

TEAM ID:PNT2022TMID41505

Final output

Import datagenerator to train and test

In [83]:

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

In [84]:

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

In [85]:

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

In [82]:

```
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 [86]:

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

In [87]:

```
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 [88]:

```
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 [89]:

```
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 [90]:

```
x_train.class_indices
```

Out[90]:

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

In [51]:

```
x_test.class_indices
```

Out[51]:

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

MODEL BUILDING

In [91]:

```
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 [92]:

```
model=Sequential()
```

In [93]:

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

In [94]:

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

In [95]:

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

In [96]:

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

In [97]:

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

In [98]:

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

In [99]:

```
model.save('Realtime.h5')
```

In []:

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

Length of training and testing data

In []:

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

216

48

TEST THE MODEL

In [31]:

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

In [32]:

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

Out[32]:



In [102]:

```
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 [101]:

```
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 [39]:

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

In [34]:

```
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()
```

1/1 [=====] - 0s 285ms/step

THE PREDICTED LETTER IS I



In [79]:

```
frame=cv2.imread('/content/drive/MyDrive/dataset/dataset/test_set/C/12.png')data=detect(frame)from google.colab.patches import cv2_imshowcv2_imshow(frame)cv2.waitKey(0)cv2.destroyAllWindows()
```

1/1 [=====] - 0s 78ms/step

THE PREDICTED LETTER IS A



In [103]:

```
frame=cv2.imread('/content/drive/MyDrive/dataset/dataset/training_set/D/1008.png')data=detect(frame)from google.colab.patches import cv2_imshowcv2_imshow(frame)cv2.waitKey(0)cv2.destroyAllWindows()
```

1/1 [=====] - 0s 75ms/step

THE PREDICTED LETTER IS E

