

Department of Computer Science & Engineering  
Jahangirnagar University

LAB REPORT

COURSE Code - CSE-408

COURSE Title - Digital Image Processing Laboratory

Submitted to:

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CSE, JU

Experiment No. - 03

Experiment Title - Image Filtering

Objectives :

We will perform the following tasks :

- (i) Low pass filtering
- (ii) Highpass filtering
- (iii) Gaussian filtering
- (iv) Laplacian of Gaussian filtering

Procedure :

1. Average filtering / Low pass filtering

```
import skimage.io as io
```

```
import scipy.ndimage as ndi
```

```
img01 = io.imread('D:\\Dataset\\7.2-01.tif')
```

```
io.imshow(img01)
```

```
io.show()
```

```
f = np.ones((3,3))/9
```

```
img02 = ndi.convolve(img01, f, mode = 'constant')
```

```
io.imshow(img02)
```

```
io.show()
```

1b. Low pass filtering

```
import numpy as np
```

```
import skimage.io as io
```

```
import skimage.data as data
```

```
import scipy.ndimage as ndi
```

```
img01 = data.camera()
```

```
io.imshow(img01)
```

```
io.show()
```

```
f = np.ones((9,9))/81
```

```
img02 = ndi.convolve(img01, f, mode = 'reflect')  
io.imshow(img02)  
io.show()
```

### 1c. Low pass filtering with uniform filter

```
import skimage.io as io  
import skimage.data as data  
import scipy.ndimage as ndi  
img01 = data.camera()  
io.imshow(img01)  
io.show()  
img02 = ndi.uniform_filter(img01, 9)  
io.imshow(img02)  
io.show()
```

### 2. Highpass filter

```
import numpy as np  
import skimage.io as io  
import skimage.data as data  
import scipy.ndimage as ndi
```

```
img01 = data.camera()  
io.imshow(img01)  
io.show()  
f = np.array([[1.5, 6, 1.5], [6, -30, 6], [1.5, 6, 1.5]])  
img02 = ndi.convolve(img01, f)  
io.imshow(img02)  
io.show()
```

### 3. Gaussian filter

```
import skimage.io as io
import skimage.data as data
import scipy.ndimage as ndi
```

```
img01 = data.camera()
```

```
io.imshow(img01)
```

```
io.show()
```

```
img02 = ndi.gaussian_filter(img01, 5, truncate=3)
```

```
io.imshow(img02)
```

```
io.show()
```

### 3b. Gaussian lowpass filter

```
import numpy as np
```

```
import skimage.io as io
```

```
import skimage.data as data
```

```
import scipy.ndimage as ndi
```

```
img01 = data.camera()
```

```
io.imshow(img01)
```

```
io.show()
```

```
k = np.zeros((5,5))
```

```
k[2,2] = 1
```

```
f = ndi.gaussian_filter(k, 1, truncate=2)
```

```
img02 = ndi.convolve(img01, f)
```

```
io.imshow(img02)
```

```
io.show()
```

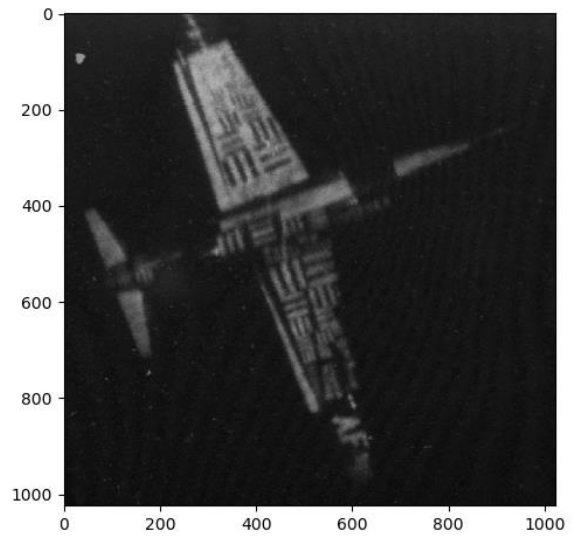
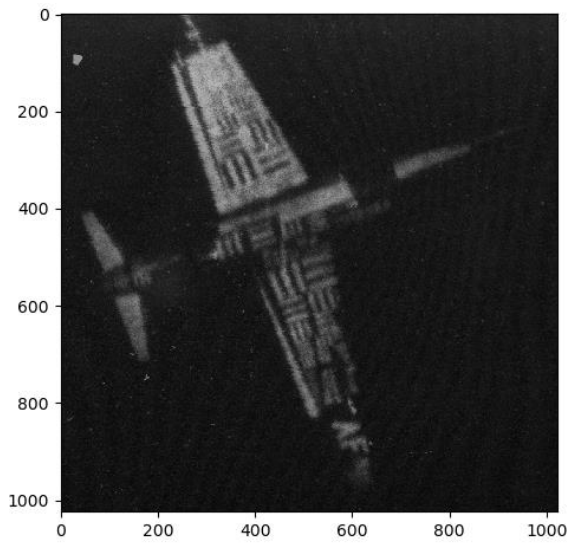
#### 9. Laplacian of Gaussian filter

```
import skimage.io as io
import skimage.data as data
import scipy.ndimage as ndi

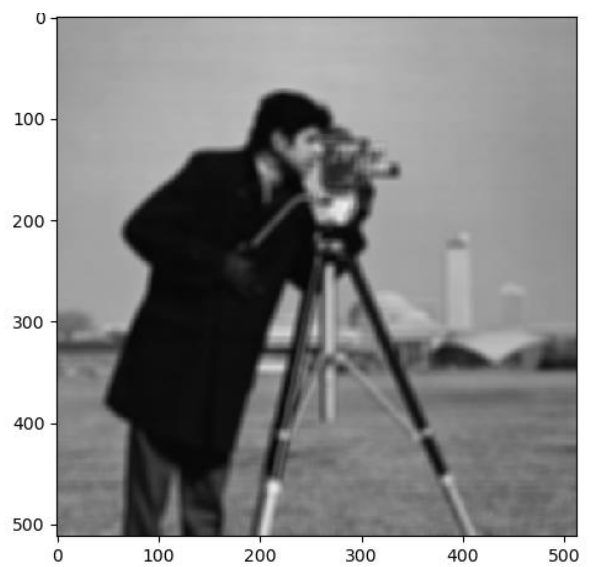
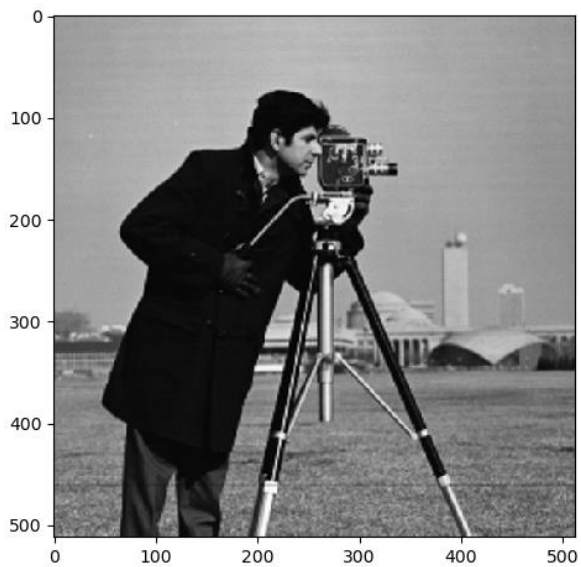
img01 = data.camera()
io.imshow(img01)
io.show()
img02 = ndi.gaussian_laplace(img01, 2)
io.imshow(img02)
io.show()
```

## Output:

### 1. Average filtering/Lowpass filtering

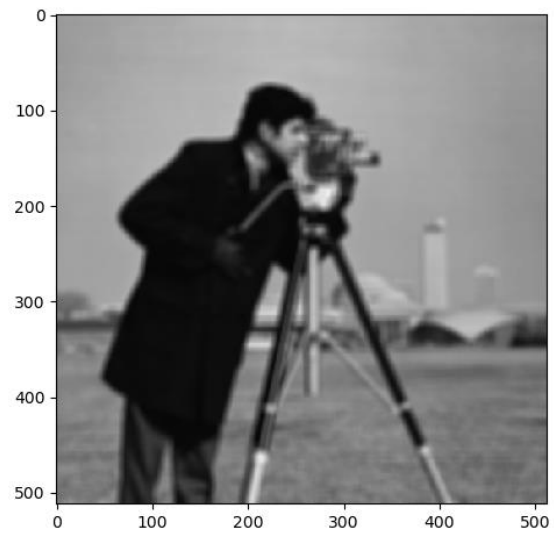
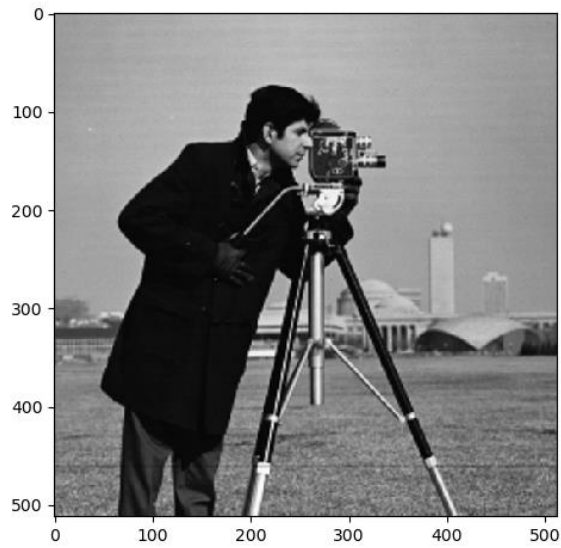


### 1b. Low pass filtering

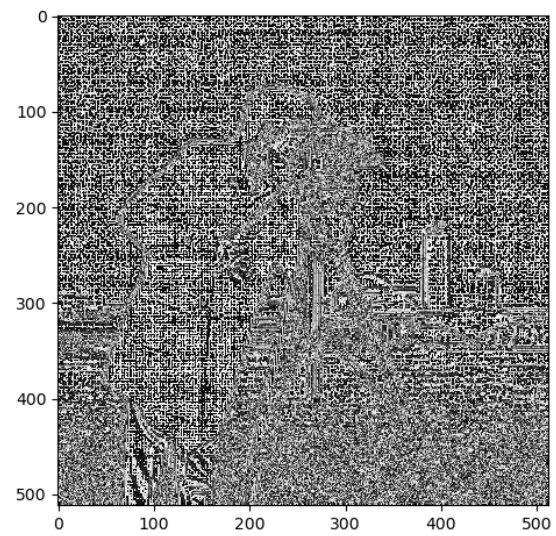
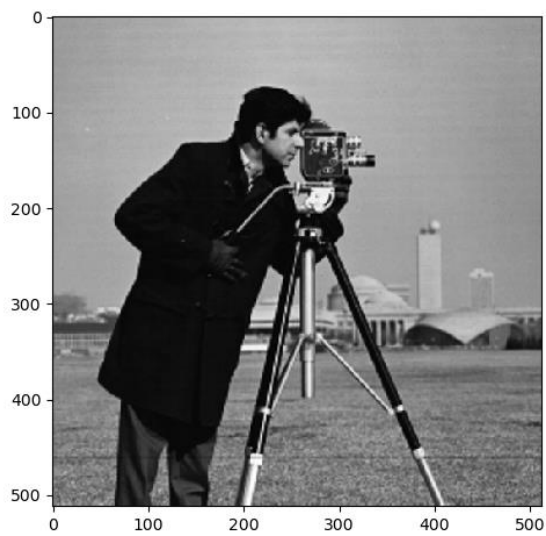




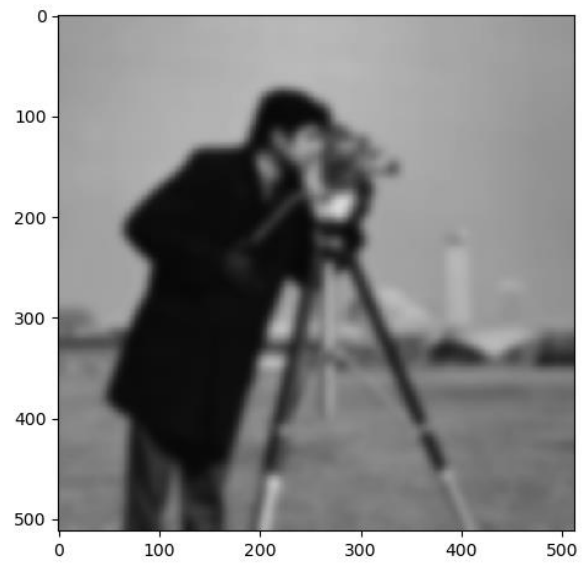
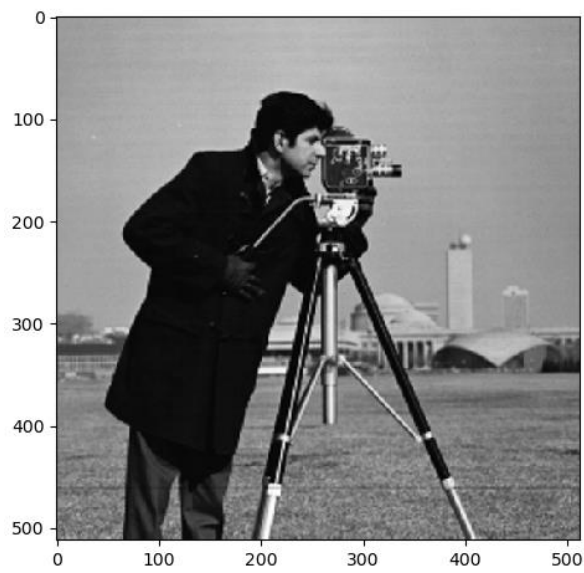
### 1c. Lowpass filtering with uniform filter



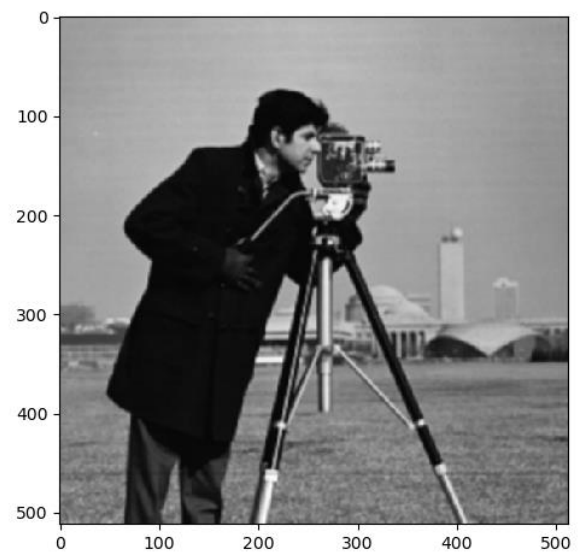
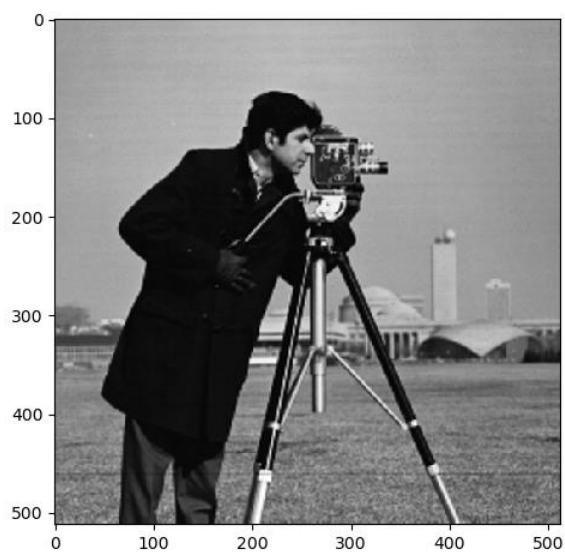
### 2. Highpass filter



### 3. Gaussian filter



### 3b. Gaussian lowpass filter





#### 4. Laplacian of Gaussian Filter

