TEAMID:PNT2022TMID41505

TEST THE MODEL

Import datagenerator to train and test

In [106]:

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [107]:

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

In [108]:

```
test_datagen = ImageDataGenerator(rescale = 1./255)
```

In [105]:

```
import tensorflow as tfimport osfrom tensorflow.keras.models import
Sequentialfrom tensorflow.keras.layers import Dense, Conv2D,
Flatten, Dropout, MaxPooling2Dfrom
tensorflow.keras.preprocessing.image import
ImageDataGeneratorimport numpy as npimport matplotlib.pyplot as
pltimport IPython.display as displayfrom PIL import Imageimport
pathlib
```

Apply ImageDataGenerator Functionality To Train And Test set

In [109]:

```
from google.colab import drive
```

In [110]:

```
from tensorflow.keras.preprocessing.image import
ImageDataGeneratorprint("This dataset has been created and uploaded
by IBM-TeamID-IBM-Project-22773-1659857836")
```

```
This dataset has been created and uploaded by IBM-TeamID-IBM-Project-
22773-1659857836
```

In [111]:

```
x_train=
train_datagen.flow_from_directory(r"/content/drive/MyDrive/dataset/
dataset/training_set",target_size=(64,64),class_mode="categorical",
batch_size=48)
```

```
Found 10324 images belonging to 9 classes.
```

In [112]:

```
x_test =
test_datagen.flow_from_directory(r″/content/drive/MyDrive/dataset/d
ataset/test_set″,target_size= (64,64),class_mode=
″categorical″,batch_size=48)
```

```
Found 2280 images belonging to 9 classes.
```

In [113]:

```
x_train.class_indices
```

Out[113]:

```
{’A’: 0, ’B’: 1, ’C’: 2, ’D’: 3, ’E’: 4, ’F’: 5, ’G’: 6, ’H’: 7, ’I’:
 8}
```

In [114]:

```
x_test.class_indices
```

Out[114]:

```
{’A’: 0, ’B’: 1, ’C’: 2, ’D’: 3, ’E’: 4, ’F’: 5, ’G’: 6, ’H’: 7, ’I’:
 8}
```

MODEL BUILDING

In [115]:

```
from keras.models import Sequentialfrom keras.layers import
Densefrom keras.layers import Convolution2Dfrom
tensorflow.keras.layers import Conv2D, MaxPooling2Dfrom
keras.layers import Dropoutfrom keras.layers import Flatten
```

In [118]:

```
model=Sequential()
```

In [117]:

```
model.add(Convolution2D(32,(3,3), input_shape=(64,64,1), activation
= 'relu'))
```

In [119]:

```
model.add(MaxPooling2D(pool_size=(2,2)))
```

In [120]:

```
model.add(Flatten())
```

In [121]:

```
model.add(Dense( units=512, activation='relu'))
```

In [122]:

```
model.add(Dense(units=9, activation='softmax'))
```

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In [ ]:

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

In [126]:

```
model.fit(x_train,steps_per_epoch=len(x_train),epochs=5,validation_
data=x_test,validation_steps=len(x_test))
```

```
Epoch 1/5
216/216 [==============================] - 162s 749ms/step - loss: 0.
1131 - accuracy: 0.9633 - val_loss: 7.3499 - val_accuracy: 0.6456
Epoch 2/5
216/216 [==============================] - 39s 181ms/step - loss: 0.0
356 - accuracy: 0.9900 - val_loss: 7.9273 - val_accuracy: 0.6461
Epoch 3/5
216/216 [==============================] - 42s 197ms/step - loss: 0.0
294 - accuracy: 0.9923 - val_loss: 7.7494 - val_accuracy: 0.6469
Epoch 4/5
216/216 [==============================] - 41s 190ms/step - loss: 0.0
173 - accuracy: 0.9951 - val_loss: 8.0277 - val_accuracy: 0.6461
Epoch 5/5
216/216 [==============================] - 42s 194ms/step - loss: 0.0
072 - accuracy: 0.9984 - val_loss: 8.4261 - val_accuracy: 0.6465
```

Out[126]:

In [133]:

```
model.save(’Realtime.h5’)
```

In [128]:

```
a=len(x_train)b=len(x_test)
```

Length of training and testing data

In [129]:

```
print(a)print(b)
```

```
216
48
```

TEST THE MODEL

In [141]:

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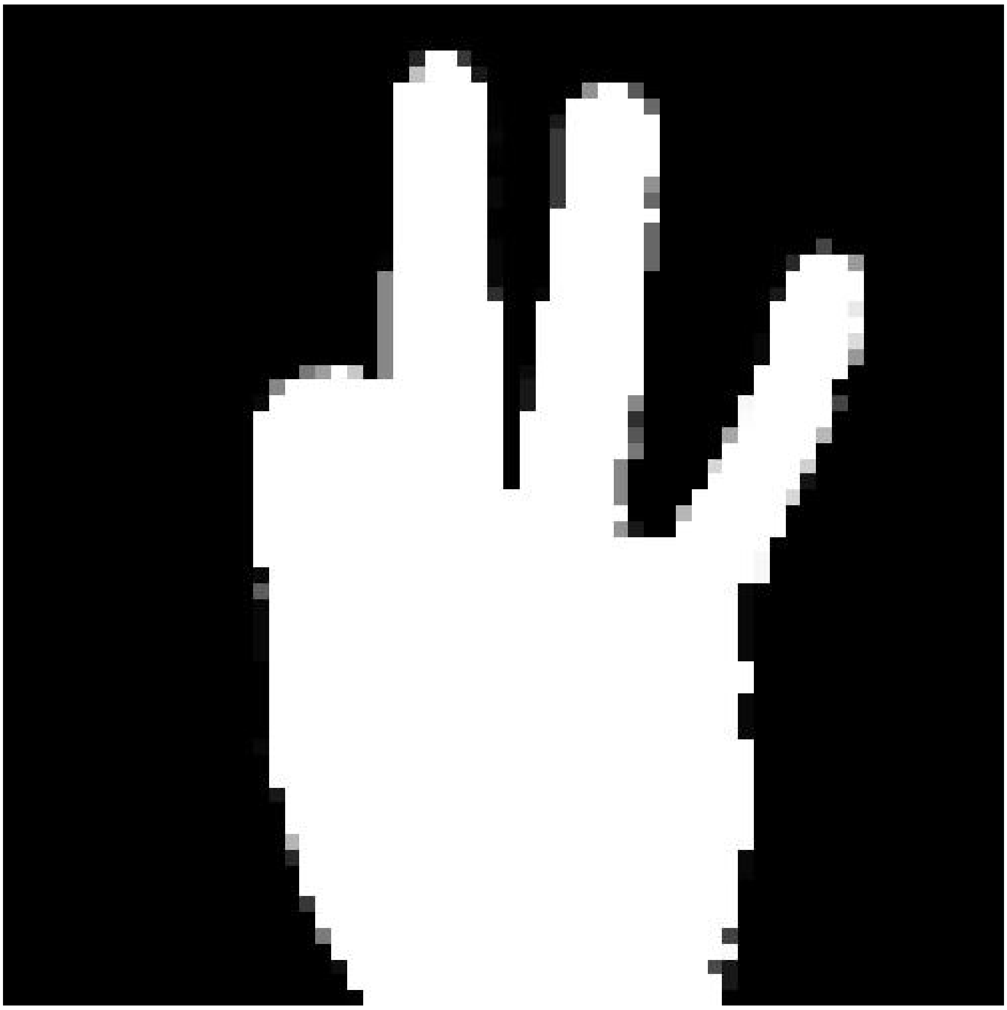
```
from tensorflow.keras.models import load_modelfrom
tensorflow.keras.preprocessing import imageimport numpy as npimport
cv2
```

In [149]:

```
img =
image.load_img('/content/drive/MyDrive/dataset/dataset/test_set/F/1
07.png',target_size = (500,500))img
```

Out[149]:



In [150]:

```
from skimage.transform import resizedef detect(frame):
    img=image.img_to_array(frame)
    img = resize(img,(64,64,1))
    img = np.expand_dims(img,axis=0)
    pred=np.argmax(model.predict(img))
    op=['A','B','C','D','E','F','G','H','I']
    print("THE PREDICTED LETTER IS ",op[pred])
```

In [153]:

```
from skimage.transform import resizedef detect(frame):
  img=resize(frame,(64,64,1))
  img=np.expand_dims(img,axis=0)
  if(np.max(img)>1):
    prediction=model.predict(img)
    print(prediction)
    prediction=model.predict_classes(img)
    print(prediction)
```

In [157]:

```
arr= image.img_to_array(img)
```

In [159]:

```
frame=cv2.imread('/content/drive/MyDrive/dataset/dataset/test_set/F
/107.png')data=detect(frame)from google.colab.patches import
cv2_imshowcv2_imshow(frame)cv2.waitKey(0)cv2.destroyAllWindows()
```