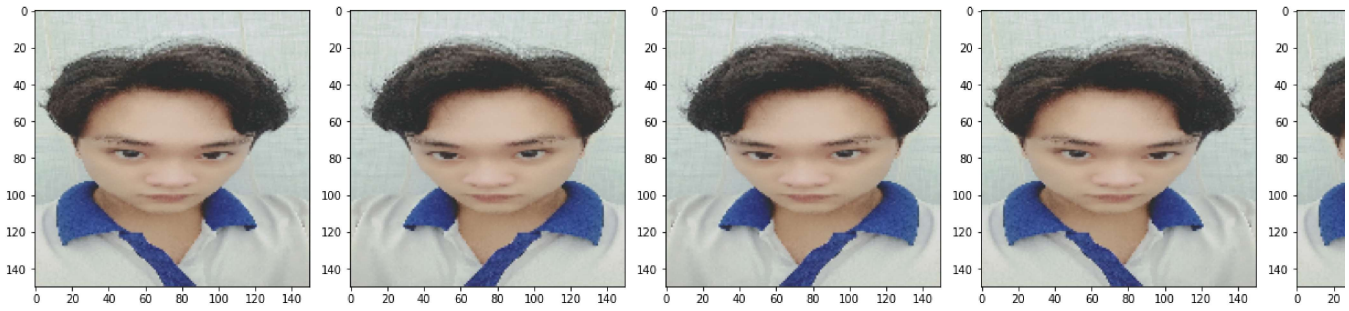
```
import os
import numpy as np
import glob
import shutil
import matplotlib.pyplot as plt
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout, MaxPooling2D
from tensorflow.keras.preprocessing.image import ImageDataGenerator


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

```
     Mounted at /content/drive
```

```
train_dir ='/content/drive/MyDrive/FaceReg/train'
val_dir = '/content/drive/MyDrive/FaceReg/val'


batch_size = 120
IMG_SHAPE = 150


image_gen = ImageDataGenerator(rescale=1./255, horizontal_flip=True)

train_data_gen = image_gen.flow_from_directory(
                                                batch_size=batch_size,
                                                directory=train_dir,
                                                shuffle=True,
                                                target_size=(IMG_SHAPE,IMG_SHAPE)
                                                )
```

```
     Found 6 images belonging to 1 classes.
```

```
# This function will plot images in the form of a grid with 1 row and 5 columns where images
def plotImages(images_arr):
    fig, axes = plt.subplots(1, 5, figsize=(20,20))
    axes = axes.flatten()
    for img, ax in zip( images_arr, axes):
        ax.imshow(img)
    plt.tight_layout()
    plt.show()

augmented_images = [train_data_gen[0][0][0] for i in range(5)]
plotImages(augmented_images)
```



```
image_gen = ImageDataGenerator(rescale=1./255, rotation_range=45)

train_data_gen = image_gen.flow_from_directory(batch_size=batch_size,
                                               directory=train_dir,
                                               shuffle=True,
                                               target_size=(IMG_SHAPE, IMG_SHAPE))
```

```
Found 6 images belonging to 1 classes.
```

```
image_gen = ImageDataGenerator(rescale=1./255, zoom_range=0.5)

train_data_gen = image_gen.flow_from_directory(
                                                batch_size=batch_size,
                                                directory=train_dir,
                                                shuffle=True,
                                                target_size=(IMG_SHAPE, IMG_SHAPE)
                                                )
```

```
Found 161 images belonging to 3 classes.
```

```
#augmented_images = [train_data_gen[0][0][0] for i in range(5)]
#plotImages(augmented_images)
```

```
image_gen_train = ImageDataGenerator(
                    rescale=1./255,
                    rotation_range=45,
                    width_shift_range=.15,
                    height_shift_range=.15,
                    horizontal_flip=True,
                    zoom_range=0.5
                    )
```

```
train_data_gen = image_gen_train.flow_from_directory(
                                                batch_size=batch_size,
                                                directory=train_dir,
```

```
                                                    shuffle=True,
                                                    target_size=(IMG_SHAPE,IMG_SHAPE),
                                                    class_mode='sparse'
                                                    )
```

```
Found 6 images belonging to 1 classes.
```

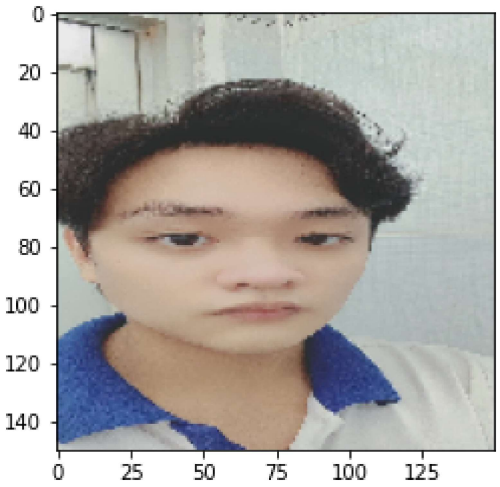
```
#augmented_images = [train_data_gen[0][0][0] for i in range(5)]
#plotImages(augmented_images)


image_gen_val = ImageDataGenerator(rescale=1./255)

val_data_gen = image_gen_val.flow_from_directory(batch_size=batch_size,
                                                 directory=val_dir,
                                                 target_size=(IMG_SHAPE, IMG_SHAPE),
                                                 class_mode='sparse')
```

```
Found 67 images belonging to 3 classes.
```

```
model = Sequential()

model.add(Conv2D(16, 3, padding='same', activation='relu', input_shape=(IMG_SHAPE,IMG_SHAPE,
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Conv2D(32, 3, padding='same', activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Conv2D(64, 3, padding='same', activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Flatten())
model.add(Dropout(0.2))
model.add(Dense(512, activation='relu'))

model.add(Dropout(0.2))
model.add(Dense(5))

model.compile(optimizer='adam',
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
              metrics=['accuracy'])


epochs = 40

history = model.fit_generator(
    train_data_gen,
    steps_per_epoch=int(np.ceil(train_data_gen.n / float(batch_size))),
    epochs=epochs,
    validation_data=val_data_gen,
```

```
    validation_steps=int(np.ceil(val_data_gen.n / float(batch_size)))
`
model.save('modelFace.h5')
from keras.models import load_model
model5 = load_model('modelFace.h5')


acc = history.history['accuracy']
val_acc = history.history['val_accuracy']

loss = history.history['loss']
val_loss = history.history['val_loss']

epochs_range = range(epochs)

plt.figure(figsize=(8, 8))
plt.subplot(1, 2, 1)
plt.plot(epochs_range, acc, label='Training Accuracy')
plt.plot(epochs_range, val_acc, label='Validation Accuracy')
plt.legend(loc='lower right')
plt.title('Training and Validation Accuracy')

plt.subplot(1, 2, 2)
plt.plot(epochs_range, loss, label='Training Loss')
plt.plot(epochs_range, val_loss, label='Validation Loss')
plt.legend(loc='upper right')
plt.title('Training and Validation Loss')
plt.show()
```


```
import numpy as np
import matplotlib.pyplot as plt
from keras.preprocessing.image import load_img,save_img
from keras.preprocessing.image import img_to_array
from keras.preprocessing.image import array_to_img

img = load_img('/content/drive/MyDrive/FaceReg/test/1.jpg',target_size=(IMG_SHAPE,IMG_SHAPE,3
plt.imshow(img)
img = img_to_array(img)
img = img.reshape(1,IMG_SHAPE,IMG_SHAPE,3)
img = img.astype('float64')
```



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