

▼ Down sampling

```
import cv2
import matplotlib.pyplot as plt
import numpy as np

img=cv2.imread('/content/cameraman.tif',0)
type(img)

numpy.ndarray

#Size of image
[m,n]=img.shape
print(m,n)

512 512

#Ask sampling rate for down sampling from the user
f=int(input("Enter the down sampling rate: "))

Enter the down sampling rate: 2

img1=np.zeros((m//f,n//f),dtype=np.int)

for i in range(0,m,f):
    for j in range(0,n,f):
        try:
            img1[i//f][j//f]=img[i][j]
        except IndexError:
            pass

img1.shape

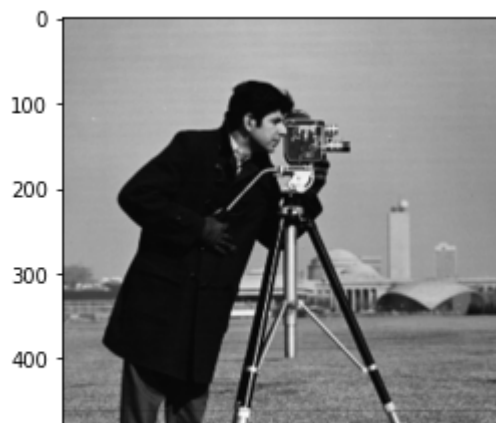
(256, 256)

cv2.imwrite('sampled_img.png',img1)

True

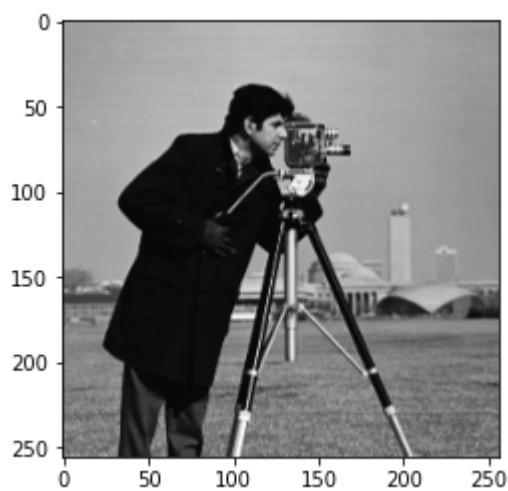
plt.imshow(img,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7fe58c0a6b00>
```



```
plt.imshow(img1,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7fe58a27f208>
```



▼ Up sampling

```
img2=np.zeros((m,n),dtype=np.int)
```

```
for i in range(0,m-1,f):  
    for j in range(0,n-1,f):  
        img2[i,j]=img1[i//f][j//f]
```

```
plt.imshow(img2,cmap='gray')
```

<matplotlib.image.AxesImage at 0x7fe58a1fd0b8>



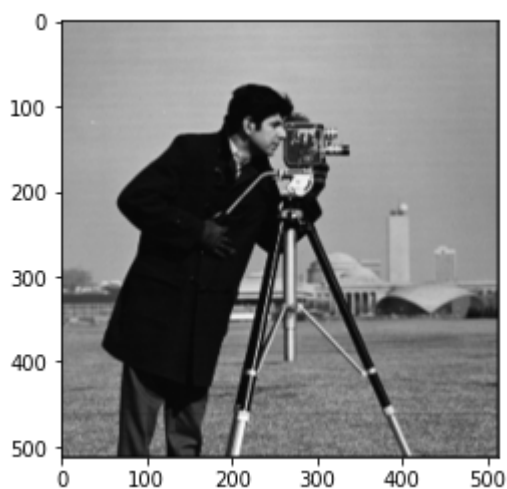
```
#Replicating rows
```

```
for i in range(1,m-1,f):  
    for j in range(0,n-1):
```

```
        img2[i,j]= img2[i-1,j]
```

```
plt.imshow(img2, cmap="gray")
```

<matplotlib.image.AxesImage at 0x7fe58a10e5f8>



```
#Replicating columns
```

```
for i in range(0,m-1):  
    for j in range(1,n-1,f):
```

```
        img2[i,j]= img2[i,j-1]
```

```
plt.imshow(img2, cmap="gray")
```

```
<matplotlib.image.AxesImage at 0x7fe58a0ea710>
```

