 - val_loss: 1
.6733 - val_accuracy: 0.4735

Epoch 00002: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 3/80
350/350 [==============================] - 711s 2s/step - loss: 1.6513 - accuracy: 0.4761 - val_loss: 1
.6177 - val_accuracy: 0.4857

Epoch 00003: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 4/80
350/350 [==============================] - 714s 2s/step - loss: 1.6125 - accuracy: 0.4875 - val_loss: 1
.5749 - val_accuracy: 0.5003

Epoch 00004: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 5/80
350/350 [==============================] - 710s 2s/step - loss: 1.5939 - accuracy: 0.5014 - val_loss: 1
.5949 - val_accuracy: 0.4931

Epoch 00005: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 6/80
350/350 [==============================] - 708s 2s/step - loss: 1.5414 - accuracy: 0.5119 - val_loss: 1
.5400 - val_accuracy: 0.5131

Epoch 00006: saving model to /content/gdrive/MyDrive/checkpoint/
```

```
Epoch 00006: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 7/80
350/350 [==============================] - 711s 2s/step - loss: 1.5194 - accuracy: 0.5198 - val_loss: 1
.5463 - val_accuracy: 0.5051

Epoch 00007: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 8/80
350/350 [==============================] - 707s 2s/step - loss: 1.4858 - accuracy: 0.5353 - val_loss: 1
.5271 - val_accuracy: 0.5170

Epoch 00008: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 9/80
350/350 [==============================] - 709s 2s/step - loss: 1.4773 - accuracy: 0.5298 - val_loss: 1
.5509 - val_accuracy: 0.5133

Epoch 00009: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 10/80
350/350 [==============================] - 712s 2s/step - loss: 1.4685 - accuracy: 0.5320 - val_loss: 1
.4822 - val_accuracy: 0.5325

Epoch 00010: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 11/80
350/350 [==============================] - 715s 2s/step - loss: 1.4666 - accuracy: 0.5348 - val_loss: 1
.4399 - val_accuracy: 0.5465

Epoch 00011: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 12/80
350/350 [==============================] - 707s 2s/step - loss: 1.4508 - accuracy: 0.5415 - val_loss: 1
.5213 - val_accuracy: 0.5205

Epoch 00012: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 13/80
350/350 [==============================] - 709s 2s/step - loss: 1.4446 - accuracy: 0.5470 - val_loss: 1
.4701 - val_accuracy: 0.5301

Epoch 00013: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 14/80
350/350 [==============================] - 710s 2s/step - loss: 1.4304 - accuracy: 0.5446 - val_loss: 1
.4231 - val_accuracy: 0.5537

Epoch 00014: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 15/80
350/350 [==============================] - 720s 2s/step - loss: 1.4078 - accuracy: 0.5563 - val_loss: 1
.4821 - val_accuracy: 0.5323

Epoch 00015: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 16/80
350/350 [==============================] - 716s 2s/step - loss: 1.4242 - accuracy: 0.5492 - val_loss: 1
.4629 - val_accuracy: 0.5438

Epoch 00016: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 17/80
350/350 [==============================] - 715s 2s/step - loss: 1.4070 - accuracy: 0.5589 - val_loss: 1
.4186 - val_accuracy: 0.5606

Epoch 00017: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 18/80
350/350 [==============================] - 712s 2s/step - loss: 1.3837 - accuracy: 0.5619 - val_loss: 1
.4281 - val_accuracy: 0.5499

Epoch 00018: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 19/80
350/350 [==============================] - 713s 2s/step - loss: 1.3793 - accuracy: 0.5606 - val_loss: 1
.4022 - val_accuracy: 0.5612

Epoch 00019: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 20/80
350/350 [==============================] - 724s 2s/step - loss: 1.3721 - accuracy: 0.5675 - val_loss: 1
.4334 - val_accuracy: 0.5549

Epoch 00020: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 21/80
350/350 [==============================] - 717s 2s/step - loss: 1.3646 - accuracy: 0.5671 - val_loss: 1
.4102 - val_accuracy: 0.5598

Epoch 00021: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 22/80
```

```
350/350 [==============================] - 713s 2s/step - loss: 1.3888 - accuracy: 0.5639 - val_loss: 1
.4031 - val_accuracy: 0.5585

Epoch 00022: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 23/80
350/350 [==============================] - 718s 2s/step - loss: 1.3593 - accuracy: 0.5716 - val_loss: 1
.4084 - val_accuracy: 0.5600

Epoch 00023: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 24/80
350/350 [==============================] - 708s 2s/step - loss: 1.3592 - accuracy: 0.5676 - val_loss: 1
.4056 - val_accuracy: 0.5587

Epoch 00024: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 25/80
350/350 [==============================] - 716s 2s/step - loss: 1.3532 - accuracy: 0.5737 - val_loss: 1
.3984 - val_accuracy: 0.5567

Epoch 00025: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 26/80
350/350 [==============================] - 714s 2s/step - loss: 1.3475 - accuracy: 0.5736 - val_loss: 1
.3858 - val_accuracy: 0.5653

Epoch 00026: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 27/80
350/350 [==============================] - 722s 2s/step - loss: 1.3274 - accuracy: 0.5814 - val_loss: 1
.4794 - val_accuracy: 0.5301

Epoch 00027: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 28/80
350/350 [==============================] - 723s 2s/step - loss: 1.3491 - accuracy: 0.5758 - val_loss: 1
.4176 - val_accuracy: 0.5592

Epoch 00028: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 29/80
350/350 [==============================] - 727s 2s/step - loss: 1.3295 - accuracy: 0.5787 - val_loss: 1
.3947 - val_accuracy: 0.5639

Epoch 00029: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 30/80
350/350 [==============================] - 723s 2s/step - loss: 1.3358 - accuracy: 0.5814 - val_loss: 1
.3815 - val_accuracy: 0.5717

Epoch 00030: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 31/80
350/350 [==============================] - 727s 2s/step - loss: 1.3237 - accuracy: 0.5821 - val_loss: 1
.4272 - val_accuracy: 0.5536

Epoch 00031: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 32/80
350/350 [==============================] - 729s 2s/step - loss: 1.3261 - accuracy: 0.5770 - val_loss: 1
.4079 - val_accuracy: 0.5600

Epoch 00032: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 33/80
350/350 [==============================] - 721s 2s/step - loss: 1.3009 - accuracy: 0.5887 - val_loss: 1
.3826 - val_accuracy: 0.5694

Epoch 00033: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 34/80
350/350 [==============================] - 724s 2s/step - loss: 1.3124 - accuracy: 0.5820 - val_loss: 1
.3769 - val_accuracy: 0.5740

Epoch 00034: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 35/80
350/350 [==============================] - 734s 2s/step - loss: 1.3121 - accuracy: 0.5850 - val_loss: 1
.3908 - val_accuracy: 0.5670

Epoch 00035: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 36/80
350/350 [==============================] - 725s 2s/step - loss: 1.3159 - accuracy: 0.5853 - val_loss: 1
.3786 - val_accuracy: 0.5698

Epoch 00036: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 37/80
350/350 [==============================] - 735s 2s/step - loss: 1.3107 - accuracy: 0.5875 - val_loss: 1
.3666 - val_accuracy: 0.5784
```

```
Epoch 00037: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 38/80
350/350 [==============================] - 728s 2s/step - loss: 1.3009 - accuracy: 0.5881 - val_loss: 1
.3902 - val_accuracy: 0.5706

Epoch 00038: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 39/80
350/350 [==============================] - 729s 2s/step - loss: 1.2936 - accuracy: 0.5895 - val_loss: 1
.3659 - val_accuracy: 0.5711

Epoch 00039: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 40/80
350/350 [==============================] - 728s 2s/step - loss: 1.3061 - accuracy: 0.5862 - val_loss: 1
.3544 - val_accuracy: 0.5766

Epoch 00040: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 41/80
350/350 [==============================] - 732s 2s/step - loss: 1.2827 - accuracy: 0.5948 - val_loss: 1
.3753 - val_accuracy: 0.5724

Epoch 00041: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 42/80
350/350 [==============================] - 724s 2s/step - loss: 1.2943 - accuracy: 0.5896 - val_loss: 1
.3829 - val_accuracy: 0.5715

Epoch 00042: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 43/80
350/350 [==============================] - 726s 2s/step - loss: 1.2968 - accuracy: 0.5870 - val_loss: 1
.3544 - val_accuracy: 0.5786

Epoch 00043: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 44/80
 67/350 [====>.........................] - ETA: 6:40 - loss: 1.2888 - accuracy: 0.5917
```

In [9]:

```
# !tensorboard dev upload --logdir /content/gdrive/MyDrive/logs/20210202-154658 \
#   --name "Transfer Learning Model:2 (initial)" \
#   --description " from TF_2.ipynb " \
#   --one_shot
```

In [ ]:

```
final_model2.load_weights(chech_path)
```

Out[ ]:

```
<tensorflow.python.training.tracking.util.CheckpointLoadStatus at 0x7fadfa9ee550>
```

In [ ]:

```
logdir = os.path.join(log_path, datetime.datetime.now().strftime("%Y%m%d-%H%M%S"))
tensorboard_callback = tf.keras.callbacks.TensorBoard(logdir, histogram_freq=1)

vgghist = final_model2.fit(train_generator,
                           validation_data=valid_generator,
                           callbacks=[tensorboard_callback,cp_callback],
                           steps_per_epoch = 350,
                           epochs = 30
                           )
```

```
Epoch 1/30
350/350 [==============================] - 727s 2s/step - loss: 1.2898 - accuracy: 0.5949 - val_loss: 1
.3840 - val_accuracy: 0.5778

Epoch 00001: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 2/30
350/350 [==============================] - 711s 2s/step - loss: 1.2689 - accuracy: 0.5972 - val_loss: 1
.3501 - val_accuracy: 0.5804

Epoch 00002: saving model to /content/gdrive/MyDrive/checkpoint/
```

```
Epoch 3/30
350/350 [==============================] - 708s 2s/step - loss: 1.2687 - accuracy: 0.5977 - val_loss: 1
.3592 - val_accuracy: 0.5797

Epoch 00003: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 4/30
350/350 [==============================] - 713s 2s/step - loss: 1.2751 - accuracy: 0.5962 - val_loss: 1
.3721 - val_accuracy: 0.5755

Epoch 00004: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 5/30
350/350 [==============================] - 713s 2s/step - loss: 1.2786 - accuracy: 0.5910 - val_loss: 1
.3710 - val_accuracy: 0.5770

Epoch 00005: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 6/30
350/350 [==============================] - 716s 2s/step - loss: 1.2664 - accuracy: 0.5973 - val_loss: 1
.3785 - val_accuracy: 0.5764

Epoch 00006: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 7/30
350/350 [==============================] - 718s 2s/step - loss: 1.2874 - accuracy: 0.5935 - val_loss: 1
.3463 - val_accuracy: 0.5810

Epoch 00007: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 8/30
350/350 [==============================] - 732s 2s/step - loss: 1.2637 - accuracy: 0.5994 - val_loss: 1
.3512 - val_accuracy: 0.5803

Epoch 00008: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 9/30
350/350 [==============================] - 752s 2s/step - loss: 1.2658 - accuracy: 0.5966 - val_loss: 1
.3614 - val_accuracy: 0.5818

Epoch 00009: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 10/30
350/350 [==============================] - 749s 2s/step - loss: 1.2493 - accuracy: 0.6024 - val_loss: 1
.3558 - val_accuracy: 0.5806

Epoch 00010: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 11/30
350/350 [==============================] - 746s 2s/step - loss: 1.2463 - accuracy: 0.6020 - val_loss: 1
.3439 - val_accuracy: 0.5847

Epoch 00011: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 12/30
350/350 [==============================] - 746s 2s/step - loss: 1.2491 - accuracy: 0.5995 - val_loss: 1
.3401 - val_accuracy: 0.5848

Epoch 00012: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 13/30
350/350 [==============================] - 747s 2s/step - loss: 1.2479 - accuracy: 0.6057 - val_loss: 1
.3588 - val_accuracy: 0.5756

Epoch 00013: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 14/30
350/350 [==============================] - 746s 2s/step - loss: 1.2591 - accuracy: 0.6016 - val_loss: 1
.3266 - val_accuracy: 0.5909

Epoch 00014: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 15/30
350/350 [==============================] - 750s 2s/step - loss: 1.2648 - accuracy: 0.5982 - val_loss: 1
.3570 - val_accuracy: 0.5780

Epoch 00015: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 16/30
350/350 [==============================] - 750s 2s/step - loss: 1.2467 - accuracy: 0.6008 - val_loss: 1
.3333 - val_accuracy: 0.5920

Epoch 00016: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 17/30
350/350 [==============================] - 748s 2s/step - loss: 1.2562 - accuracy: 0.6011 - val_loss: 1
.3586 - val_accuracy: 0.5773

Epoch 00017: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 18/30
350/350 [==============================] - 753s 2s/step - loss: 1.2380 - accuracy: 0.6063 - val_loss: 1
```

```
.3318 - val_accuracy: 0.5899

Epoch 00018: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 19/30
350/350 [==============================] - 753s 2s/step - loss: 1.2340 - accuracy: 0.6067 - val_loss: 1
.3359 - val_accuracy: 0.5861

Epoch 00019: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 20/30
350/350 [==============================] - 753s 2s/step - loss: 1.2449 - accuracy: 0.6028 - val_loss: 1
.3308 - val_accuracy: 0.5902

Epoch 00020: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 21/30
350/350 [==============================] - 748s 2s/step - loss: 1.2294 - accuracy: 0.6119 - val_loss: 1
.3367 - val_accuracy: 0.5901

Epoch 00021: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 22/30
350/350 [==============================] - 749s 2s/step - loss: 1.2410 - accuracy: 0.6085 - val_loss: 1
.3280 - val_accuracy: 0.5943

Epoch 00022: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 23/30
350/350 [==============================] - 751s 2s/step - loss: 1.2304 - accuracy: 0.6050 - val_loss: 1
.3652 - val_accuracy: 0.5795

Epoch 00023: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 24/30
350/350 [==============================] - 745s 2s/step - loss: 1.2464 - accuracy: 0.6010 - val_loss: 1
.3408 - val_accuracy: 0.5853

Epoch 00024: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 25/30
350/350 [==============================] - 734s 2s/step - loss: 1.2472 - accuracy: 0.6037 - val_loss: 1
.3339 - val_accuracy: 0.5890

Epoch 00025: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 26/30
350/350 [==============================] - 731s 2s/step - loss: 1.2253 - accuracy: 0.6072 - val_loss: 1
.3438 - val_accuracy: 0.5833

Epoch 00026: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 27/30
350/350 [==============================] - 721s 2s/step - loss: 1.2317 - accuracy: 0.6144 - val_loss: 1
.3503 - val_accuracy: 0.5848

Epoch 00027: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 28/30
350/350 [==============================] - 717s 2s/step - loss: 1.2399 - accuracy: 0.6060 - val_loss: 1
.3776 - val_accuracy: 0.5790

Epoch 00028: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 29/30
350/350 [==============================] - 722s 2s/step - loss: 1.2324 - accuracy: 0.6103 - val_loss: 1
.3507 - val_accuracy: 0.5848

Epoch 00029: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 30/30
350/350 [==============================] - 726s 2s/step - loss: 1.2360 - accuracy: 0.6084 - val_loss: 1
.3470 - val_accuracy: 0.5903

Epoch 00030: saving model to /content/gdrive/MyDrive/checkpoint/
```

In [ ]:

```
final_model2.load_weights(chech_path)
```

Out[ ]:

```
<tensorflow.python.training.tracking.util.CheckpointLoadStatus at 0x7f3dd0551fd0>
```

In [ ]:

```
logdir = os.path.join(log_path, datetime.datetime.now().strftime("%Y%m%d-%H%M%S"))
tensorboard_callback = tf.keras.callbacks.TensorBoard(logdir, histogram_freq=1)

vgghist = final_model2.fit(train_generator,
                           validation_data=valid_generator,
                           callbacks=[tensorboard_callback,cp_callback],
                           steps_per_epoch = 350,
                           epochs = 30
                           )
```

```
Epoch 1/30
350/350 [==============================] - 760s 2s/step - loss: 1.2278 - accuracy: 0.6077 - val_loss: 1
.3486 - val_accuracy: 0.5839

Epoch 00001: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 2/30
350/350 [==============================] - 765s 2s/step - loss: 1.2176 - accuracy: 0.6149 - val_loss: 1
.3426 - val_accuracy: 0.5889

Epoch 00002: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 3/30
350/350 [==============================] - 750s 2s/step - loss: 1.2057 - accuracy: 0.6168 - val_loss: 1
.3223 - val_accuracy: 0.5924

Epoch 00003: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 4/30
350/350 [==============================] - 739s 2s/step - loss: 1.2054 - accuracy: 0.6204 - val_loss: 1
.3318 - val_accuracy: 0.5922

Epoch 00004: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 5/30
350/350 [==============================] - 726s 2s/step - loss: 1.2157 - accuracy: 0.6139 - val_loss: 1
.3387 - val_accuracy: 0.5876

Epoch 00005: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 6/30
350/350 [==============================] - 740s 2s/step - loss: 1.2227 - accuracy: 0.6123 - val_loss: 1
.3376 - val_accuracy: 0.5917

Epoch 00006: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 7/30
350/350 [==============================] - 731s 2s/step - loss: 1.2181 - accuracy: 0.6130 - val_loss: 1
.3372 - val_accuracy: 0.5909

Epoch 00007: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 8/30
350/350 [==============================] - 719s 2s/step - loss: 1.2096 - accuracy: 0.6147 - val_loss: 1
.3165 - val_accuracy: 0.5945

Epoch 00008: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 9/30
350/350 [==============================] - 694s 2s/step - loss: 1.2149 - accuracy: 0.6134 - val_loss: 1
.3541 - val_accuracy: 0.5804

Epoch 00009: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 10/30
350/350 [==============================] - 676s 2s/step - loss: 1.1996 - accuracy: 0.6183 - val_loss: 1
.3430 - val_accuracy: 0.5892

Epoch 00010: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 11/30
350/350 [==============================] - 701s 2s/step - loss: 1.2030 - accuracy: 0.6221 - val_loss: 1
.3148 - val_accuracy: 0.5974

Epoch 00011: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 12/30
350/350 [==============================] - 703s 2s/step - loss: 1.2062 - accuracy: 0.6179 - val_loss: 1
.3138 - val_accuracy: 0.6022

Epoch 00012: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 13/30
350/350 [==============================] - 686s 2s/step - loss: 1.1859 - accuracy: 0.6250 - val_loss: 1
.3285 - val_accuracy: 0.5894

Epoch 00013: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 14/30
```

```
Epoch 14/30
350/350 [==============================] - 710s 2s/step - loss: 1.2204 - accuracy: 0.6149 - val_loss: 1
.3197 - val_accuracy: 0.5967

Epoch 00014: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 15/30
350/350 [==============================] - 674s 2s/step - loss: 1.1978 - accuracy: 0.6179 - val_loss: 1
.3227 - val_accuracy: 0.5941

Epoch 00015: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 16/30
350/350 [==============================] - 668s 2s/step - loss: 1.2011 - accuracy: 0.6191 - val_loss: 1
.3261 - val_accuracy: 0.5999

Epoch 00016: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 17/30
350/350 [==============================] - 669s 2s/step - loss: 1.2063 - accuracy: 0.6161 - val_loss: 1
.3287 - val_accuracy: 0.5951

Epoch 00017: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 18/30
350/350 [==============================] - 673s 2s/step - loss: 1.1991 - accuracy: 0.6234 - val_loss: 1
.3306 - val_accuracy: 0.5915

Epoch 00018: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 19/30
350/350 [==============================] - 675s 2s/step - loss: 1.2059 - accuracy: 0.6149 - val_loss: 1
.3149 - val_accuracy: 0.5974

Epoch 00019: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 20/30
350/350 [==============================] - 654s 2s/step - loss: 1.1837 - accuracy: 0.6209 - val_loss: 1
.3253 - val_accuracy: 0.6029

Epoch 00020: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 21/30
350/350 [==============================] - 652s 2s/step - loss: 1.2120 - accuracy: 0.6155 - val_loss: 1
.3384 - val_accuracy: 0.5897

Epoch 00021: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 22/30
350/350 [==============================] - 658s 2s/step - loss: 1.2079 - accuracy: 0.6159 - val_loss: 1
.3196 - val_accuracy: 0.6008

Epoch 00022: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 23/30
350/350 [==============================] - 669s 2s/step - loss: 1.2000 - accuracy: 0.6190 - val_loss: 1
.3482 - val_accuracy: 0.5854

Epoch 00023: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 24/30
350/350 [==============================] - 683s 2s/step - loss: 1.2012 - accuracy: 0.6164 - val_loss: 1
.3182 - val_accuracy: 0.5928

Epoch 00024: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 25/30
350/350 [==============================] - 698s 2s/step - loss: 1.2025 - accuracy: 0.6185 - val_loss: 1
.3349 - val_accuracy: 0.5923

Epoch 00025: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 26/30
350/350 [==============================] - 678s 2s/step - loss: 1.1813 - accuracy: 0.6239 - val_loss: 1
.3561 - val_accuracy: 0.5846

Epoch 00026: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 27/30
350/350 [==============================] - 706s 2s/step - loss: 1.1949 - accuracy: 0.6213 - val_loss: 1
.3184 - val_accuracy: 0.5972

Epoch 00027: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 28/30
350/350 [==============================] - 689s 2s/step - loss: 1.1827 - accuracy: 0.6195 - val_loss: 1
.3294 - val_accuracy: 0.5987

Epoch 00028: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 29/30
350/350 [==============================] - ETA: 0s - loss: 1.1903 - accuracy: 0.6198
```

In [ ]:

```
final_model2.load_weights(chech_path)
```

Out[ ]:

```
<tensorflow.python.training.tracking.util.CheckpointLoadStatus at 0x7fadfe4a75f8>
```

In [ ]:

```
logdir = os.path.join(log_path, datetime.datetime.now().strftime("%Y%m%d-%H%M%S"))
tensorboard_callback = tf.keras.callbacks.TensorBoard(logdir, histogram_freq=1)

vgghist = final_model2.fit(train_generator,
                           validation_data=valid_generator,
                           callbacks=[tensorboard_callback,cp_callback],
                           steps_per_epoch = 350,
                           epochs = 30
                           )
```

```
Epoch 1/30
350/350 [==============================] - 721s 2s/step - loss: 1.1856 - accuracy: 0.6257 - val_loss: 1
.3452 - val_accuracy: 0.5842

Epoch 00001: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 2/30
350/350 [==============================] - 723s 2s/step - loss: 1.1955 - accuracy: 0.6166 - val_loss: 1
.3373 - val_accuracy: 0.5872

Epoch 00002: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 3/30
350/350 [==============================] - 713s 2s/step - loss: 1.1884 - accuracy: 0.6204 - val_loss: 1
.3326 - val_accuracy: 0.5933

Epoch 00003: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 4/30
350/350 [==============================] - 721s 2s/step - loss: 1.1759 - accuracy: 0.6259 - val_loss: 1
.3251 - val_accuracy: 0.5989

Epoch 00004: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 5/30
350/350 [==============================] - 718s 2s/step - loss: 1.1819 - accuracy: 0.6271 - val_loss: 1
.3579 - val_accuracy: 0.5853

Epoch 00005: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 6/30
350/350 [==============================] - 719s 2s/step - loss: 1.1800 - accuracy: 0.6254 - val_loss: 1
.3227 - val_accuracy: 0.5983

Epoch 00006: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 7/30
350/350 [==============================] - 719s 2s/step - loss: 1.2030 - accuracy: 0.6227 - val_loss: 1
.3381 - val_accuracy: 0.5911

Epoch 00007: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 8/30
350/350 [==============================] - 719s 2s/step - loss: 1.2004 - accuracy: 0.6197 - val_loss: 1
.3241 - val_accuracy: 0.5969

Epoch 00008: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 9/30
350/350 [==============================] - 717s 2s/step - loss: 1.2007 - accuracy: 0.6191 - val_loss: 1
.3305 - val_accuracy: 0.5937

Epoch 00009: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 10/30
142/350 [===========>..................] - ETA: 5:00 - loss: 1.1893 - accuracy: 0.6273
```

In [19]:

```
final_model2.load_weights(chech_path)
```

Out[19]:

```
<tensorflow.python.training.tracking.util.CheckpointLoadStatus at 0x7f3b3014ee48>
```

In [20]:

```
logdir = os.path.join(log_path, datetime.datetime.now().strftime("%Y%m%d-%H%M%S"))
tensorboard_callback = tf.keras.callbacks.TensorBoard(logdir, histogram_freq=1)

vgghist = final_model2.fit(train_generator,
                           validation_data=valid_generator,
                           callbacks=[tensorboard_callback,cp_callback],
                           steps_per_epoch = 350,
                           epochs = 30
                           )
```

```
Epoch 1/30
350/350 [==============================] - 729s 2s/step - loss: 1.1767 - accuracy: 0.6233 - val_loss: 1
.3444 - val_accuracy: 0.5883

Epoch 00001: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 2/30
350/350 [==============================] - 715s 2s/step - loss: 1.1949 - accuracy: 0.6160 - val_loss: 1
.3354 - val_accuracy: 0.5956

Epoch 00002: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 3/30
350/350 [==============================] - 708s 2s/step - loss: 1.1719 - accuracy: 0.6264 - val_loss: 1
.3165 - val_accuracy: 0.5995

Epoch 00003: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 4/30
350/350 [==============================] - 716s 2s/step - loss: 1.1813 - accuracy: 0.6257 - val_loss: 1
.3111 - val_accuracy: 0.6012

Epoch 00004: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 5/30
350/350 [==============================] - 714s 2s/step - loss: 1.1793 - accuracy: 0.6259 - val_loss: 1
.3193 - val_accuracy: 0.5962

Epoch 00005: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 6/30
350/350 [==============================] - 713s 2s/step - loss: 1.1656 - accuracy: 0.6285 - val_loss: 1
.3278 - val_accuracy: 0.5978

Epoch 00006: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 7/30
350/350 [==============================] - 711s 2s/step - loss: 1.1864 - accuracy: 0.6268 - val_loss: 1
.3313 - val_accuracy: 0.5933

Epoch 00007: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 8/30
350/350 [==============================] - 712s 2s/step - loss: 1.1857 - accuracy: 0.6244 - val_loss: 1
.3284 - val_accuracy: 0.5928

Epoch 00008: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 9/30
350/350 [==============================] - 717s 2s/step - loss: 1.1758 - accuracy: 0.6227 - val_loss: 1
.3306 - val_accuracy: 0.5949

Epoch 00009: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 10/30
350/350 [==============================] - 710s 2s/step - loss: 1.1830 - accuracy: 0.6251 - val_loss: 1
.2956 - val_accuracy: 0.6022

Epoch 00010: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 11/30
350/350 [==============================] - 709s 2s/step - loss: 1.1760 - accuracy: 0.6261 - val_loss: 1
.3039 - val_accuracy: 0.6054

Epoch 00011: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 12/30
350/350 [==============================] - 707s 2s/step - loss: 1.1755 - accuracy: 0.6242 - val_loss: 1
```

```
.3563 - val_accuracy: 0.5905

Epoch 00012: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 13/30
350/350 [==============================] - 709s 2s/step - loss: 1.1628 - accuracy: 0.6291 - val_loss: 1
.3149 - val_accuracy: 0.5947

Epoch 00013: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 14/30
350/350 [==============================] - 709s 2s/step - loss: 1.1654 - accuracy: 0.6340 - val_loss: 1
.3073 - val_accuracy: 0.6017

Epoch 00014: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 15/30
350/350 [==============================] - 714s 2s/step - loss: 1.1811 - accuracy: 0.6250 - val_loss: 1
.3361 - val_accuracy: 0.5910

Epoch 00015: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 16/30
350/350 [==============================] - 711s 2s/step - loss: 1.1776 - accuracy: 0.6265 - val_loss: 1
.3315 - val_accuracy: 0.5963

Epoch 00016: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 17/30
350/350 [==============================] - 709s 2s/step - loss: 1.1774 - accuracy: 0.6233 - val_loss: 1
.3085 - val_accuracy: 0.6027

Epoch 00017: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 18/30
350/350 [==============================] - 714s 2s/step - loss: 1.1739 - accuracy: 0.6260 - val_loss: 1
.3152 - val_accuracy: 0.5962

Epoch 00018: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 19/30
350/350 [==============================] - 717s 2s/step - loss: 1.1640 - accuracy: 0.6272 - val_loss: 1
.3207 - val_accuracy: 0.5987

Epoch 00019: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 20/30
350/350 [==============================] - 716s 2s/step - loss: 1.1795 - accuracy: 0.6265 - val_loss: 1
.3198 - val_accuracy: 0.6037

Epoch 00020: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 21/30
350/350 [==============================] - 712s 2s/step - loss: 1.1724 - accuracy: 0.6275 - val_loss: 1
.3269 - val_accuracy: 0.5932

Epoch 00021: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 22/30
350/350 [==============================] - 711s 2s/step - loss: 1.1798 - accuracy: 0.6248 - val_loss: 1
.3162 - val_accuracy: 0.5992

Epoch 00022: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 23/30
350/350 [==============================] - 712s 2s/step - loss: 1.1629 - accuracy: 0.6294 - val_loss: 1
.2989 - val_accuracy: 0.6024

Epoch 00023: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 24/30
350/350 [==============================] - 708s 2s/step - loss: 1.1715 - accuracy: 0.6289 - val_loss: 1
.3011 - val_accuracy: 0.6062

Epoch 00024: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 25/30
350/350 [==============================] - 708s 2s/step - loss: 1.1720 - accuracy: 0.6273 - val_loss: 1
.3329 - val_accuracy: 0.5953

Epoch 00025: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 26/30
350/350 [==============================] - 712s 2s/step - loss: 1.1728 - accuracy: 0.6281 - val_loss: 1
.3000 - val_accuracy: 0.6026

Epoch 00026: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 27/30
350/350 [==============================] - 714s 2s/step - loss: 1.1602 - accuracy: 0.6333 - val_loss: 1
.3082 - val_accuracy: 0.6023
```

```
Epoch 00027: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 28/30
350/350 [==============================] - 712s 2s/step - loss: 1.1684 - accuracy: 0.6292 - val_loss: 1
.3341 - val_accuracy: 0.5994

Epoch 00028: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 29/30
350/350 [==============================] - 714s 2s/step - loss: 1.1607 - accuracy: 0.6308 - val_loss: 1
.3228 - val_accuracy: 0.5973

Epoch 00029: saving model to /content/gdrive/MyDrive/checkpoint/
Epoch 30/30
350/350 [==============================] - 713s 2s/step - loss: 1.1809 - accuracy: 0.6223 - val_loss: 1
.2993 - val_accuracy: 0.6084

Epoch 00030: saving model to /content/gdrive/MyDrive/checkpoint/
```

In [11]:

```
!tensorboard dev upload --logdir /content/gdrive/MyDrive/logs/20210202-154658 \
  --name "Transfer Learning Model:2 (initial-42 epochs)" \
  --description " from TF_2.ipynb " \
  --one_shot
```

```
2021-02-07 10:30:55.380472: I tensorflow/stream_executor/platform/default/dso_loader.cc:49] Successfull
y opened dynamic library libcudart.so.10.1

New experiment created. View your TensorBoard at: https://tensorboard.dev/experiment/lpOXRkvySZevA53ylo
m3AA/

[2021-02-07T10:30:58] Started scanning logdir.
[2021-02-07T10:31:06] Total uploaded: 180 scalars, 1446 tensors (3.2 MB), 1 binary objects (76.3 kB)
[2021-02-07T10:31:06] Done scanning logdir.


Done. View your TensorBoard at https://tensorboard.dev/experiment/lpOXRkvySZevA53ylom3AA/
```

In [12]:

```
!tensorboard dev upload --logdir /content/gdrive/MyDrive/logs/20210207-035930 \
  --name "Transfer Learning Model:2 (final-30 epochs)" \
  --description " from TF_2.ipynb " \
  --one_shot
```

```
2021-02-07 10:32:00.894437: I tensorflow/stream_executor/platform/default/dso_loader.cc:49] Successfull
y opened dynamic library libcudart.so.10.1

New experiment created. View your TensorBoard at: https://tensorboard.dev/experiment/SzjE3JJRSgyqo7jUXm
sgWA/

[2021-02-07T10:32:03] Started scanning logdir.
[2021-02-07T10:32:09] Total uploaded: 120 scalars, 964 tensors (2.1 MB), 1 binary objects (76.3 kB)
[2021-02-07T10:32:09] Done scanning logdir.


Done. View your TensorBoard at https://tensorboard.dev/experiment/SzjE3JJRSgyqo7jUXmsgWA/
```

In [ ]: