

# IBM Project Name: Real-Time Communication System Powered by AI for Specially Abled

## TEAM ID: PNT2022TMID19449

In[9]:

```
#import imagedatagenerator
from keras.preprocessing.image import ImageDataGenerator
```

In [10]:

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

In [11]:

```
#testing datagen
test_datagen=ImageDataGenerator(rescale=1./255)
```

IMPORTING tensorflow

In [12]:

```
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'
```

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

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inflating: Dataset/training\_set/I/1511.png  
extracting: Dataset/training\_set/I/1512.png

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inflating: Dataset/training_set/I/1564.png
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  inflating: Dataset/training\_set/I/68.png  
  inflating: Dataset/training\_set/I/680.png  
  inflating: Dataset/training\_set/I/681.png  
  inflating: Dataset/training\_set/I/682.png  
extracting: Dataset/training\_set/I/683.png  
  inflating: Dataset/training\_set/I/684.png  
  inflating: Dataset/training\_set/I/685.png  
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  inflating: Dataset/training\_set/I/687.png  
  inflating: Dataset/training\_set/I/688.png  
  inflating: Dataset/training\_set/I/689.png  
  inflating: Dataset/training\_set/I/69.png  
  inflating: Dataset/training\_set/I/690.png  
  inflating: Dataset/training\_set/I/691.png  
  inflating: Dataset/training\_set/I/692.png  
  inflating: Dataset/training\_set/I/693.png  
extracting: Dataset/training\_set/I/694.png  
  inflating: Dataset/training\_set/I/695.png  
extracting: Dataset/training\_set/I/696.png  
extracting: Dataset/training\_set/I/697.png  
  inflating: Dataset/training\_set/I/698.png  
  inflating: Dataset/training\_set/I/699.png  
extracting: Dataset/training\_set/I/7.png  
extracting: Dataset/training\_set/I/70.png  
extracting: Dataset/training\_set/I/700.png  
  inflating: Dataset/training\_set/I/701.png  
  inflating: Dataset/training\_set/I/702.png  
  inflating: Dataset/training\_set/I/703.png  
  inflating: Dataset/training\_set/I/704.png  
extracting: Dataset/training\_set/I/705.png  
  inflating: Dataset/training\_set/I/706.png  
  inflating: Dataset/training\_set/I/707.png

[illegible]

[illegible]

[illegible]

inflating: Dataset/training\_set/I/862.png  
extracting: Dataset/training\_set/I/863.png  
inflating: Dataset/training\_set/I/864.png  
inflating: Dataset/training\_set/I/865.png  
inflating: Dataset/training\_set/I/866.png  
inflating: Dataset/training\_set/I/867.png  
extracting: Dataset/training\_set/I/868.png  
inflating: Dataset/training\_set/I/869.png  
inflating: Dataset/training\_set/I/87.png  
inflating: Dataset/training\_set/I/870.png  
inflating: Dataset/training\_set/I/871.png  
inflating: Dataset/training\_set/I/872.png  
inflating: Dataset/training\_set/I/873.png  
inflating: Dataset/training\_set/I/874.png  
inflating: Dataset/training\_set/I/875.png  
inflating: Dataset/training\_set/I/876.png  
inflating: Dataset/training\_set/I/877.png  
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inflating: Dataset/training\_set/I/881.png  
inflating: Dataset/training\_set/I/882.png  
inflating: Dataset/training\_set/I/883.png  
inflating: Dataset/training\_set/I/884.png  
inflating: Dataset/training\_set/I/885.png  
extracting: Dataset/training\_set/I/886.png  
extracting: Dataset/training\_set/I/887.png  
inflating: Dataset/training\_set/I/888.png  
inflating: Dataset/training\_set/I/889.png  
inflating: Dataset/training\_set/I/89.png  
inflating: Dataset/training\_set/I/890.png  
inflating: Dataset/training\_set/I/891.png  
inflating: Dataset/training\_set/I/892.png  
inflating: Dataset/training\_set/I/893.png  
inflating: Dataset/training\_set/I/894.png  
inflating: Dataset/training\_set/I/895.png  
inflating: Dataset/training\_set/I/896.png  
inflating: Dataset/training\_set/I/897.png  
inflating: Dataset/training\_set/I/898.png  
inflating: Dataset/training\_set/I/899.png  
inflating: Dataset/training\_set/I/9.png  
inflating: Dataset/training\_set/I/90.png  
inflating: Dataset/training\_set/I/900.png  
inflating: Dataset/training\_set/I/901.png  
inflating: Dataset/training\_set/I/902.png  
inflating: Dataset/training\_set/I/903.png  
inflating: Dataset/training\_set/I/904.png  
extracting: Dataset/training\_set/I/905.png  
inflating: Dataset/training\_set/I/906.png  
inflating: Dataset/training\_set/I/907.png  
inflating: Dataset/training\_set/I/908.png  
inflating: Dataset/training\_set/I/909.png  
inflating: Dataset/training\_set/I/91.png  
inflating: Dataset/training\_set/I/910.png  
extracting: Dataset/training\_set/I/911.png  
extracting: Dataset/training\_set/I/912.png

[illegible]



```
inflating: Dataset/training_set/I/965.png
inflating: Dataset/training_set/I/966.png
inflating: Dataset/training_set/I/967.png
inflating: Dataset/training_set/I/968.png
inflating: Dataset/training_set/I/969.png
inflating: Dataset/training_set/I/97.png
inflating: Dataset/training_set/I/970.png
inflating: Dataset/training_set/I/971.png
inflating: Dataset/training_set/I/972.png
extracting: Dataset/training_set/I/973.png
inflating: Dataset/training_set/I/974.png
inflating: Dataset/training_set/I/975.png
inflating: Dataset/training_set/I/976.png
inflating: Dataset/training_set/I/977.png
inflating: Dataset/training_set/I/978.png
inflating: Dataset/training_set/I/979.png
inflating: Dataset/training_set/I/98.png
inflating: Dataset/training_set/I/980.png
inflating: Dataset/training_set/I/981.png
inflating: Dataset/training_set/I/982.png
extracting: Dataset/training_set/I/983.png
inflating: Dataset/training_set/I/984.png
inflating: Dataset/training_set/I/985.png
inflating: Dataset/training_set/I/986.png
inflating: Dataset/training_set/I/987.png
inflating: Dataset/training_set/I/988.png
inflating: Dataset/training_set/I/989.png
inflating: Dataset/training_set/I/99.png
inflating: Dataset/training_set/I/990.png
inflating: Dataset/training_set/I/991.png
inflating: Dataset/training_set/I/992.png
extracting: Dataset/training_set/I/993.png
inflating: Dataset/training_set/I/994.png
inflating: Dataset/training_set/I/995.png
extracting: Dataset/training_set/I/996.png
inflating: Dataset/training_set/I/997.png
inflating: Dataset/training_set/I/998.png
inflating: Dataset/training_set/I/999.png
```

#### 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())
```

```
-----
NameError                                Traceback (most recent call last)
~\AppData\Local\Temp\ipykernel_30084\2564012816.py in 
----> 1 model.add(Flatten())
```

**NameError:** name 'model' is not defined

### 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=['ac
curacy'])
```

### 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 version. 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 [ ]:
```

```
from tensorflow.keras.models import load_model
```

```
import numpy as np
```

```
import cv2
```

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

```
In [ ]:
```

```
#load the model
```

```
model=load_model('aslpng2.h5')
```

**In[ ]:**

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

**Out[ ]:**

