

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

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IMPORTING NECESSARY LIBRARIES

```
import os
```

```
import cv2
```

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

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

RENAMING DATA FILES

```
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
```

```
fn = 'Space'
```

```
rename_imgs(fn)
```

```
file_names = '0123456789'+'ABCDEFGHIJKLMNOPQRSTUVWXYZ'
```

```
for fn in file_names:
```

```
    rename_imgs(fn)
```

DISPLAYING SAMPLE IMAGES FROM DATASET

```
train_data_path = 'train_dataset/'
```

```
test_data_path = 'test_dataset/'
```

```
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)
```

Training Data Images

```
sign_img = cv2.imread(train_data_path+'O/O_234.jpeg')
```

```
display(sign_img,'a')
```

```
sign_img = cv2.imread(train_data_path+'A/A_204.jpeg')
```

```
display(sign_img,'A')
```

```
sign_img = cv2.imread(train_data_path+'3/3_340.jpeg')
```

```
display(sign_img,'3')
```

```
sign_img = cv2.imread(train_data_path+'M/M_100.jpeg')
```

```
display(sign_img,'M')
```

```
sign_img = cv2.imread(train_data_path+'S/S_10.jpeg')
```

```
display(sign_img,'Space')
```

Test Data Images

```
sign_img = cv2.imread(test_data_path+'S/S_15.jpeg')
```

```
display(sign_img,'S')
```

```
sign_img = cv2.imread(test_data_path+'Z/Z_1.jpeg')
```

```
display(sign_img,'Z')
```

```
sign_img = cv2.imread(test_data_path+'7/7_8.jpeg')
```

```
display(sign_img,'7')
```

AUGMENTATION AND PREPROCESSING THE DATASET

Creating ImageDataGenerator

```
image_gen = ImageDataGenerator(rotation_range=30,  
                                width_shift_range=0.1,  
                                height_shift_range=0.1,  
                                shear_range=0.2,  
                                zoom_range=0.2,  
                                rescale=1/255,  
                                horizontal_flip=True,  
                                fill_mode='nearest',  
                                validation_split=0.25)
```

Original Image

```
sign_img = cv2.imread(train_data_path+'3/3_100.jpeg')  
display(sign_img,'3')
```

Augmented Images

```
display(image_gen.random_transform(sign_img))
```

```
display(image_gen.random_transform(sign_img))
```

SPLITTING INTO TRAIN AND VALIDATION DATASET

Train Data Generator

```
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

```
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

```
test_data_gen = image_gen.flow_from_directory(test_data_path,
                                              target_size=(250,250),
                                              batch_size=8,
                                              shuffle=True,
                                              class_mode='categorical',
                                              )
```

Found 2586 images belonging to 37 classes.

train_data_gen.class_indices

```
{'0': 0,
'1': 1,
'2': 2,
'3': 3,
'4': 4,
'5': 5,
'6': 6,
'7': 7,
'8': 8,
'9': 9,
'A': 10,
'B': 11,
'C': 12,
'D': 13,
'E': 14,
```

'F': 15,
'G': 16,
'H': 17,
'I': 18,
'J': 19,
'K': 20,
'L': 21,
'M': 22,
'N': 23,
'O': 24,
'P': 25,
'Q': 26,
'R': 27,
'S': 28,
'Space': 29,
'T': 30,
'U': 31,
'V': 32,
'W': 33,
'X': 34,
'Y': 35,
'Z': 36}

test_data_gen.classes

array([0, 0, 0, ..., 36, 36, 36])

len(train_data_gen.classes)

41625

len(test_data_gen.classes)

2586