Model Building

Import the required Libraries

```
[22] 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

```
[6] model=Sequential()
```

Adding Convolution Layer

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

Adding Pooling Layer

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

Adding Flatten Layer

```
[9] model.add(Flatten())
```

Adding Dense Layer

```
[10] model.add(Dense(units=512,activation='relu'))
     model.add(Dense(units=9,activation='Softmax'))
```

Compile the Model

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

Fit and Save the model

```
[12] model.fit_generator(x_train,steps_per_epoch=24,epochs=10,validation_data=x_test,validation_steps=40)
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.fit_generator` is deprecated and will be re
  """Entry point for launching an IPython kernel.
Epoch 1/10
24/24 [==============================] - ETA: 0s - loss: 0.9502 - accuracy: 0.7001 WARNING:tensorflow:Your input ran out of dat
24/24 [==============================] - 1695s 71s/step - loss: 0.9502 - accuracy: 0.7001 - val_loss: 0.3483 - val_accuracy: 0.
Epoch 2/10
24/24 [==============================] - 659s 27s/step - loss: 0.2261 - accuracy: 0.9359
Epoch 3/10
24/24 [==============================] - 357s 15s/step - loss: 0.1212 - accuracy: 0.9668
Epoch 4/10
24/24 [==============================] - 195s 8s/step - loss: 0.0710 - accuracy: 0.9832
Epoch 5/10
24/24 [==============================] - 110s 5s/step - loss: 0.0534 - accuracy: 0.9856
Epoch 6/10
24/24 [==============================] - 64s 3s/step - loss: 0.0348 - accuracy: 0.9929
Epoch 7/10
24/24 [==============================] - 47s 2s/step - loss: 0.0213 - accuracy: 0.9956
Epoch 8/10
24/24 [==============================] - 33s 1s/step - loss: 0.0200 - accuracy: 0.9946
Epoch 9/10
24/24 [==============================] - 28s 1s/step - loss: 0.0145 - accuracy: 0.9965
Epoch 10/10
24/24 [==============================] - 25s 1s/step - loss: 0.0113 - accuracy: 0.9980
<keras.callbacks.History at 0x7fb5aca6f190>
```

Testing the Model

Import Packages and Load saved Model

```
[23] from keras.models import load_model
     import numpy as np
     import cv2
```

```
[18] model=load_model('model.h5')
```

Loading the Test Image, Preprocessing and Predicting

```
[24] from skimage.transform import resize
```

```
frame=cv2.imread(r'/content/drive/MyDrive/Dataset/Dataset/test_set/I/
1.png')
data=detect(frame)
from google.colab.patches import cv2_imshow
cv2_imshow(frame)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

```
1/1 [==============================] - 0s 31ms/step
THE PREDICTED LETTER IS  I
```