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

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

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

SAMPLE IMAGES FROM DATASET

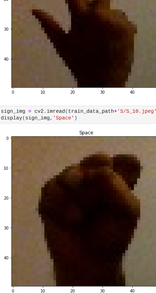
```
In [ ]: train_data_path = 'train_dataset/'
        test_data_path = 'test_dataset/'
```

```
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)
```

Training Data Set

```
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')
```


```
In [ ]: sign_img = cv2.imread(train_data_path+'S/S_10.jpeg')
        display(sign_img,'Space')
```

Test Data Set

```
In [ ]: sign_img = cv2.imread(test_data_path+'5/5_15.jpeg')
        display(sign_img,'5')
```


```
In [ ]: sign_img = cv2.imread(test_data_path+'Z/Z_1.jpeg')
        display(sign_img,'Z')
```

Image Data Generator

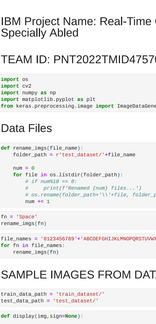
```
In [ ]: image_gen = ImageDataGenerator(rotation_range=30,
                                       width_shift_range=0.1,
                                       height_shift_range=0.1,
                                       shear_range=0.2,
                                       zoom_range=0.2,
  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

Original Image

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


Augmented Images

```
In [ ]: display(image_gen.random_transform(sign_img))
```



Split into Test & Validation dataset

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,
                                                     target_size=(250,250),
                                                     batch_size=8,
                                                     shuffle=True,
                                                     class_mode='categorical',
                                                     )
```

```
Found 2586 images belonging to 37 classes.
```

```
In [7]: train_data_gen.class_indices
```

```
Out[7]: {'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': 29,
         'T': 30,
         'U': 31,
         'V': 32,
         'W': 33,
         'X': 34,
         'Y': 35,
         'Z': 36}
```

```
In [ ]: test_data_gen.classes
```

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

```
In [8]: len(train_data_gen.classes)
```

```
Out[8]: 41625
```