

IMPORT LIBRARIES

```
In [156]:
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout,
MaxPooling2D
from tensorflow.keras.preprocessing.image import ImageDataGenerator
import numpy as np
import matplotlib.pyplot as plt
import cv2
```

unzip the file

```
In [1]:
!unzip '/content/drive/MyDrive/IBMPROJECT/conversation engine for deaf and
dumb.zip'
```

Streaming output truncated to the last 5000 lines.

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```

DATA AUGMENTATION

```
In [35]:
from keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale      =      1./255,      shear_range=0.2,
zoom_range=0.2,horizontal_flip=True,vertical_flip=False)
test_datagen = ImageDataGenerator(rescale=1./255)

In [53]:
x_train  =  train_datagen.flow_from_directory("/content/Dataset/training_set",
target_size=(64,64),batch_size=100,
                                         class_mode='categorical',
color_mode ="grayscale")

Found 15750 images belonging to 9 classes.
In [54]:
x_test    =      test_datagen.flow_from_directory("/content/Dataset/test_set",
target_size=(64,64),batch_size=100,
                                         class_mode='categorical',  color_mode
="grayscale")

Found 2250 images belonging to 9 classes.
In [55]:
len(x_train)

Out[55]:
158
In [56]:
len(x_test)

Out[56]:
23
In [57]:
x_train.class_indices

Out[57]:
{'A': 0, 'B': 1, 'C': 2, 'D': 3, 'E': 4, 'F': 5, 'G': 6, 'H': 7, 'I': 8}
```

MODEL BUILDING

```
In [40]:
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from tensorflow.keras.layers import Conv2D, MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten

In [101]:
#Creating the model
model=Sequential()
```

```

#Adding the layers
model.add(Convolution2D(32, (3,3),      input_shape=(64,64,1),      activation =
'relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())

#adding hidden layers
model.add(Dense(400, activation='relu'))
model.add(Dense(200, activation='relu'))
model.add(Dense(100, activation='relu'))

#Adding the output layer
model.add(Dense(9, activation='softmax'))

In [102]:
model.compile(loss='categorical_crossentropy',      optimizer='adam',
metrics=['accuracy'])

In [157]:
model.fit_generator(x_train,      steps_per_epoch=30,      epochs=10,
validation_data=x_test, validation_steps=50)

Epoch 1/10
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning:
`Model.fit_generator` is deprecated and will be removed in a future version.
Please use `Model.fit`, which supports generators.
    """Entry point for launching an IPython kernel.
30/30 [=====] - ETA: 0s - loss: 0.0083 - accuracy:
0.9957
WARNING:tensorflow:Your input ran out of data; interrupting training. Make
sure that your dataset or generator can generate at least `steps_per_epoch *
epochs` batches (in this case, 50 batches). You may need to use the repeat()
function when building your dataset.
30/30 [=====] - 18s 587ms/step - loss: 0.0083 -
accuracy: 0.9957 - val_loss: 0.2910 - val_accuracy: 0.9693
Epoch 2/10
30/30 [=====] - 12s 402ms/step - loss: 0.0081 -
accuracy: 0.9980
Epoch 3/10
30/30 [=====] - 12s 400ms/step - loss: 0.0102 -
accuracy: 0.9963
Epoch 4/10
30/30 [=====] - 12s 402ms/step - loss: 0.0049 -
accuracy: 0.9993
Epoch 5/10
30/30 [=====] - 12s 402ms/step - loss: 0.0030 -
accuracy: 0.9997
Epoch 6/10
30/30 [=====] - 12s 394ms/step - loss: 0.0019 -
accuracy: 0.9997
Epoch 7/10
30/30 [=====] - 12s 401ms/step - loss: 0.0081 -
accuracy: 0.9973
Epoch 8/10
30/30 [=====] - 12s 402ms/step - loss: 0.0124 -
accuracy: 0.9960
Epoch 9/10

```

```

30/30 [=====] - 12s 401ms/step - loss: 0.0070 -
accuracy: 0.9987
Epoch 10/10
30/30 [=====] - 12s 399ms/step - loss: 0.0089 -
accuracy: 0.9973
Out[157]:
In [77]:
model.save('Real_time.h5')

```

TEST THE MODEL

```

In [104]:
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import numpy as np
import cv2

In [105]:
model = load_model('/content/Real_time.h5')

In [151]:
img = image.load_img('/content/Dataset/test_set/H/107.png',target_size =
(100,100))
img

Out[151]:

In [149]:
from skimage.transform import resize
def 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 [150]:
img=image.load_img("/content/Dataset/test_set/H/107.png")
detect(img)

1/1 [=====] - 0s 28ms/step
THE PREDICTED LETTER IS  H

In [155]:
img = image.load_img('/content/Dataset/test_set/A/110.png')
pred=detect(img)

1/1 [=====] - 0s 26ms/step
THE PREDICTED LETTER IS  A

In [158]:
img=image.load_img('/content/Dataset/test_set/E/111.png')
detect(img)

1/1 [=====] - 0s 30ms/step
THE PREDICTED LETTER IS  E

```