

Date	12 November 2022
Team ID	PNT2022TMID46648
Project Name	Real-Time Communication System Powered by AI for Specially Abled
Marks	8 marks

## IMPORT LIBRARIES

```

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
import zipfile

```

```
!unzip '/content/drive/MyDrive/IBMPROJECT/conversation engine for deaf and dumb.zip'
```

Streaming output truncated to the last 5000 lines.

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extracting: Dataset/training\_set/I/1673.png  
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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

```

## DATA AUGMENTATION

```

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)

```

```

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.

```

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.

```
len(x_train)
```

158

```
len(x_test)
```

23

```
x_train.class_indices
```

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

## MODEL BUILDING

```
from keras.models import Sequential
from keras.layers import Dense, Convolution2D
from tensorflow.keras.layers import Conv2D, MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
```

```
#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'))
```

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

```
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

```

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

## TEST THE MODEL

```

from tensorflow.keras.models import load_model from tensorflow.keras.preprocessing import image import
numpy as np import cv2

```

```
model = load_model('/content/Real_time.h5')
```

```

img = image.load_img('/content/Dataset/test_set/H/107.png',target_size = (100,100))
img

```

```

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])

```

```
img=image.load_img("/content/Dataset/test_set/H/107.png") detect(img)
```

```

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

```

```
img = image.load_img('/content/Dataset/test_set/A/110.png') pred=detect(img)
```

```

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

```

```
img=image.load_img('/content/Dataset/test_set/E/111.png') detect(img)
```

```

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

```