Process for stress detector and recommendation

In [2]:

```
from scipy.spatial import distance as dist
from imutils import face_utils
import numpy as np
import  math
import imutils
import  time
import  dlib
import cv2
from cv2 import VideoWriter_fourcc, VideoWriter
import matplotlib.pyplot as plt
from tensorflow.keras.utils import img_to_array
#  from keras.preprocessing.image import img_to_array
from keras.models import load_model
```

In [4]:

```
def eye_brow_distance(leye,reye):
    global points
    distq = dist.euclidean(leye,reye)
    #calculation of distance between left and right eye.
    points.append(int(distq))
    return distq

def emotion_finder(faces,frame):
    global emotion_classifier
    EMOTIONS = ["angry" ,"disgust","fear", "happy", "sad", "surprise","neutral"]
    x,y,w,h = face_utils.rect_to_bb(faces)
    frame = frame[y:y+h,x:x+w]
    roi = cv2.resize(frame,(64,64))
    roi = roi.astype("float") / 255.0
    roi = img_to_array(roi)
    roi = np.expand_dims(roi,axis=0)
    preds = emotion_classifier.predict(roi)[0]
    emotion_probability = np.max(preds)
    label = EMOTIONS[preds.argmax()]
    if label in ['fear','sad', 'neutral']:
        label = 'stressed'
    else:
        label = 'not stressed'
    return label

def normalize_values(points,disp):
    normalized_value = abs(disp - np.min(points))/abs(np.max(points) - np.min(points))
    stress_value = np.exp(-(normalized_value))
    return stress_value



detector = dlib.get_frontal_face_detector()
predictor = dlib.shape_predictor("shape_predictor_68_face_landmarks.dat")
emotion_classifier = load_model("_mini_XCEPTION.102-0.66.hdf5", compile=False)
print(emotion_classifier, flush = True)
cap = cv2.VideoCapture('ved.mp4')
'''cap =cv2.VideoCapture(0)

fps=30 # Frames per second
size=(int(cap.get(cv2.CAP_PROP_FRAME_WIDTH)),int(cap.get(cv2.CAP_PROP_FRAME_HEIGHT)))

videoWriter=cv2.VideoWriter('MyVedio.avi',cv2.VideoWriter_fourcc('I','4','2','0'),fps,siz

success, frame =cap.read()
```

```
    #read gives two outputs

numFramesRemaining = 10*fps-1

while success and numFramesRemaining >0:
    videoWriter.write(frame)
    success,frame= cap.read()
    numFramesRemaining -=1'''

points = []
stress_list = []
stressval_list = []
stressgraph = []
size=0
while(True):
    _,frame = cap.read()
    if(not _): break
    frame = cv2.flip(frame,1)
    frame = imutils.resize(frame, width=500,height=500)


    (lBegin, lEnd) = face_utils.FACIAL_LANDMARKS_IDXS["right_eyebrow"]
    (rBegin, rEnd) = face_utils.FACIAL_LANDMARKS_IDXS["left_eyebrow"]

    #preprocessing the image
    gray = cv2.cvtColor(frame,cv2.COLOR_BGR2GRAY)

    detections = detector(gray,0)
    for detection in detections:
        emotion = emotion_finder(detection,gray)
        cv2.putText(frame, emotion, (10,10),cv2.FONT_HERSHEY_SIMPLEX, 0.5, (0, 0, 255), 1
        shape = predictor(frame,detection)
        shape = face_utils.shape_to_np(shape)

        leyebrow = shape[lBegin:lEnd]
        reyebrow = shape[rBegin:rEnd]

        reyebrowhull = cv2.convexHull(reyebrow)
        leyebrowhull = cv2.convexHull(leyebrow)

        cv2.drawContours(frame, [reyebrowhull], -1, (0, 0, 255), 1)
        cv2.drawContours(frame, [leyebrowhull], -1, (0, 0, 255), 1)

        distq = eye_brow_distance(leyebrow[-1],reyebrow[0])
        stress_value = normalize_values(points,distq)
        print(stress_value)
        #if stress_value!=1.0: stress_list.append(stress_list)
        if math.isnan(stress_value):
            continue
        #cv2.putText(frame,"stress level:{}".format(str(int(stress_value*100))),(20,40),c
        #stress_list.append(frame)
        cv2.putText(frame,"stress level:{}".format(str(int(stress_value*100))),(20,40),cv
        stress_list.append(frame)
    height, width, layers = frame.shape
    size = (width,height)
    stressval_list.append(stress_value)
out = cv2.VideoWriter('resvid.avi',cv2.VideoWriter_fourcc(*'DIVX'), 10, size)
cap.release()
print("END REACHED")
for i in range(len(stress_list)):
    out.write(stress_list[i])
```

```
<keras.engine.functional.Functional object at 0x00000298FFEB1B20>
1/1 [==============================] - 0s 473ms/step
nan
```

```
C:\Users\Naina\AppData\Local\Temp/ipykernel_4572/3626964051.py:27: RuntimeWarning: invalid
value encountered in double_scalars
  normalized_value = abs(disp - np.min(points))/abs(np.max(points) - np.min(points))
1/1 [==============================] - 0s 51ms/step
0.9963304773755267
1/1 [==============================] - 0s 32ms/step
1.0
1/1 [==============================] - 0s 34ms/step
0.7165313105737893
1/1 [==============================] - 0s 50ms/step
0.7165313105737893
1/1 [==============================] - 0s 36ms/step
0.7165313105737893
1/1 [==============================] - 0s 42ms/step
0.36787944117144233
1/1 [==============================] - 0s 34ms/step
0.513417119032592
1/1 [==============================] - 0s 41ms/step
0.7165313105737893
1/1 [==============================] - 0s 39ms/step
1.0
1/1 [==============================] - 0s 42ms/step
0.5480051968723176
1/1 [==============================] - 0s 52ms/step
0.5488116360940265
1/1 [==============================] - 0s 59ms/step
0.6693203702378075
1/1 [==============================] - 0s 47ms/step
0.5488116360940265
1/1 [==============================] - 0s 74ms/step
0.6703200460356393
1/1 [==============================] - 0s 35ms/step
1.0
1/1 [==============================] - 0s 51ms/step
0.8174912623151172
1/1 [==============================] - 0s 47ms/step
0.9986988433691236
1/1 [==============================] - 0s 63ms/step
0.8453972514000658
1/1 [==============================] - 0s 41ms/step
0.7156272220906609
1/1 [==============================] - 0s 53ms/step
1.0
1/1 [==============================] - 0s 52ms/step
0.7165313105737893
1/1 [==============================] - 0s 44ms/step
0.9989925088965526
1/1 [==============================] - 0s 57ms/step
0.8816218988384807
1/1 [==============================] - 0s 35ms/step
0.9992819205181686
1/1 [==============================] - 0s 64ms/step
0.8464817248906141
1/1 [==============================] - 0s 56ms/step
0.6065306597126334
1/1 [==============================] - 0s 34ms/step
0.6592406302004438
1/1 [==============================] - 0s 66ms/step
0.9992819205181686
1/1 [==============================] - 0s 35ms/step
0.8464817248906141
1/1 [==============================] - 0s 49ms/step
0.9992819205181686
1/1 [==============================] - 0s 34ms/step
1.0
1/1 [==============================] - 0s 33ms/step
```

```
0.9975794926125358
1/1 [==============================] - 0s 31ms/step
0.9993941730606076
1/1 [==============================] - 0s 30ms/step
0.9994215132903
1/1 [==============================] - 0s 29ms/step
0.9994841867917443
1/1 [==============================] - 0s 40ms/step
0.9482495195900245
1/1 [==============================] - 0s 54ms/step
0.9468116258023203
1/1 [==============================] - 0s 42ms/step
0.9482495195900245
1/1 [==============================] - 0s 55ms/step
0.9487294800164372
1/1 [==============================] - 0s 44ms/step
0.9468116258023203
1/1 [==============================] - 0s 46ms/step
0.853523652728261
1/1 [==============================] - 0s 50ms/step
0.8539396656235352
1/1 [==============================] - 0s 49ms/step
0.9468116258023203
1/1 [==============================] - 0s 44ms/step
0.8983023733820897
1/1 [==============================] - 0s 44ms/step
0.9000876262522592
1/1 [==============================] - 0s 42ms/step
0.8996408615292885
1/1 [==============================] - 0s 42ms/step
0.9000876262522592
1/1 [==============================] - 0s 45ms/step
0.8539396656235352
1/1 [==============================] - 0s 53ms/step
0.9487294800164372
1/1 [==============================] - 0s 44ms/step
0.853523652728261
1/1 [==============================] - 0s 53ms/step
0.7686205265937358
1/1 [==============================] - 0s 70ms/step
0.7682594463669772
1/1 [==============================] - 0s 47ms/step
0.8539396656235352
1/1 [==============================] - 0s 37ms/step
0.8097702243888371
1/1 [==============================] - 0s 56ms/step
0.6915120242186787
1/1 [==============================] - 0s 32ms/step
0.6915120242186787
1/1 [==============================] - 0s 47ms/step
0.6918258252705172
1/1 [==============================] - 0s 37ms/step
0.7292129525252351
1/1 [==============================] - 0s 38ms/step
0.6563555554708402
1/1 [==============================] - 0s 43ms/step
0.5907775139012317
1/1 [==============================] - 0s 45ms/step
0.6560628872775571
1/1 [==============================] - 0s 46ms/step
0.6227038648477501
1/1 [==============================] - 0s 51ms/step
0.560488043568919
1/1 [==============================] - 0s 43ms/step
0.6560628872775571
1/1 [==============================] - 0s 27ms/step
```

```
0.5907775139012317
1/1 [==============================] - 0s 72ms/step
0.6227038648477501
1/1 [==============================] - 0s 34ms/step
0.5905227207908098
1/1 [==============================] - 0s 65ms/step
0.5044883526787212
1/1 [==============================] - 0s 51ms/step
0.560488043568919
1/1 [==============================] - 0s 52ms/step
0.5044883526787212
1/1 [==============================] - 0s 61ms/step
0.5317515301305707
1/1 [==============================] - 0s 32ms/step
0.5315294720643506
1/1 [==============================] - 0s 57ms/step
0.5042809703296425
1/1 [==============================] - 0s 50ms/step
0.4786229725112321
1/1 [==============================] - 0s 66ms/step
0.5315294720643506
1/1 [==============================] - 0s 64ms/step
0.560488043568919
1/1 [==============================] - 0s 48ms/step
0.47842924870869347
1/1 [==============================] - 0s 66ms/step
0.4539027161944048
1/1 [==============================] - 0s 50ms/step
0.560488043568919
1/1 [==============================] - 0s 59ms/step
0.45408372383450274
1/1 [==============================] - 0s 64ms/step
0.4786229725112321
1/1 [==============================] - 0s 26ms/step
0.5602502113620464
1/1 [==============================] - 0s 34ms/step
0.5897592055889845
1/1 [==============================] - 0s 43ms/step
0.5315294720643506
1/1 [==============================] - 0s 52ms/step
0.560488043568919
1/1 [==============================] - 0s 36ms/step
0.5602502113620464
1/1 [==============================] - 0s 47ms/step
0.6563555554708402
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0.5905227207908098
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0.5044883526787212
1/1 [==============================] - 0s 40ms/step
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1/1 [==============================] - 0s 51ms/step
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1/1 [==============================] - 0s 47ms/step
0.4786229725112321
1/1 [==============================] - 0s 42ms/step
0.5317515301305707
1/1 [==============================] - 0s 37ms/step
0.45408372383450274
1/1 [==============================] - 0s 46ms/step
0.4539027161944048
1/1 [==============================] - 0s 44ms/step
```

```
0.45408372383450274
1/1 [==============================] - 0s 44ms/step
0.43063345021612087
1/1 [==============================] - 0s 51ms/step
0.5042809703296425
1/1 [==============================] - 0s 57ms/step
0.4539027161944048
1/1 [==============================] - 0s 31ms/step
0.45408372383450274
1/1 [==============================] - 0s 48ms/step
0.5044883526787212
1/1 [==============================] - 0s 42ms/step
0.43080261519743523
1/1 [==============================] - 0s 44ms/step
0.43063345021612087
1/1 [==============================] - 0s 41ms/step
0.408715141105984
1/1 [==============================] - 0s 41ms/step
0.5042809703296425
1/1 [==============================] - 0s 47ms/step
0.45408372383450274
1/1 [==============================] - 0s 46ms/step
0.5315294720643506
1/1 [==============================] - 0s 58ms/step
0.4539027161944048
1/1 [==============================] - 0s 38ms/step
0.45408372383450274
1/1 [==============================] - 0s 52ms/step
0.45408372383450274
1/1 [==============================] - 0s 52ms/step
0.43080261519743523
1/1 [==============================] - 0s 41ms/step
0.36787944117144233
1/1 [==============================] - 0s 70ms/step
0.43080261519743523
1/1 [==============================] - 0s 48ms/step
0.45408372383450274
1/1 [==============================] - 0s 44ms/step
0.43080261519743523
1/1 [==============================] - 0s 42ms/step
0.4539027161944048
1/1 [==============================] - 0s 48ms/step
0.408715141105984
1/1 [==============================] - 0s 52ms/step
0.3876122521072523
1/1 [==============================] - 0s 39ms/step
0.4539027161944048
1/1 [==============================] - 0s 60ms/step
0.36787944117144233
1/1 [==============================] - 0s 68ms/step
0.43080261519743523
1/1 [==============================] - 0s 63ms/step
0.45408372383450274
1/1 [==============================] - 0s 48ms/step
0.43063345021612087
1/1 [==============================] - 0s 48ms/step
0.43080261519743523
1/1 [==============================] - 0s 66ms/step
0.4085570087611661
1/1 [==============================] - 0s 39ms/step
0.43080261519743523
1/1 [==============================] - 0s 45ms/step
0.43080261519743523
1/1 [==============================] - 0s 56ms/step
0.408715141105984
1/1 [==============================] - 0s 50ms/step
```

```
0.3876122521072523
1/1 [==============================] - 0s 53ms/step
0.5044883526787212
END REACHED
```

Training the model ;)

In [3]:

```python
from __future__ import print_function
import keras
from keras.preprocessing.image import ImageDataGenerator
from keras.models import Sequential
from keras.layers import Dense,Dropout,Activation,Flatten,BatchNormalization
from keras.layers import Conv2D,MaxPooling2D
import os

num_classes = 7 # number of labels
img_rows,img_cols = 48,48
batch_size = 32 #number of traning example utlized in 1 iteration

train_data_dir = 'train'
validation_data_dir = 'test'

train_datagen = ImageDataGenerator(
                                          rescale=1./255,
                                          rotation_range=30,
                                          shear_range=0.3,
                                          zoom_range=0.3,
                                          width_shift_range=0.4,
                                          height_shift_range=0.4,
                                          horizontal_flip=True,
                                          fill_mode='nearest')

validation_datagen = ImageDataGenerator(rescale=1./255)

train_generator = train_datagen.flow_from_directory(
                                          train_data_dir,
                                          color_mode='grayscale',
                                          target_size=(img_rows,img_cols),
                                          batch_size=batch_size,
                                          class_mode='categorical',
                                          shuffle=True)

validation_generator = validation_datagen.flow_from_directory(
                                                          validation_data_dir,
                                                          color_mode='grayscale',
                                                          target_size=(img_rows,img_cols),
                                                          batch_size=batch_size,
                                                          class_mode='categorical',
                                                          shuffle=True)


model = Sequential()

# LAYER 1

model.add(Conv2D(32,(3,3),padding='same',kernel_initializer='he_normal',input_shape=(img_
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(Conv2D(32,(3,3),padding='same',kernel_initializer='he_normal',input_shape=(img_
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Dropout(0.2))
```

```
# LAYER 2

model.add(Conv2D(64,(3,3),padding='same',kernel_initializer='he_normal'))
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(Conv2D(64,(3,3),padding='same',kernel_initializer='he_normal'))
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Dropout(0.2))

# LAYER 3

model.add(Conv2D(128,(3,3),padding='same',kernel_initializer='he_normal'))
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(Conv2D(128,(3,3),padding='same',kernel_initializer='he_normal'))
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Dropout(0.2))


# LAYER 4

model.add(Flatten())
model.add(Dense(64,kernel_initializer='he_normal'))
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(Dropout(0.5))

# LAYER 5

model.add(Dense(64,kernel_initializer='he_normal'))
model.add(Activation('elu'))
model.add(BatchNormalization())
model.add(Dropout(0.5))

# LAYER 6

model.add(Dense(num_classes,kernel_initializer='he_normal'))
model.add(Activation('softmax'))

print(model.summary())
```

```
Found 28709 images belonging to 7 classes.
Found 7178 images belonging to 7 classes.
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 conv2d (Conv2D)             (None, 48, 48, 32)        320       
                                                                 
 activation (Activation)     (None, 48, 48, 32)        0         
                                                                 
 batch_normalization (BatchN  (None, 48, 48, 32)       128       
 ormalization)                                                   
                                                                 
 conv2d_1 (Conv2D)           (None, 48, 48, 32)        9248      
                                                                 
 activation_1 (Activation)   (None, 48, 48, 32)        0         
                                                                 
 batch_normalization_1 (Batc  (None, 48, 48, 32)       128       
 hNormalization)                                                 
 max_pooling2d (MaxPooling2D   (None, 24, 24, 32)       0
 )

 dropout (Dropout)            (None, 24, 24, 32)       0

 conv2d_2 (Conv2D)            (None, 24, 24, 64)       18496

 activation_2 (Activation)    (None, 24, 24, 64)       0

 batch_normalization_2 (Batc   (None, 24, 24, 64)       256
 hNormalization)

 conv2d_3 (Conv2D)            (None, 24, 24, 64)       36928

 activation_3 (Activation)    (None, 24, 24, 64)       0

 batch_normalization_3 (Batc   (None, 24, 24, 64)       256
 hNormalization)

 max_pooling2d_1 (MaxPooling   (None, 12, 12, 64)       0
 2D)

 dropout_1 (Dropout)          (None, 12, 12, 64)       0

 conv2d_4 (Conv2D)            (None, 12, 12, 128)      73856

 activation_4 (Activation)    (None, 12, 12, 128)      0

 batch_normalization_4 (Batc   (None, 12, 12, 128)      512
 hNormalization)

 conv2d_5 (Conv2D)            (None, 12, 12, 128)      147584

 activation_5 (Activation)    (None, 12, 12, 128)      0

 batch_normalization_5 (Batc   (None, 12, 12, 128)      512
 hNormalization)

 max_pooling2d_2 (MaxPooling   (None, 6, 6, 128)        0
 2D)

 dropout_2 (Dropout)          (None, 6, 6, 128)        0

 flatten (Flatten)            (None, 4608)             0

 dense (Dense)                (None, 64)               294976

 activation_6 (Activation)    (None, 64)               0

 batch_normalization_6 (Batc   (None, 64)               256
 hNormalization)

 dropout_3 (Dropout)          (None, 64)               0

 dense_1 (Dense)              (None, 64)               4160

 activation_7 (Activation)    (None, 64)               0

 batch_normalization_7  (Batc  (None, 64)               256
 hNormalization)

 dropout_4 (Dropout)          (None, 64)               0

 dense_2 (Dense)              (None, 7)                455
 activation_8 (Activation)    (None, 7)                 0

=================================================================
Total params: 588,327
Trainable params: 587,175
Non-trainable params: 1,152
_________________________________________________________________
None
```

In [5]:

```
from tensorflow.keras.optimizers import RMSprop,SGD,Adam
from tensorflow.keras.callbacks import ModelCheckpoint, EarlyStopping, ReduceLROnPlateau

checkpoint = ModelCheckpoint('Users/Naina/Stress/Emotion_little_vgg.h5',
                             monitor='val_loss',
                             mode='min',
                             save_best_only=True,
                             verbose=1)

earlystop = EarlyStopping(monitor='val_loss',
                          min_delta=0,
                          patience=3,
                          verbose=1,
                          restore_best_weights=True
                          )

reduce_lr = ReduceLROnPlateau(monitor='val_loss',
                              factor=0.2,
                              patience=3,
                              verbose=1,
                              min_delta=0.0001)

callbacks = [earlystop,checkpoint,reduce_lr]

model.compile(loss='categorical_crossentropy',
              optimizer = Adam(lr=0.001),
              metrics=['accuracy'])

nb_train_samples = 24176
nb_validation_samples = 3006
epochs=25

history=model.fit_generator(
                train_generator,
                steps_per_epoch=nb_train_samples//batch_size,
                epochs=epochs,
                callbacks=callbacks,
                validation_data=validation_generator,
                validation_steps=nb_validation_samples//batch_size)

model.save('trained_model.hdf5')
```

```
C:\Users\Naina\AppData\Local\Temp/ipykernel_8988/3405561283.py:33: UserWarning: `Model.fit
_generator` is deprecated and will be removed in a future version. Please use `Model.fit`,
which supports generators.
  history=model.fit_generator(
Epoch 1/25
755/755 [==============================] - ETA: 0s - loss: 1.7966 - accuracy: 0.2494
Epoch 00001: val_loss improved from inf to 1.76592, saving model to Users/Naina/Stress\Emo
tion_little_vgg.h5
755/755 [==============================] - 236s 311ms/step - loss: 1.7966 - accuracy: 0.24
94 - val_loss: 1.7659 - val_accuracy: 0.2769 - lr: 0.0010
Epoch 2/25
755/755 [==============================] - ETA: 0s - loss: 1.7724 - accuracy: 0.2649
Epoch 00002: val_loss improved from 1.76592 to 1.75244, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
```

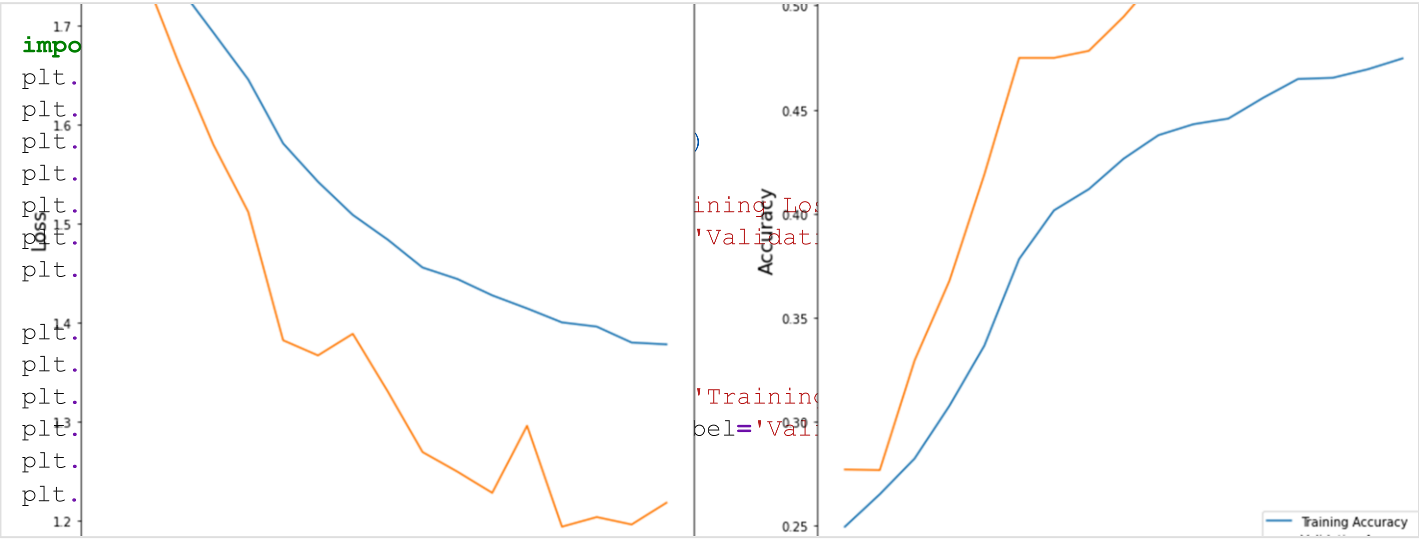
```
755/755 [==============================] - 232s 308ms/step - loss: 1.7724 - accuracy: 0.26
49 - val_loss: 1.7524 - val_accuracy: 0.2765 - lr: 0.0010
Epoch 3/25
755/755 [==============================] - ETA: 0s - loss: 1.7399 - accuracy: 0.2821
Epoch 00003: val_loss improved from 1.75244 to 1.66264, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 233s 308ms/step - loss: 1.7399 - accuracy: 0.28
21 - val_loss: 1.6626 - val_accuracy: 0.3293 - lr: 0.0010
Epoch 4/25
755/755 [==============================] - ETA: 0s - loss: 1.6930 - accuracy: 0.3075
Epoch 00004: val_loss improved from 1.66264 to 1.57970, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 233s 309ms/step - loss: 1.6930 - accuracy: 0.30
75 - val_loss: 1.5797 - val_accuracy: 0.3676 - lr: 0.0010
Epoch 5/25
755/755 [==============================] - ETA: 0s - loss: 1.6456 - accuracy: 0.3364
Epoch 00005: val_loss improved from 1.57970 to 1.51193, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 236s 312ms/step - loss: 1.6456 - accuracy: 0.33
64 - val_loss: 1.5119 - val_accuracy: 0.4187 - lr: 0.0010
Epoch 6/25
755/755 [==============================] - ETA: 0s - loss: 1.5811 - accuracy: 0.3781
Epoch 00006: val_loss improved from 1.51193 to 1.38241, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 235s 312ms/step - loss: 1.5811 - accuracy: 0.37
81 - val_loss: 1.3824 - val_accuracy: 0.4748 - lr: 0.0010
Epoch 7/25
755/755 [==============================] - ETA: 0s - loss: 1.5425 - accuracy: 0.4015
Epoch 00007: val_loss improved from 1.38241 to 1.36719, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 236s 312ms/step - loss: 1.5425 - accuracy: 0.40
15 - val_loss: 1.3672 - val_accuracy: 0.4748 - lr: 0.0010
Epoch 8/25
755/755 [==============================] - ETA: 0s - loss: 1.5089 - accuracy: 0.4117
Epoch 00008: val_loss did not improve from 1.36719
755/755 [==============================] - 236s 312ms/step - loss: 1.5089 - accuracy: 0.41
17 - val_loss: 1.3890 - val_accuracy: 0.4782 - lr: 0.0010
Epoch 9/25
755/755 [==============================] - ETA: 0s - loss: 1.4841 - accuracy: 0.4263
Epoch 00009: val_loss improved from 1.36719 to 1.33090, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 238s 315ms/step - loss: 1.4841 - accuracy: 0.42
63 - val_loss: 1.3309 - val_accuracy: 0.4946 - lr: 0.0010
Epoch 10/25
755/755 [==============================] - ETA: 0s - loss: 1.4559 - accuracy: 0.4377
Epoch 00010: val_loss improved from 1.33090 to 1.26966, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 243s 321ms/step - loss: 1.4559 - accuracy: 0.43
77 - val_loss: 1.2697 - val_accuracy: 0.5141 - lr: 0.0010
Epoch 11/25
755/755 [==============================] - ETA: 0s - loss: 1.4443 - accuracy: 0.4429
Epoch 00011: val_loss improved from 1.26966 to 1.24982, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 254s 336ms/step - loss: 1.4443 - accuracy: 0.44
29 - val_loss: 1.2498 - val_accuracy: 0.5131 - lr: 0.0010
Epoch 12/25
755/755 [==============================] - ETA: 0s - loss: 1.4278 - accuracy: 0.4456
Epoch 00012: val_loss improved from 1.24982 to 1.22843, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 248s 328ms/step - loss: 1.4278 - accuracy: 0.44
56 - val_loss: 1.2284 - val_accuracy: 0.5272 - lr: 0.0010
Epoch 13/25
755/755 [==============================] - ETA: 0s - loss: 1.4146 - accuracy: 0.4556
Epoch 00013: val_loss did not improve from 1.22843
755/755 [==============================] - 237s 315ms/step - loss: 1.4146 - accuracy: 0.45
56 - val_loss: 1.2962 - val_accuracy: 0.5037 - lr: 0.0010
```

```
Epoch 14/25
755/755 [==============================] - ETA: 0s - loss: 1.4005 - accuracy: 0.4646
Epoch 00014: val_loss improved from 1.22843 to 1.19430, saving model to Users/Naina/Stress
\Emotion_little_vgg.h5
755/755 [==============================] - 236s 312ms/step - loss: 1.4005 - accuracy: 0.46
46 - val_loss: 1.1943 - val_accuracy: 0.5363 - lr: 0.0010
Epoch 15/25
755/755 [==============================] - ETA: 0s - loss: 1.3962 - accuracy: 0.4652
Epoch 00015: val_loss did not improve from 1.19430
755/755 [==============================] - 237s 314ms/step - loss: 1.3962 - accuracy: 0.46
52 - val_loss: 1.2040 - val_accuracy: 0.5333 - lr: 0.0010
Epoch 16/25
755/755 [==============================] - ETA: 0s - loss: 1.3802 - accuracy: 0.4693
Epoch 00016: val_loss did not improve from 1.19430
755/755 [==============================] - 247s 328ms/step - loss: 1.3802 - accuracy: 0.46
93 - val_loss: 1.1965 - val_accuracy: 0.5309 - lr: 0.0010
Epoch 17/25
755/755 [==============================] - ETA: 0s - loss: 1.3783 - accuracy: 0.4745Restor
ing model weights from the end of the best epoch: 14.

Epoch 00017: val_loss did not improve from 1.19430

Epoch 00017: ReduceLROnPlateau reducing learning rate to 0.00020000000949949026.
755/755 [==============================] - 274s 363ms/step - loss: 1.3783 - accuracy: 0.47
45 - val_loss: 1.2185 - val_accuracy: 0.5323 - lr: 0.0010
Epoch 00017: early stopping
```

In [6]:



```
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```
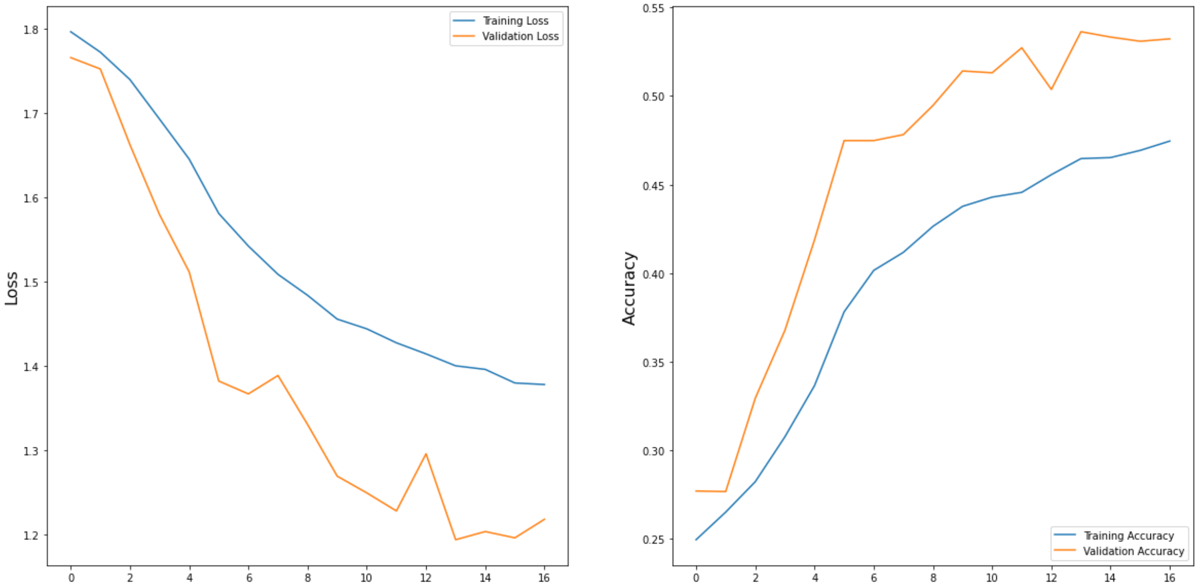

Optimizer : Adam



Testing :)

In [1]:

```
#from keras.preprocessing.image import img_to_array
import cv2
from tensorflow.keras.utils import img_to_array
from keras.models import load_model
import numpy as np
# loading files
haar_file="haarcascade_frontalface_default.xml"
emotion_model='_mini_XCEPTION.102-0.66.hdf5'

cascade=cv2.CascadeClassifier(haar_file)
emotion_classifier=load_model(emotion_model,compile=True)
emotion_names=["angry","disgust","fear", "happy", "sad", "surprise","neutral"]
#frame=cv2.imread('images/disgust_face.jpeg')
#frame=cv2.imread('images/happy_face.jpeg')
frame=cv2.imread('images/sad_face.png')
#frame=cv2.imread('images/me_happy2.jpg')
gray_frame=cv2.cvtColor(frame,cv2.COLOR_BGR2GRAY)
faces=cascade.detectMultiScale(gray_frame,1.5,5)
text=[]
for (x,y,w,h) in faces:
    roi=gray_frame[y:y+h,x:x+w]
    roi=cv2.resize(roi,(64,64))
    roi=roi.astype("float")/255.0
    roi=img_to_array(roi)
    roi=np.expand_dims(roi,axis=0)

    predicted_emotion=emotion_classifier.predict(roi)[0]
    probab=np.max(predicted_emotion)
    label=emotion_names[predicted_emotion.argmax()]
    percen=predicted_emotion*100
    for j in range(7):
        text.append(emotion_names[j]+"  :  "+str(percen[j]))
    for i in range(7):
        #cv2.putText(frame,text[i],(5,i*30+15),cv2.FONT_HERSHEY_SIMPLEX,0.8,(0,255,255),2
        print(text[i])
    cv2.putText(frame,label,(x,y-10),cv2.FONT_HERSHEY_SIMPLEX,2,(255,255,255),1)
    cv2.rectangle(frame,(x,y),(x+w,y+h),(0,0,255),2)
cv2.imwrite('images/result.jpg', frame)
```

```
WARNING:tensorflow:Error in loading the saved optimizer state. As a result, your model is
starting with a freshly initialized optimizer.
1/1 [==============================] - 2s 2s/step
angry : 21.7511
disgust : 0.054468527
fear : 5.193165
happy : 0.0013106188
sad : 70.66278
surprise : 0.06525041
neutral : 2.2719183
```

Out[1]:

```
True
```

In [ ]:

Recomendation ;)

In [9]:

```
from playsound import playsound
```

In [14]:

```
#labels = ["happy", "angry", "fear", "disgust", "sad", "surprised", "neutral"]
#label = "sad"
tips = {"fear":["Drink water","Get a good night's sleep","Eat wholesome meals","Go for a
        "angry":["Repeat gentle phrases to yourself","Take a walk","Use visualization to
        "sad":["Do things you enjoy (or used to)","Get quality exercise","Eat a nutritiou
       }
website_links  =  {"fear":["https://www.businessinsider.in/science/health/heres-how-to-take
                 "angry":["https://www.thehotline.org/resources/how-to-cool-off-when-your
                 "sad":["https://www.vandrevalafoundation.com/","https://www.healthline.c
                }
youtube_links = {"fear":["https://www.youtube.com/watch?v=IAODG6KaNBc"],
                 "angry":["https://www.youtube.com/watch?v=P6aPg3YBvBQ"],
                 "sad":["https://www.youtube.com/watch?v=P6aPg3YBvBQ"]
                }
song_links  =  {"fear":["https://www.youtube.com/watch?v=GyA8ccqwp-4&feature=youtu.be","htt
              "angry":["https://www.youtube.com/watch?v=e74wLJ_KRes&feature=youtu.be","ht
              "sad":["https://www.youtube.com/watch?v=25ROFXjoaAU&feature=youtu.be","http
              "happy":["https://www.youtube.com/watch?v=vGZhMIXH62M","https://www.youtube
             }
 tunes = {"fear":'fear.mp3',
         "angry":'angry.mp3',
         "sad":'sad.mp3'
         }

if (label == "happy"):
    # songs
    print("Here are some song suggestions for your mood:")
    for s in song_links.get('happy'):
        print(s)

elif (label == "angry"):
    # songs
    print("Here are some song suggestions for your mood:")
    for s in song_links.get('angry'):
        print(s)
    # tips
    print("Here are some tips to help you feel better:")
    for i in tips.get('angry'):
        print("-> "+i)
```

```
            # resources
            print("Here are some resources that you may find beneficial:")
            for j in
                website_
                links.ge
                t('angry
                '):
                print(j)
            for k in
                youtube_
                links.ge
                t('angry
                '):
                print(k)
            # tunes
           # print("Here's a tune that will help you
            calm down.")
            #playsound(tunes.get('angry'))

        elif (label == "fear"):
            # songs
            print("Here are some song suggestions for your mood:")
            for s in
                song_lin
                ks.get('
                fear'):
                print(s)
            # tips
            print("Here are some tips to help you feel better:")
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            # resources
            print("Here are some resources that you may find beneficial:")
            for j in
                website_
                links.ge
                t('fear'
                ):
                print(j)
            for k in
                youtube_
                links.ge
                t('fear'
                ):
                print(k)
            # tunes
            #print("Here's a tune that will make you
            feel better.")
            #playsound(tunes.get('fear'))

        elif (label == "sad"):
            # songs
            print("Here are some song suggestions for your mood:")
            for s in
                song_lin
                ks.get('
                sad'):
                print(s)
            # tips
            print("Here are some tips to help you feel better:")
            f
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# resources
print("Here are some resources that you may find beneficial:")
for j in
    website_
    links.ge
    t('sad')
    :
    print(j)
for k in
    youtube_
    links.ge
    t('sad')
    :
    print(k)
# tunes
#print("Listen to a tune that will soothe
you.") #playsound(tunes.get('sad'))
```

```
Here are some song suggestions for your mood:
https://www.youtube.com/watch?v=25ROFXjoaAU&feature=youtu.be
https://www.youtube.com/watch?v=BzE1mX4Px0I
Here are some tips to help you feel better:
-> Do things you enjoy (or used to)
-> Get quality exercise
-> Eat a nutritious diet
-> Challenge negative thinking
Here are some resources that you may find
beneficial: https://www.vandrevalafoundation.com/
https://www.healthline.com/health/depression/recogn
izing-symptoms#fatigue
https://www.youtube.com/watch?v=P6aPg3YBvBQ
```

```
In [ ]:
```