Delivery of Sprint 3

Date	06 November 2022
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Project Name	Real time Communication System Powered by AI for Specially Abled

Model Building

Import The Required Model Building Libraries

In [6]:
```
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
```

Initialize The Model

In [7]:
```
model=Sequential()
```

Add The Convolution Layer

In [10]:
```
model.add(Convolution2D(32,(3,3),activation="relu",input_shape=(64,64,3)))
#No of feature detectors, size of feature detector, image size, activation function
```

Add The Pooling Layer

In [11]:
```
model.add(MaxPooling2D(pool_size=(2,2)))
```

Add The Flatten Layer

In [12]:
```
model.add(Flatten())
```

Adding The Dense Layers

In [13]:
```
model.add(Dense(200,activation='relu'))
```

In [15]:
```
model.add(Dense(9,activation="softmax"))
```

Compile The Model

In [16]:
```
model.compile(loss="categorical_crossentropy",metrics=["accuracy"],optimizer='adam')
```

In [17]:
```
len(x_train)
```

Out[17]: 525

In [18]:
```
len(x_test)
```

Out[18]: 75

Fit And Save The Model

In [32]:
```
model.fit(x_train,epochs=8,validation_data=x_test,steps_per_epoch=len(x_train),validation_steps=len(x_test)
```

```
Epoch 1/8
525/525 [==============================] - 620s 1s/step - loss: 0.6116 - accuracy: 0.7691 - val_loss: 0.3
006 - val_accuracy: 0.9329
Epoch 2/8
525/525 [==============================] - 223s 425ms/step - loss: 0.1041 - accuracy: 0.9683 - val_loss:
0.0779 - val_accuracy: 0.9858
Epoch 3/8
525/525 [==============================] - 132s 250ms/step - loss: 0.0592 - accuracy: 0.9829 - val_loss:
0.1236 - val_accuracy: 0.9760
Epoch 4/8
525/525 [==============================] - 104s 198ms/step - loss: 0.0431 - accuracy: 0.9879 - val_loss:
0.2067 - val_accuracy: 0.9742
Epoch 5/8
525/525 [==============================] - 107s 204ms/step - loss: 0.0322 - accuracy: 0.9912 - val_loss:
0.0713 - val_accuracy: 0.9800
Epoch 6/8
525/525 [==============================] - 113s 216ms/step - loss: 0.0348 - accuracy: 0.9895 - val_loss:
0.1267 - val_accuracy: 0.9787
Epoch 7/8
525/525 [==============================] - 101s 193ms/step - loss: 0.0293 - accuracy: 0.9926 - val_loss:
0.1558 - val_accuracy: 0.9751
Epoch 8/8
525/525 [==============================] - 107s 205ms/step - loss: 0.0222 - accuracy: 0.9940 - val_loss:
0.1998 - val_accuracy: 0.9769
```

Out[32]:
```
<keras.callbacks.History at 0x20f394a4e20>
```

In [33]:
```
model.save("C:/Users/rajes/Downloads/signlanguage-new.h5")
```

Test the Model

Test the Model

Import The Packages And Load The Saved Model

In [35]:
```
from keras.models import load_model
import numpy as np
import h5py
import cv2
```

In [36]:
```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import numpy as np
```

In [37]:
```
model = load_model("C:/Users/rajes/Downloads/signlanguage-new.h5")
```

Load The Test Image, Pre-Process It And Predict

In [39]:
```
img =image.load_img(r"C:\Users\rajes\Desktop\Dataset\test_set\A\8.png",target_size = (64,64,1))
img
```

Out[39]:

In [41]:
```
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 [42]:
```
from skimage.transform import resize
def detect(frame):
    img=resize(frame,(64,64,1))
    img=np.expand_dims(img,axis=0)
    if(np.max(img)>1):
        img=img/255.0
        prediction=model.predict(img)
        print(prediction)
        prediction=model.predict_classes(img)
        print(prediction)
```

In [43]:
```
frame=cv2.imread(r"C:\Users\rajes\Desktop\Dataset\test_set\A\8.png")
data=detect(frame)
```

In [44]:
```
type(img)
```

Out[44]:
```
PIL.Image.Image
```

In [45]:
```
x = image.img_to_array(img)
x
```

Out[45]:
```
array([[[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       ...,

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],


          [[0., 0., 0.],
           [0., 0., 0.],
           [0., 0., 0.],
           ...,
           [0., 0., 0.],
           [0., 0., 0.],
           [0., 0., 0.]],

          [[0., 0., 0.],
           [0., 0., 0.],
           [0., 0., 0.],
           ...,
           [0., 0., 0.],
           [0., 0., 0.],
           [0., 0., 0.]]], dtype=float32)
```

In [46]:
```
x.shape
```

Out[46]:
```
(64, 64, 3)
```

In [47]:
```
x=np.expand_dims(x,axis=0)
x.shape
```

Out[47]:
```
(1, 64, 64, 3)
```

In [48]:
```
pred_prob = model.predict(x)
```

```
1/1 [==============================] - 1s 1s/step
```

In [49]:
```
pred_prob
```

Out[49]:
```
array([[9.9954236e-01, 7.8000909e-13, 7.1030300e-08, 7.4072335e-07,
        3.7532591e-04, 2.8473270e-12, 1.7780074e-05, 6.3732426e-05,
        7.7890165e-09]], dtype=float32)
```

In [50]:
```
class_name=["A","B","C","D","E","F","G","H","I"]
pred_id = pred_prob.argmax(axis=1)[0]
```

In [51]:
```
pred_id
```

Out[51]:
```
0
```

In [52]:
```
print("the alphabet is  ",str(class_name[pred_id]))
```

```
the alphabet is   A
```

In [71]:
```
import cv2
```

In [72]:
```
img=cv2.imread(r"C:\Users\rajes\Desktop\Dataset\test_set\A\8.png",1)
```

In [73]:
```
print(img.shape)
```

```
(64, 64, 3)
```

In [74]:
```
cv2.imshow('image',img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

In [ ]:
```
import cv2
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model=load_model('signlanguage-new.h5')
video=cv2.VideoCapture(0)
index=['A','B','C','D','E','F','G','H','I']
while 1:
    succes,frame=video.read()
    cv2.imwrite('image.jpg',frame)
    img=image.load_img('image.jpg',target_size=(64,64))
    x=image.img_to_array(img)
    x=np.expand_dims(x,axis=0)
    pred=np.argmax(model.predict(x),axis=1)
    y=pred[0]
    copy = frame.copy()
    cv2.rectangle(copy, (320, 100), (620,400), (255,0,0), 5)
    cv2.putText(frame,'The Predicted Alphabet is: '+str(index[y]),(100,100),cv2.FONT_HERSHEY_SIMPLEX,1,(0,0
    cv2.imshow('image',frame)
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break
video.release()
cv2.destroyAllWindows()
```

```
1/1 [==============================] - 0s 175ms/step
1/1 [==============================] - 0s 35ms/step
1/1 [==============================] - 0s 28ms/step
1/1 [==============================] - 0s 29ms/step
```

```
1/1 [==============================] - 0s 27ms/step
1/1 [==============================] - 0s 28ms/step
1/1 [==============================] - 0s 25ms/step
1/1 [==============================] - 0s 28ms/step
1/1 [==============================] - 0s 27ms/step
1/1 [==============================] - 0s 27ms/step
1/1 [==============================] - 0s 27ms/step
1/1 [==============================] - 0s 27ms/step

1/1 [==============================] - 0s 26ms/step
1/1 [==============================] - 0s 26ms/step
1/1 [==============================] - 0s 24ms/step
1/1 [==============================] - 0s 28ms/step
1/1 [==============================] - 0s 26ms/step
1/1 [==============================] - 0s 28ms/step
1/1 [==============================] - 0s 30ms/step
```

In [ ]:

OUTPUT: