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☒ Python 3.9

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Instantiating runtime for Model building
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```
In [10]: from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from tensorflow.keras.layers import Conv2D, MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
```

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```
In [ ]: import os, types
import pandas as pd
from boto3.client import Config
import ibm_boto3

def __iter__(self): return 0

#@hidden_cell
# The following code accesses a file in your IBM Cloud Object Storage. It includes your credentials.
# You might want to remove those credentials before you share the notebook.
cos_client = ibm_boto3.client(service_name='s3',
                              ibm_api_key_id='IMzFuAwRpYPnwh2XocJvGqTbHiPAMWnnEcIB8t8bQRGq',
                              ibm_auth_endpoint='https://iam.cloud.ibm.com/oidc/token',
                              config=Config(signature_version='oauth'),
                              endpoint_url='https://s3.private.us.cloud-object-storage.appdomain.cloud')

bucket = 'realtimecommunication-donotdelete-pr-fx3wrumk8qzbvv'
object_key = 'Dataset.zip'

streaming_body_7 = cos_client.get_object(Bucket=bucket, Key=object_key)['Body']

# Your data file was loaded into a boto3.response.StreamingBody object.
# Please read the documentation of ibm boto3 and pandas to learn more about the possibilities to load the data.
```

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In []: #####IMPORTING LIBRARIES

In []: import os
import cv2
import numpy as np
import matplotlib.pyplot as plt
from keras.preprocessing.image import ImageDataGenerator

Define DATA FILES

In []: def rename_imgs(file_name):
folder_path = r'test_dataset/'+file_name

num = 0
for file in os.listdir(folder_path):
if num%10 == 0:
print(f'Renamed {num} files...')
os.rename(folder_path+'\\'+file, folder_path+'\\'+file_name+'_'+str(num)+'.jpeg')
num += 1

In []: fn = 'Space'
rename_imgs(fn)

In []: #fn = 'Space'
#rename_imgs(fn)

```
for file in os.listdir(folder_path):
    # if num%10 == 0:
    #     print(f'Renamed {num} files...')
    # os.rename(folder_path+'\\'+file, folder_path+'\\'+file_name+'_'+str(num)+'.jpeg')
    num += 1
```

```
In [ ]: fn = 'Space'
         rename_imgs(fn)
```

```
In [ ]: file_names = '0123456789'+'ABCDEFGHIJKLMNPOQRSTUVWXYZ'
for fn in file_names:
    rename_imgs(fn)
```

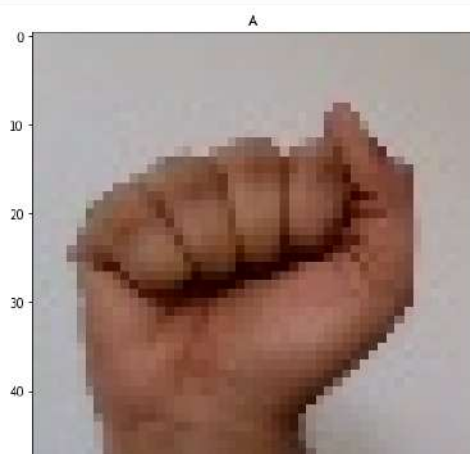
SAMPLE IMAGES FROM DATASET

```
In [ ]: train_data_path = 'train_dataset/'
        test_data_path = 'test_dataset/'
```

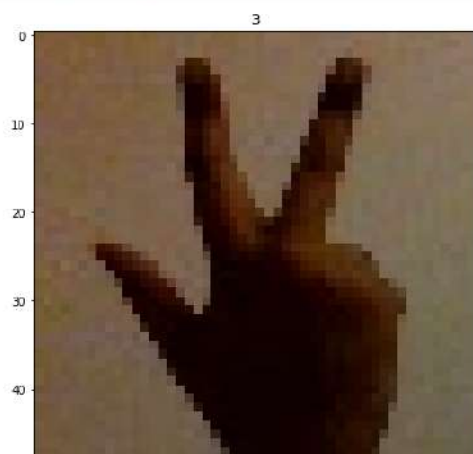
```
In [ ]: def display(img,sign=None):  
        img = cv2.cvtColor(img,cv2.COLOR_BGR2RGB)  
        fig = plt.figure(figsize=(7,7))  
        ax = fig.add_subplot(111)  
        plt.title(sign)  
        ax.imshow(img)
```



```
In [ ]: sign_img = cv2.imread(train_data_path+'A/A_204.jpeg')
display(sign_img,'A')
```



```
In [ ]: sign_img = cv2.imread(train_data_path+'3/3_340.jpeg')
display(sign_img, '3')
```



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Train Data Generator

In []: train_data_gen = image_gen.flow_from_directory(train_data_path,
target_size=(250,250),
batch_size=16,
shuffle=True,
class_mode='binary',
subset='training')

Found 41625 images belonging to 37 classes.

Validation Data Generator

In []: validation_data_gen = image_gen.flow_from_directory(train_data_path,
target_size=(250,250),
batch_size=16,
shuffle=True,
class_mode='binary',
subset='validation')

Found 13875 images belonging to 37 classes.

Test Data Generator

In []: test_data_gen = image_gen.flow_from_directory(test_data_path