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Department of Computer Engineering

FDVIP Lab

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Date : *1/3/2023*

AIM - To study and perform basic arithmetic and logical operations used in image processing.

S.No.	Arithmetic Operations	Logical Operations
1.	Addition	AND
2.	Subtraction	OR
3.	Multiplication	XOR
4.	Division	NOT

Importing Dependencies

```
import cv2
import numpy as np
```

Reading the images

```
# For Arithmetic Operations
img_lena = cv2.imread('../data/lena.png', 0)
img_star = cv2.imread('../data/star.png', 0)
```

```
# For Logical Operations
img_circle = cv2.imread('../data/circle.png', 0)
img_square = cv2.imread('../data/square.png', 0)
```

1. Arithmetic Operations

1.A. Addition

```
img_add = cv2.add(img_lena, img_star)
cv2.imshow('Addition', img_add)
```

1.B. Subtraction

```
img_sub = cv2.subtract(img_lena, img_star)
cv2.imshow('Subtraction', img_sub)
```

1.C. Multiplication

```
img_mul = cv2.multiply(img_lena, img_star)
cv2.imshow('Multiplication', img_mul)
```

1.D. Division

```
img_div = cv2.divide(img_lena, img_star)
cv2.imshow('Division', img_div)
```

1.C.i Scaling UP

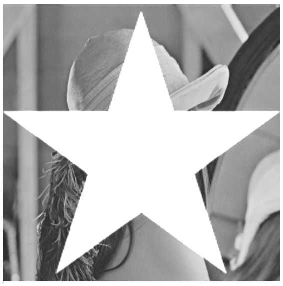
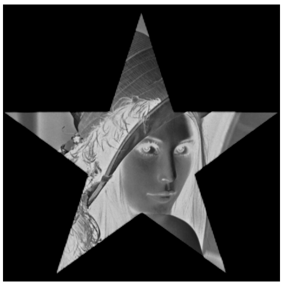
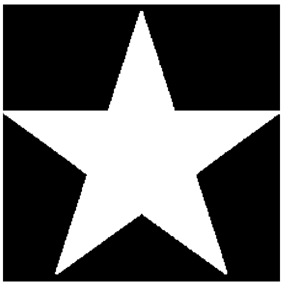
```
img_mul_scaled = cv2.multiply(img_lena, img_star, scale=2)
cv2.imshow('Multiplication Scaled', img_mul_scaled)
```

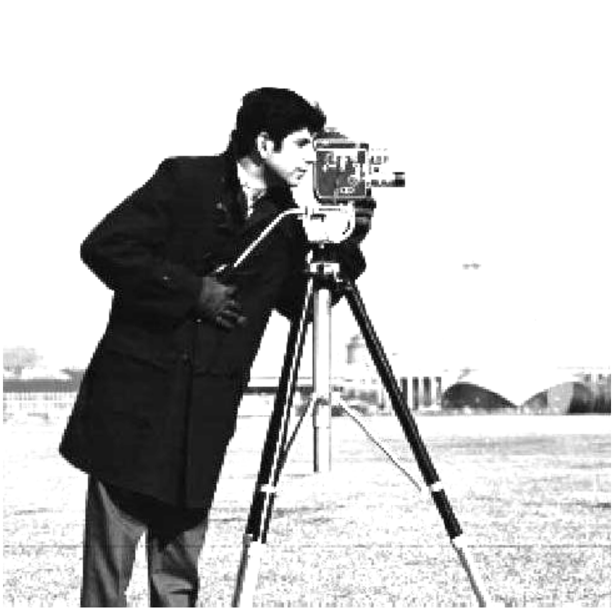
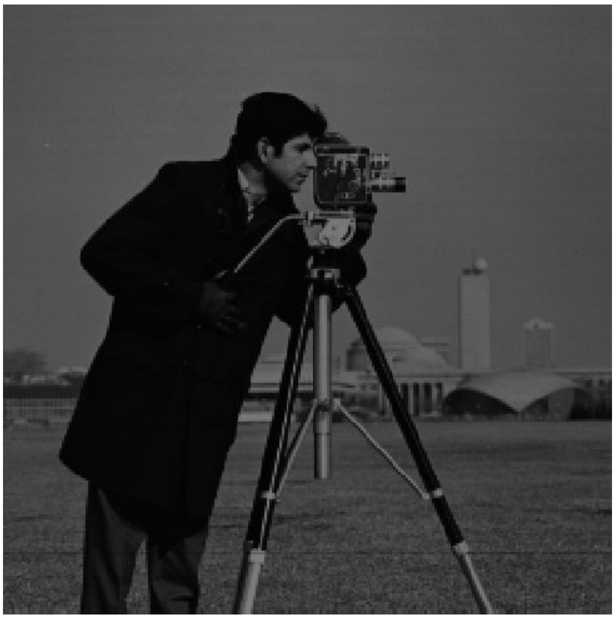
1.C.ii Scaling DOWN

```
img_mul_scaled = cv2.multiply(img_lena, img_star, scale=0.5)
cv2.imshow('Multiplication Scaled', img_mul_scaled)
```

Output

Addition	Subtraction	Multiplication	Division

Addition	Subtraction	Multiplication	Division
			

Multiplication Scaled UP	Multiplication Scaled DOWN
	

2. Logical Operations

2.A. AND

```
img_and = cv2.bitwise_and(img_circle, img_square)
cv2.imshow('AND', img_and)
```

2.B. OR

```
img_or = cv2.bitwise_or(img_circle, img_square)
cv2.imshow('OR', img_or)
```

2.C. XOR

```
img_xor = cv2.bitwise_xor(img_circle, img_square)
cv2.imshow('XOR', img_xor)
```

2.D. NOT

```
img_not = cv2.bitwise_not(img_circle)
cv2.imshow('NOT', img_not)
```

Output

AND	OR	XOR	NOT