Model Building

Import The Required Model Building Libraries

In [ ]:
```
#import imagedatagenerator
from keras.preprocessing.image import ImageDataGenerator
```

In [ ]:
```
#training datagen
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
```

In [ ]:
```
#testing datagen
test_datagen=ImageDataGenerator(rescale=1./255)
```

IMPORTING tensorflow

In [ ]:
```
import tensorflow as tf
import os
```

Initialize The Model

In [ ]:
```
#create model
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [ ]:
```
import numpy as np
import matplotlib.pyplot as plt #to view graph in colab itself
import IPython.display as display
from PIL import Image
import pathlib
```

Unzipping the dataset

In [ ]:
```
!unzip '/content/conversation engine for deaf and dumb (1).zip'
```

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Streaming output truncated to the last 5000 lines.
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```

Applying ImageDataGenerator to training set

In [ ]:
```
x_train=train_datagen.flow_from_directory('/content/Dataset/training_set',target_size=(64,64),batch_size=200,
                                          class_mode='categorical',color_mode="grayscale")
```

```
Found 15750 images belonging to 9 classes.
```

Applying ImageDataGenerator to test set

In [ ]:
```
x_test=test_datagen.flow_from_directory('/content/Dataset/test_set',target_size=(64,64),batch_size=200,
                                        class_mode='categorical',color_mode="grayscale")
```

```
Found 2250 images belonging to 9 classes.
```

In [ ]:
```
a=len(x_train)
b=len(x_test)
```

Length of training set

In [ ]:
```
print(a)
```

```
79
```

Length of test set

In [ ]:
```
print(b)
```

```
12
```

Add Layers

In [ ]:
```
#create model
model=Sequential()
```

Add The Convolution Layer

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

Add Pooling Layer

In [ ]:
```
model.add(MaxPooling2D(pool_size=(2,2)))
```

Add The Flatten Layer

In [ ]:
```
model.add(Flatten())
```

Adding The Dense Layers

In [ ]:
```
#1st hidden layer
model.add(Dense(units=512,activation='relu'))
#2nd hidden layer
model.add(Dense(units=261,activation='relu'))
```

In [ ]:
```
#output layer
model.add(Dense(units=9,activation='softmax'))
```

Compile The Model

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

Fit The Model

In [ ]:
```
model.fit_generator(x_train,steps_per_epoch=len(x_train),epochs=10,validation_data=x_test,validation_steps=len(x_test))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future versi
```

Fit The Model

In [ ]:
```
model.fit_generator(x_train,steps_per_epoch=len(x_train),epochs=10,validation_data=x_test,validation_steps=len(x_test))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future versi
on. Please use `Model.fit`, which supports generators.
  """Entry point for launching an IPython kernel.
Epoch 1/10
79/79 [==============================] - 90s 1s/step - loss: 0.3965 - accuracy: 0.8746 - val_loss: 0.2797 - val_accuracy: 0.9529
Epoch 2/10
79/79 [==============================] - 86s 1s/step - loss: 0.0419 - accuracy: 0.9884 - val_loss: 0.2846 - val_accuracy: 0.9751
Epoch 3/10
79/79 [==============================] - 84s 1s/step - loss: 0.0195 - accuracy: 0.9947 - val_loss: 0.3436 - val_accuracy: 0.9751
Epoch 4/10
79/79 [==============================] - 87s 1s/step - loss: 0.0083 - accuracy: 0.9982 - val_loss: 0.3722 - val_accuracy: 0.9751
Epoch 5/10
79/79 [==============================] - 83s 1s/step - loss: 0.0066 - accuracy: 0.9983 - val_loss: 0.4095 - val_accuracy: 0.9756
Epoch 6/10
79/79 [==============================] - 88s 1s/step - loss: 0.0072 - accuracy: 0.9979 - val_loss: 0.3874 - val_accuracy: 0.9756
Epoch 7/10
79/79 [==============================] - 86s 1s/step - loss: 0.0059 - accuracy: 0.9985 - val_loss: 0.3891 - val_accuracy: 0.9747
Epoch 8/10
79/79 [==============================] - 86s 1s/step - loss: 0.0027 - accuracy: 0.9992 - val_loss: 0.4429 - val_accuracy: 0.9756
Epoch 9/10
79/79 [==============================] - 84s 1s/step - loss: 0.0073 - accuracy: 0.9981 - val_loss: 0.4907 - val_accuracy: 0.9756
Epoch 10/10
79/79 [==============================] - 85s 1s/step - loss: 0.0048 - accuracy: 0.9987 - val_loss: 0.4866 - val_accuracy: 0.9702
```

Out[ ]:

Save The Model

In [ ]:
```
model.save('aslpng2.h5')
```

Import The Packages And Load The Saved Model

In [38]:
```
from tensorflow.keras.models import load_model
import numpy as np
import cv2
from tensorflow.keras.preprocessing import image
```

In [45]:
```
#load the model
model=load_model('aslpng2.h5')
```

In [46]:
```
img=image.load_img('/content/Dataset/test_set/A/10.png',target_size=(400,500))
img
```

Out[46]: