```
# get the data from
!wget https://www.dropbox.com/s/w3zlhing4dkgeyb/train.zip?dl=0

# unzip the data
!unzip train.zip?dl=0
```

```
--2023-03-31 09:58:38--  https://www.dropbox.com/s/w3zlhing4dkgeyb/train.zip?dl=0
Resolving www.dropbox.com (www.dropbox.com)... 162.125.4.18, 2620:100:6019:18::a27d:412
Connecting to www.dropbox.com (www.dropbox.com)|162.125.4.18|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: /s/raw/w3zlhing4dkgeyb/train.zip [following]
--2023-03-31 09:58:38--  https://www.dropbox.com/s/raw/w3zlhing4dkgeyb/train.zip
Reusing existing connection to www.dropbox.com:443.
HTTP request sent, awaiting response... 302 Found
Location: https://uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com/cd/0/inline/B5TDXb7LlUaPP4sBzP3HaIx2MyL0gq1v1a_ANQgfCV6t-OpQ
--2023-03-31 09:58:38--  https://uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com/cd/0/inline/B5TDXb7LlUaPP4sBzP3HaIx2MyL0gq1v1
Resolving uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com (uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com)... 162.125.
Connecting to uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com (uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com)|162.125
HTTP request sent, awaiting response... 302 Found
Location: /cd/0/inline2/B5RqT9vi--a280zJmigTz6Lmy86LzBUj7fbbFZ3uvXsOpYITI76H9CibcdxT45e-nsgumklu4eL2Z8iwvqS6GQTIajEgb8twWkLogjv5-dLeH
--2023-03-31 09:58:39--  https://uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com/cd/0/inline2/B5RqT9vi--a280zJmigTz6Lmy86LzBUj
Reusing existing connection to uceb999bd4a5d5cf541b06c1ca42.dl.dropboxusercontent.com:443.
HTTP request sent, awaiting response... 200 OK
Length: 2331728 (2.2M) [application/zip]
Saving to: ‘train.zip?dl=0’

train.zip?dl=0      100%[===================>]   2.22M  --.-KB/s    in 0.05s

2023-03-31 09:58:39 (48.1 MB/s) - ‘train.zip?dl=0’ saved [2331728/2331728]

Archive:  train.zip?dl=0
  inflating: train/Happy/images (34).jpg
  inflating: train/Happy/images (29).jpg
  inflating: train/Neutral/images (39).jpg
  inflating: train/Happy/images (19).jpg
  inflating: train/Happy/images (22).jpg
  inflating: train/Happy/images (32).jpg
  inflating: train/Happy/images (27).jpg
  inflating: train/Happy/images (33).jpg
  inflating: train/Happy/images (28).jpg
  inflating: train/Neutral/images (41).jpg
  inflating: train/Happy/images (31).jpg
  inflating: train/Happy/images (14).jpg
  inflating: train/Happy/images (20).jpg
  inflating: train/Happy/images (13).jpg
  inflating: train/Happy/images (16).jpg
  inflating: train/Neutral/images (42).jpg
  inflating: train/Happy/images (21).jpg
  inflating: train/Happy/images (24).jpg
  inflating: train/Happy/images (35).jpg
  inflating: train/Happy/images (18).jpg
  inflating: train/Neutral/images (44).jpg
  inflating: train/Happy/images (30).jpg
  inflating: train/Happy/images (17).jpg
  inflating: train/Happy/images (37).jpg
  inflating: train/Neutral/images (43).jpg
  inflating: train/Happy/images (36).jpg
  inflating: train/Neutral/images (40).jpg
  inflating: train/Neutral/images (38).jpg
  inflating: train/Neutral/images (28).jpg
  inflating: train/Neutral/images (36).jpg
  inflating: train/Neutral/images (32).jpg
  inflating: train/Neutral/images (33).jpg
```

```
!pip install matplotlib-venn
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: matplotlib-venn in /usr/local/lib/python3.9/dist-packages (0.11.9)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.9/dist-packages (from matplotlib-venn) (3.7.1)
Requirement already satisfied: scipy in /usr/local/lib/python3.9/dist-packages (from matplotlib-venn) (1.10.1)
Requirement already satisfied: numpy in /usr/local/lib/python3.9/dist-packages (from matplotlib-venn) (1.22.4)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (1.0.7)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (3.0.9)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (23.0)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (8.4.0)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (2.8.2)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (4.39.3)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (0.11.0)
Requirement already satisfied: importlib-resources>=3.2.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib->matplotlib-venn) (1.4.4)
Requirement already satisfied: zipp>=3.1.0 in /usr/local/lib/python3.9/dist-packages (from importlib-resources>=3.2.0->matplotlib->matpl
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.9/dist-packages (from python-dateutil>=2.7->matplotlib->matplotlib-ver
```

```
!apt-get -qq install -y libfluidsynth1
```

```
E: Package 'libfluidsynth1' has no installation candidate
```

```
# https://pypi.python.org/pypi/libarchive
!apt-get -qq install -y libarchive-dev && pip install -U libarchive
import libarchive
```

```
Selecting previously unselected package libarchive-dev:amd64.
(Reading database ... 128288 files and directories currently installed.)
Preparing to unpack .../libarchive-dev_3.4.0-2ubuntu1.2_amd64.deb ...
Unpacking libarchive-dev:amd64 (3.4.0-2ubuntu1.2) ...
Setting up libarchive-dev:amd64 (3.4.0-2ubuntu1.2) ...
Processing triggers for man-db (2.9.1-1) ...
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting libarchive
  Downloading libarchive-0.4.7.tar.gz (23 kB)
  Preparing metadata (setup.py) ... done
Collecting nose
  Downloading nose-1.3.7-py3-none-any.whl (154 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 154.7/154.7 KB 16.6 MB/s eta 0:00:00
Building wheels for collected packages: libarchive
  Building wheel for libarchive (setup.py) ... done
  Created wheel for libarchive: filename=libarchive-0.4.7-py3-none-any.whl size=31644 sha256=cb8d5b458a6408a07e4caaf6b4d9ebea4313624b561
  Stored in directory: /root/.cache/pip/wheels/c9/a5/cc/cb20f1314d4cdec0001fd72baa1efe93e1542a81bdea2fc639
Successfully built libarchive
Installing collected packages: nose, libarchive
Successfully installed libarchive-0.4.7 nose-1.3.7
```

```
# https://pypi.python.org/pypi/pydot
!apt-get -qq install -y graphviz && pip install pydot
import pydot
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: pydot in /usr/local/lib/python3.9/dist-packages (1.4.2)
Requirement already satisfied: pyparsing>=2.1.4 in /usr/local/lib/python3.9/dist-packages (from pydot) (3.0.9)
```

```
!pip install cartopy
import cartopy
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting cartopy
  Downloading Cartopy-0.21.1.tar.gz (10.9 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 10.9/10.9 MB 52.4 MB/s eta 0:00:00
  Installing build dependencies ... done
  Getting requirements to build wheel ... done
  Preparing metadata (pyproject.toml) ... done
Collecting pyshp>=2.1
  Downloading pyshp-2.3.1-py2.py3-none-any.whl (46 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 46.5/46.5 KB 5.5 MB/s eta 0:00:00
Requirement already satisfied: shapely>=1.6.4 in /usr/local/lib/python3.9/dist-packages (from cartopy) (2.0.1)
Requirement already satisfied: matplotlib>=3.1 in /usr/local/lib/python3.9/dist-packages (from cartopy) (3.7.1)
Collecting pyproj>=3.0.0
  Downloading pyproj-3.5.0-cp39-cp39-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (7.8 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 7.8/7.8 MB 63.2 MB/s eta 0:00:00
Requirement already satisfied: numpy>=1.18 in /usr/local/lib/python3.9/dist-packages (from cartopy) (1.22.4)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (4.39.3)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (23.0)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (3.0.9)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (1.0.7)
Requirement already satisfied: importlib-resources>=3.2.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (5.1
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (0.11.0)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (8.4.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (1.4.4)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.9/dist-packages (from matplotlib>=3.1->cartopy) (2.8.2)
Requirement already satisfied: certifi in /usr/local/lib/python3.9/dist-packages (from pyproj>=3.0.0->cartopy) (2022.12.7)
Requirement already satisfied: zipp>=3.1.0 in /usr/local/lib/python3.9/dist-packages (from importlib-resources>=3.2.0->matplotlib>=3.1->
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.9/dist-packages (from python-dateutil>=2.7->matplotlib>=3.1->cartopy)
Building wheels for collected packages: cartopy
  Building wheel for cartopy (pyproject.toml) ... done
  Created wheel for cartopy: filename=Cartopy-0.21.1-cp39-cp39-linux_x86_64.whl size=11113618 sha256=abeaaed30499d302635a14469e660edf3a
  Stored in directory: /root/.cache/pip/wheels/74/b9/f5/2c94acd7cd21480e6cf63169144d7aac3e8d9cf638225ed578
Successfully built cartopy
```

```
Installing collected packages: pyshp, pyproj, cartopy
Successfully installed cartopy-0.21.1 pyproj-3.5.0 pyshp-2.3.1
```

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

from keras.applications.mobilenet import MobileNet, preprocess_input
from keras.models import Model  # Functional API
from keras.layers import Flatten, Dense

from keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.utils import img_to_array, load_img


# Working with pre trained model
base_model = MobileNet( input_shape=(224,224,3), include_top= False ) # weights

for layer in base_model.layers:  # To prevent retraining of the model!
  layer.trainable = False              # every layer trainablety is false

x = Flatten()(base_model.output)
x = Dense(units=7 , activation='softmax' )(x)

# creating our model.
model = Model(base_model.input, x)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/mobilenet/mobilenet_1_0_224_tf_no_top.h5
17225924/17225924 [==============================] - 0s 0us/step
```

```
# all the layers of the model

model.summary()
```

```
Model: "model"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 input_1 (InputLayer)        [(None, 224, 224, 3)]     0         
                                                                 
 conv1 (Conv2D)              (None, 112, 112, 32)      864       
                                                                 
 conv1_bn (BatchNormalizatio  (None, 112, 112, 32)     128       
 n)                                                              
                                                                 
 conv1_relu (ReLU)           (None, 112, 112, 32)      0         
                                                                 
 conv_dw_1 (DepthwiseConv2D)  (None, 112, 112, 32)     288       
                                                                 
 conv_dw_1_bn (BatchNormaliz  (None, 112, 112, 32)     128       
 ation)                                                          
                                                                 
 conv_dw_1_relu (ReLU)       (None, 112, 112, 32)      0         
                                                                 
 conv_pw_1 (Conv2D)          (None, 112, 112, 64)      2048      
                                                                 
 conv_pw_1_bn (BatchNormaliz  (None, 112, 112, 64)     256       
 ation)                                                          
                                                                 
 conv_pw_1_relu (ReLU)       (None, 112, 112, 64)      0         
                                                                 
 conv_pad_2 (ZeroPadding2D)  (None, 113, 113, 64)      0         
                                                                 
 conv_dw_2 (DepthwiseConv2D)  (None, 56, 56, 64)       576       
                                                                 
 conv_dw_2_bn (BatchNormaliz  (None, 56, 56, 64)       256       
 ation)                                                          
                                                                 
 conv_dw_2_relu (ReLU)       (None, 56, 56, 64)        0         
                                                                 
 conv_pw_2 (Conv2D)          (None, 56, 56, 128)       8192      
                                                                 
 conv_pw_2_bn (BatchNormaliz  (None, 56, 56, 128)      512       
 ation)                                                          
                                                                 
 conv_pw_2_relu (ReLU)       (None, 56, 56, 128)       0         
                                                                 
 conv_dw_3 (DepthwiseConv2D)  (None, 56, 56, 128)      1152      
 conv_dw_3_bn (BatchNormaliz  (None, 56, 56, 128)      512
 ation)

 conv_dw_3_relu (ReLU)       (None, 56, 56, 128)       0

 conv_pw_3 (Conv2D)          (None, 56, 56, 128)       16384

 conv_pw_3_bn (BatchNormaliz  (None, 56, 56, 128)      512
 ation)

 conv_pw_3_relu (ReLU)       (None, 56, 56, 128)       0

 conv_pad_4 (ZeroPadding2D)  (None, 57, 57, 128)       0
```

```
model.compile(optimizer='adam', loss= "categorical_crossentropy" , metrics=['accuracy'])
```

```
train_datagen = ImageDataGenerator(
    zoom_range = 0.2,
    shear_range = 0.2,
    horizontal_flip=True,
    rescale = 1./255
)

train_data = train_datagen.flow_from_directory(directory="/content/train",
                                               target_size=(224,224),
                                               batch_size=32,
                                  )

train_data.class_indices
```

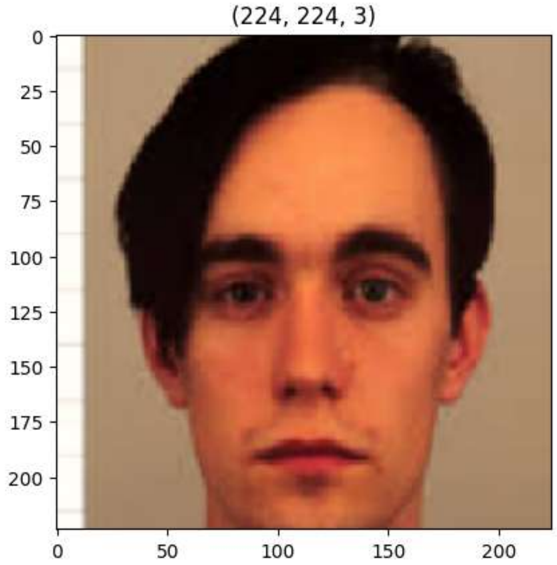
```
Found 350 images belonging to 7 classes.
{'Angry': 0,
 'Disguist': 1,
 'Fear': 2,
 'Happy': 3,
 'Neutral': 4,
 'Sad': 5,
 'Surprise': 6}
```

```
val_datagen = ImageDataGenerator(rescale = 1/255 )

val_data = val_datagen.flow_from_directory(directory= "/content/train",
                                           target_size=(224,224),
                                           batch_size=32,
                                 )
```

```
Found 350 images belonging to 7 classes.
```

```
# to visualize the images in the traing data denerator

t_img , label = train_data.next()

#-----------------------------------------------------------------------------
# function when called will prot the images
def plotImages(img_arr, label):
  """
  input  :- image array
  output  :- plots the images
  """
  count = 0
  for im, l in zip(img_arr,label) :
    plt.imshow(im)
    plt.title(im.shape)
    plt.axis = False
    plt.show()

    count +=1
    if count == 10:
      break

#------------------------------------------------------------------------------
# function call to plot the images
plotImages(t_img, label)
```

(224, 224, 3)
0
25
50
75
100
125
150
175
200
0
50
100
150
200


(224, 224, 3)
0
25
50
75
100
125
150
175
200
0
50
100
150
200

(224, 224, 3)
0
25
50
75
100
125

```
## having early stopping and model check point

from keras.callbacks import ModelCheckpoint, EarlyStopping

# early stopping
es = EarlyStopping(monitor='val_accuracy', min_delta= 0.01 , patience= 5, verbose= 1, mode='auto')

# model check point
mc = ModelCheckpoint(filepath="best_model.h5", monitor= 'val_accuracy', verbose= 1, save_best_only= True, mode = 'auto')

# puting call back in a list
call_back = [es, mc]


hist = model.fit_generator(train_data,
                           steps_per_epoch= 10,
                           epochs= 30,
                           validation_data= val_data,
                           validation_steps= 8,
                           callbacks=[es,mc])
```

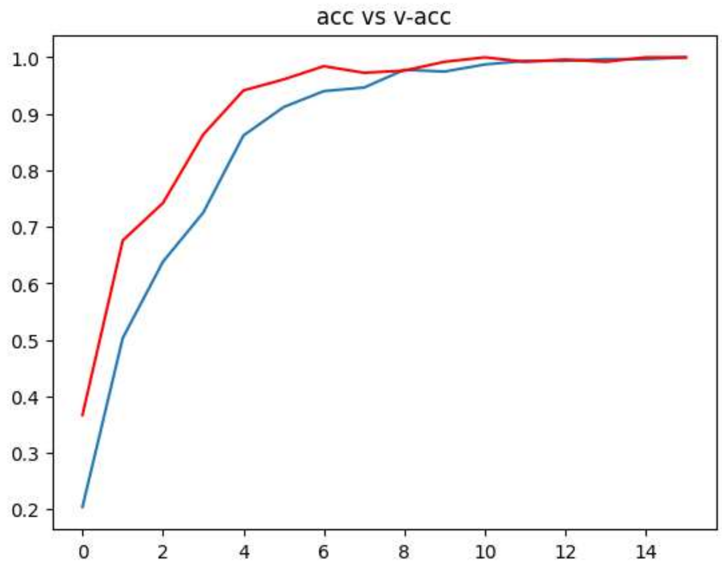
```
<ipython-input-15-f681b3c69731>:1: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please u
  hist = model.fit_generator(train_data,
Epoch 1/30
10/10 [==============================] - ETA: 0s - loss: 12.8928 - accuracy: 0.2044
Epoch 1: val_accuracy improved from -inf to 0.36719, saving model to best_model.h5
10/10 [==============================] - 40s 4s/step - loss: 12.8928 - accuracy: 0.2044 - val_loss: 7.3308 - val_accuracy: 0.3672
Epoch 2/30
10/10 [==============================] - ETA: 0s - loss: 5.3960 - accuracy: 0.5031
Epoch 2: val_accuracy improved from 0.36719 to 0.67578, saving model to best_model.h5
10/10 [==============================] - 38s 4s/step - loss: 5.3960 - accuracy: 0.5031 - val_loss: 3.2229 - val_accuracy: 0.6758
Epoch 3/30
10/10 [==============================] - ETA: 0s - loss: 2.9655 - accuracy: 0.6384
Epoch 3: val_accuracy improved from 0.67578 to 0.74219, saving model to best_model.h5
10/10 [==============================] - 26s 3s/step - loss: 2.9655 - accuracy: 0.6384 - val_loss: 1.3002 - val_accuracy: 0.7422
Epoch 4/30
10/10 [==============================] - ETA: 0s - loss: 1.9764 - accuracy: 0.7250
Epoch 4: val_accuracy improved from 0.74219 to 0.86328, saving model to best_model.h5
10/10 [==============================] - 28s 3s/step - loss: 1.9764 - accuracy: 0.7250 - val_loss: 0.7700 - val_accuracy: 0.8633
Epoch 5/30
10/10 [==============================] - ETA: 0s - loss: 0.8487 - accuracy: 0.8616
Epoch 5: val_accuracy improved from 0.86328 to 0.94141, saving model to best_model.h5
10/10 [==============================] - 36s 4s/step - loss: 0.8487 - accuracy: 0.8616 - val_loss: 0.2827 - val_accuracy: 0.9414
Epoch 6/30
10/10 [==============================] - ETA: 0s - loss: 0.3819 - accuracy: 0.9119
Epoch 6: val_accuracy improved from 0.94141 to 0.96094, saving model to best_model.h5
10/10 [==============================] - 37s 4s/step - loss: 0.3819 - accuracy: 0.9119 - val_loss: 0.1602 - val_accuracy: 0.9609
Epoch 7/30
10/10 [==============================] - ETA: 0s - loss: 0.3286 - accuracy: 0.9403
Epoch 7: val_accuracy improved from 0.96094 to 0.98438, saving model to best_model.h5
10/10 [==============================] - 37s 4s/step - loss: 0.3286 - accuracy: 0.9403 - val_loss: 0.0999 - val_accuracy: 0.9844
Epoch 8/30
10/10 [==============================] - ETA: 0s - loss: 0.1769 - accuracy: 0.9465
Epoch 8: val_accuracy did not improve from 0.98438
10/10 [==============================] - 28s 3s/step - loss: 0.1769 - accuracy: 0.9465 - val_loss: 0.0804 - val_accuracy: 0.9727
Epoch 9/30
10/10 [==============================] - ETA: 0s - loss: 0.0639 - accuracy: 0.9780
Epoch 9: val_accuracy did not improve from 0.98438
10/10 [==============================] - 36s 4s/step - loss: 0.0639 - accuracy: 0.9780 - val_loss: 0.0756 - val_accuracy: 0.9766
Epoch 10/30
10/10 [==============================] - ETA: 0s - loss: 0.0931 - accuracy: 0.9748
Epoch 10: val_accuracy improved from 0.98438 to 0.99219, saving model to best_model.h5
10/10 [==============================] - 27s 3s/step - loss: 0.0931 - accuracy: 0.9748 - val_loss: 0.0442 - val_accuracy: 0.9922
Epoch 11/30
10/10 [==============================] - ETA: 0s - loss: 0.0320 - accuracy: 0.9874
Epoch 11: val_accuracy improved from 0.99219 to 1.00000, saving model to best_model.h5
10/10 [==============================] - 27s 3s/step - loss: 0.0320 - accuracy: 0.9874 - val_loss: 0.0069 - val_accuracy: 1.0000
Epoch 12/30
10/10 [==============================] - ETA: 0s - loss: 0.0281 - accuracy: 0.9937
Epoch 12: val_accuracy did not improve from 1.00000
10/10 [==============================] - 26s 3s/step - loss: 0.0281 - accuracy: 0.9937 - val_loss: 0.0276 - val_accuracy: 0.9922
Epoch 13/30
10/10 [==============================] - ETA: 0s - loss: 0.0183 - accuracy: 0.9937
Epoch 13: val_accuracy did not improve from 1.00000
10/10 [==============================] - 28s 3s/step - loss: 0.0183 - accuracy: 0.9937 - val_loss: 0.0216 - val_accuracy: 0.9961
Epoch 14/30
10/10 [==============================] - ETA: 0s - loss: 0.0381 - accuracy: 0.9969
Epoch 14: val_accuracy did not improve from 1.00000
```

```
# Loading the best fit model
from keras.models import load_model
model = load_model("/content/best_model.h5")
```

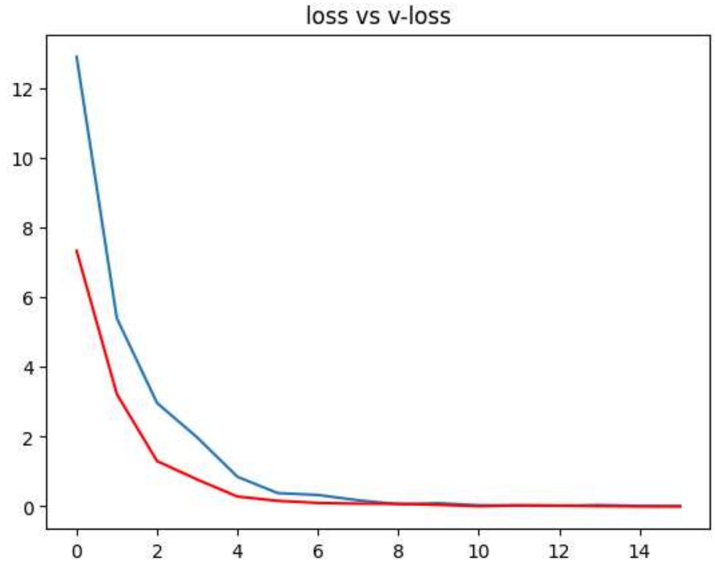
```
h =  hist.history
h.keys()
```

```
     dict_keys(['loss', 'accuracy', 'val_loss', 'val_accuracy'])
```

```
plt.plot(h['accuracy'])
plt.plot(h['val_accuracy'] , c = "red")
plt.title("acc vs v-acc")
plt.show()
```



```
plt.plot(h['loss'])
plt.plot(h['val_loss'] , c = "red")
plt.title("loss vs v-loss")
plt.show()
```

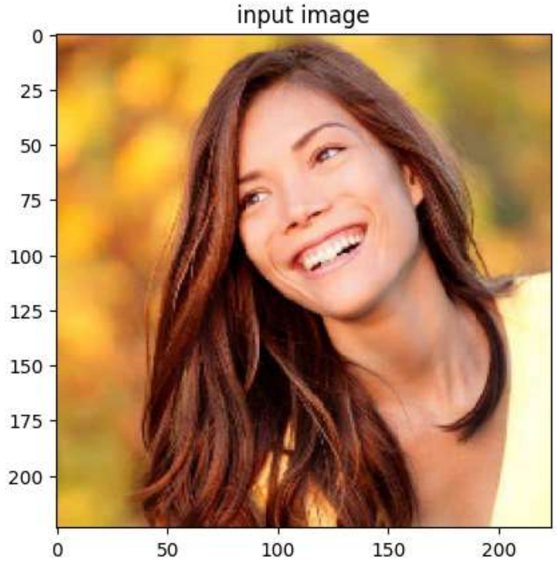


```
# just to map o/p values
op = dict(zip( train_data.class_indices.values(), train_data.class_indices.keys()))
```

```
# path for the image to see if it predics correct class

path = "/content/Happy face 2.jfif"
img = load_img(path, target_size=(224,224) )
```

```
i = img_to_array(img)/255
input_arr = np.array([i])
input_arr.shape

pred = np.argmax(model.predict(input_arr))

print(f" the image is of {op[pred]}")

# to display the image
plt.imshow(input_arr[0])
plt.title("input image")
plt.show()
```

```
1/1 [==============================] - 1s 1s/step
 the image is of Happy
```



New Section