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Model Building

Adding The Convolution Layer

In [ ]:

```
import numpy as np import
matplotlib.pyplot as plt
```

In [ ]:

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

In [ ]:

```
# Training Datagen train_datagen
=
ImageDataGenerator(rescale=1/255,zoom_range=0.2,horizontal_flip=True,vertica
l_flip=False) # Testing Datagen
test_datagen = ImageDataGenerator(rescale=1/255)
```

In [ ]:

```
# Training Dataset
x_train=train_datagen.flow_from_directory(r'/content/drive/MyDrive/Dataset/t
raining_set',target_size=(64,64), class_mode='categorical',batch_size=900)
# Testing Dataset
x_test=test_datagen.flow_from_directory(r'/content/drive/MyDrive/Dataset/tes
t_set',target_size=(64,64), class_mode='categorical',batch_size=900)
```

```
Found 15760 images belonging to 9 classes.
Found 2250 images belonging to 9 classes.
```

In [ ]:

```
# let img1 be an image with no features img1 =
np.array([np.array([200, 200]), np.array([200, 200])]) img2 =
np.array([np.array([200, 200]), np.array([0, 0])]) img3 =
np.array([np.array([200, 0]), np.array([200, 0])])

kernel_horizontal = np.array([np.array([2, 2]), np.array([-2, -2])])
print(kernel_horizontal, 'is a kernel for detecting horizontal edges')
   kernel_vertical = np.array([np.array([2, -2]), np.array([2, -
2])]) print(kernel_vertical, 'is a kernel for detecting vertical
edges')
```

In [ ]:

```
# We will apply the kernels on the images by #
elementwise multiplication followed by summation
def apply_kernel(img, kernel):
    return np.sum(np.multiply(img, kernel))

# Visualizing img1
plt.imshow(img1) plt.axis('off')
plt.title('img1') plt.show()
```

```
# Checking for horizontal and vertical features in image1 print('Horizontal
edge confidence score:', apply_kernel(img1,
kernel_horizontal)) print('Vertical edge confidence score:',
apply_kernel(img1,
kernel_vertical))
```

In [ ]:

```
# Visualizing img2
plt.imshow(img2)
plt.axis('off')
plt.title('img2') plt.show()

# Checking for horizontal and vertical features in image2 print('Horizontal
edge confidence score:', apply_kernel(img2,
kernel_horizontal)) print('Vertical edge confidence score:',
apply_kernel(img2,
kernel_vertical))
```

In [ ]:

```
# Visualizing img3
plt.imshow(img3)
plt.axis('off')
plt.title('img3') plt.show()

# Checking for horizontal and vertical features in image3 print('Horizontal
edge confidence score:', apply_kernel(img3,
kernel_horizontal)) print('Vertical edge confidence score:',
apply_kernel(img3,
kernel_vertical))
```

In [ ]:

```
print("Len x-train : ", len(x_train)) print("Len
x-test : ", len(x_test))
```

```
Len x-train :  18 Len
x-test :  3
```

In [ ]:

```
# The Class Indices in Training Dataset
x_train.class_indices
```

Out[ ]:

```
{'A': 0, 'B': 1, 'C': 2, 'D': 3, 'E': 4, 'F': 5, 'G': 6, 'H': 7, 'I': 8}
```

Model Creation

In [ ]:

```
# Importing Libraries
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
```

In [ ]:

```
# Creating Model model=Sequential()
```

In [ ]:

```
# Adding Layers
model.add(Convolution2D(32,(3,3
```