Marwadi University	**Marwadi University** **Faculty of Technology** **Department of Information and Communication Technology**	
Subject: Machine Learning (01CT0519)	**Aim: To observe the impact of the usage of the kernels over the image**	
Experiment No: 11	**Date:**	**Enrolment No:92000133018**

Aim: To observe the impact of the usage of the kernels over the image

IDE: Google Colab

Theory:

An image kernel is a small matrix used to apply effects like the ones you might find in Photoshop or Gimp, such as blurring, sharpening, outlining or embossing. They're also used in machine learning for 'feature extraction', a technique for determining the most important portions of an image. In this context the process is referred to more generally as "convolution".

Program (Code):

```
import cv2
import numpy as np
import  matplotlib.pyplot as plt
from PIL import Image,ImageFilter
import pandas as pd
from scipy.ndimage.filters import convolve

# converting gray scale image
path = r"./images.jpeg"
img = cv2.imread(path, cv2.IMREAD_GRAYSCALE)
cv2.imshow("image", img)
cv2.waitKey(0)
# apply various kernels
identity = np.array([[0,0,0], [0,1,0], [0,0,0]])
edgedetection = ([[-1, -1, -1], [-1, 8, -1], [-1, -1, -1]])
top_sobel = np.array([[1, 2, 1], [0, 0, 0], [-1, -2, -1]])
sharpen = np.array([[0, -1, 0], [-1, 5, -1], [0, -1, 0]])
emboss =  np.array([[-2, -1, 0], [-1,  1, 1], [ 0,  1, 2]])
gaussian = (1 / 256.0) * np.array([[1, 4, 6, 4, 1], [4, 16, 24, 16, 4], [6, 24, 36, 24, 6], [4, 16, 24, 16, 4], [1, 4, 6, 4, 1]])
smallBlur = np.ones((7, 7), dtype="float") * (1.0/(10))
horizontal = np.array([[-1, -1, -1], [2, 2, 2], [-1, -1, -1]])
vertical = np.array([[-1, 2, -1], [-1, 2, -1], [-1, 2, -1]])
kernels = [identity, edgedetection, top_sobel, sharpen, emboss, gaussian, smallBlur, horizontal, vertical]
k_name = ['Identity', 'Edgedetection', 'Top_sobel', 'Sharpen', 'Emboss', 'Gaussian', 'SmallBlur', 'Horizontal',
'Vertical']
```

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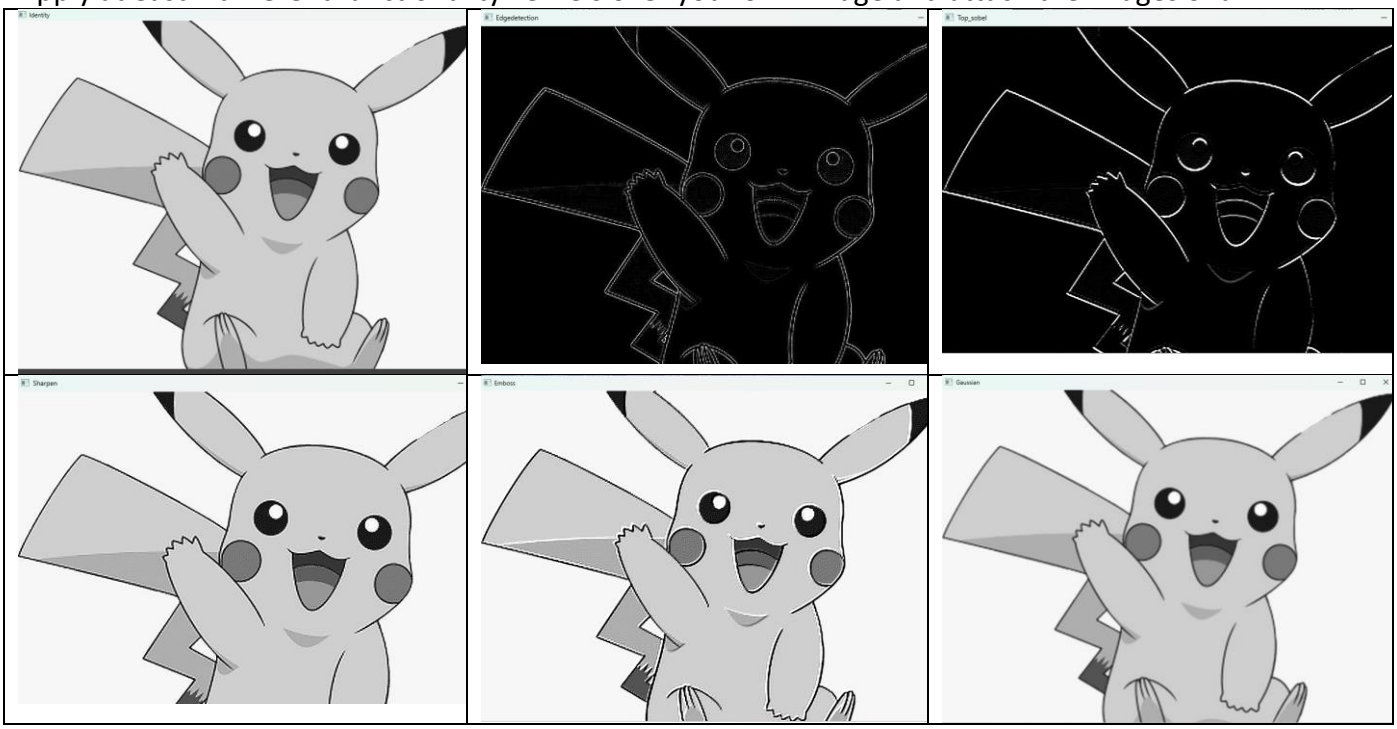
```
im = np.array(img, dtype=float)

for i in range(len(kernels)):
    kernel = kernels[i];
    name = k_name[i];

    # kernel = kernels[0]
    im2 = convolve(im, kernel)
    img3 = np.array(np.clip(im2,0,255), dtype=np.uint8)

    img_new = cv2.hconcat([img3])
    cv2.imshow(name, img_new)
    cv2.waitKey(0)
```

Results:

To be attached with

Apply atleast 7 different functionality kernels over your own image and attach the images of all



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Observation and Result Analysis:

a. Name of Kernel-1: _____
   Kernel-1 matrix:

   Observation:

   _____

   _____

b. Name of Kernel-2: _____
   Kernel-2 matrix:

   Observation:

   _____

   _____

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c. Name of Kernel-3: _____
Kernel-3 matrix:

Observation:

_____

_____

d. Name of Kernel-4: _____
Kernel-4 matrix:

Observation:

_____

_____

e. Name of Kernel-5: _____
Kernel-5 matrix:

Observation:

_____

_____

f. Name of Kernel-6: _____
Kernel-6 matrix:

Observation:

_____

_____

g. Name of Kernel-7: _____
Kernel-7 matrix:

Observation:

_____

_____