
 Marwadi University <small>Marwadi Chandarana Group</small> 	Marwadi University Faculty of Engineering and Technology Department of Information and Communication Technology	
Subject: DSIP (01CT1513)	AIM: Image processing.	
Experiment No: 08	Date:	Enrolment No: 92301733046

Code:

```
import cv2
```

```
import numpy as np
```

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

```
def apply_smoothing_filter(image, kernel_size):
```

```
    # Apply smoothing filter to the image
```

```
    smoothed_image = cv2.blur(image, (kernel_size, kernel_size))
```

```
    return smoothed_image
```

```
def apply_sharpening_filter(image):
```

```
    # Create a sharpening kernel
```

```
    kernel = np.array([[0, -1, 0], [-1, 5, -1], [0, -1, 0]])
```

```
    # Apply the sharpening kernel to the image
```

```
    sharpened_image = cv2.filter2D(image, -1, kernel)
```

```
    return sharpened_image
```

```
# Load the input image
```


```
image_path = "D:\DSIP\codes\ex1_2.png"
```

```
input_image = cv2.imread(image_path)
```

```
# Apply smoothing filter
```

```
smoothed_image = apply_smoothing_filter(input_image, kernel_size=5)
```

```
# Apply sharpening filter
```

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```
sharpened_image = apply_sharpening_filter(input_image)
```

```
# Display the original image and the filtered images side by side
```

```
combined_image = np.hstack((input_image, smoothed_image, sharpened_image))
```

```
cv2.imshow("Original | Smoothed | Sharpened", combined_image)
```

```
cv2.waitKey(0)
```

```
# Save the filtered images (optional)
```

```
smoothed_path = 'smoothed_image.jpg'
```

```
sharpened_path = 'sharpened_image.jpg'
```

```
cv2.imwrite(smoothed_path, smoothed_image)
```

```
cv2.imwrite(sharpened_path, sharpened_image)
```

```
print(f"Smoothed image saved at: {smoothed_path}")
```

```
print(f"Sharpened image saved at: {sharpened_path}")
```

Output:

