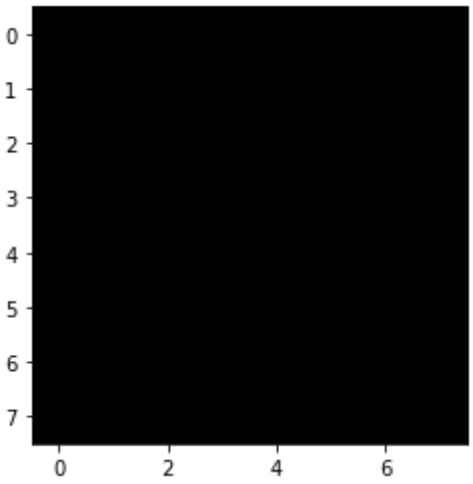
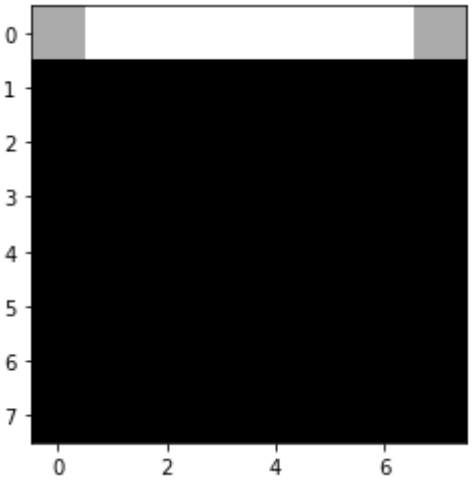
CO543 - Image Processing
Lab 03 - Filters
E/16/057 - Chamith U.K.D.K

Question 1 :

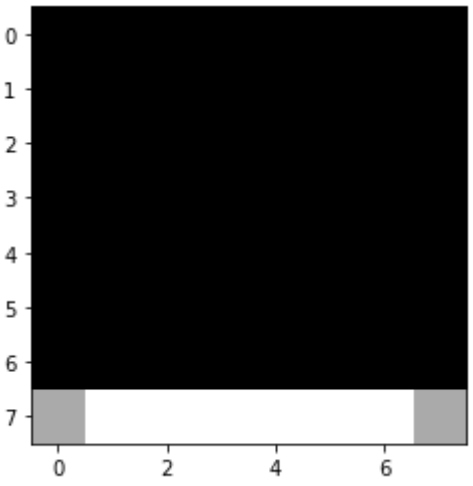
Original image



built in function



custom function



Array representation of above images

```
[[10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]
 [10 10 10 10 10 10 10 10]]
```

```
[[20 30 30 30 30 30 30 20]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]]
```

```
[[ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [20 30 30 30 30 30 30 20]]
```

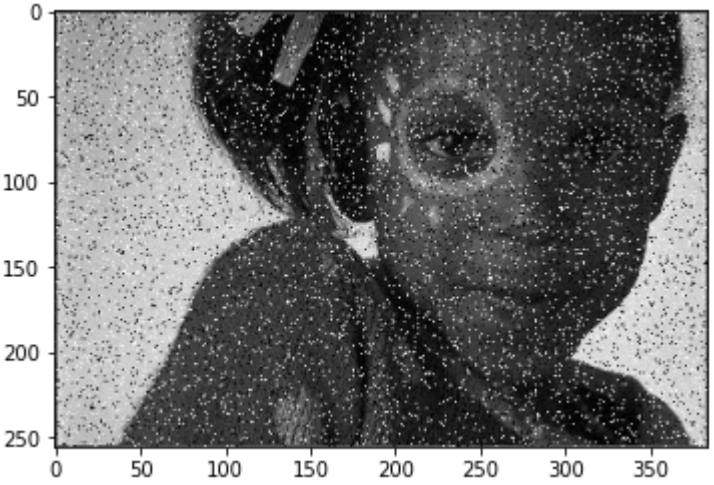
As you can see, there is a 180 degree rotation between the built in function result and custom function result. It is because OpenCV does not rotate the kernel by 180 degrees when applying the kernel. It assumes the kernel is already rotated when applying the result.

But theoretically we have to rotate the kernel by 180 degrees when applying convolution.

Question 2:

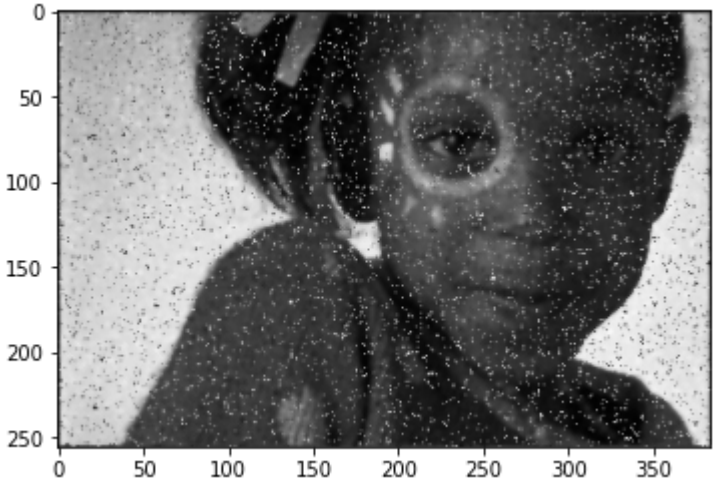
- **Bilateral filter with mask size 5 × 5**

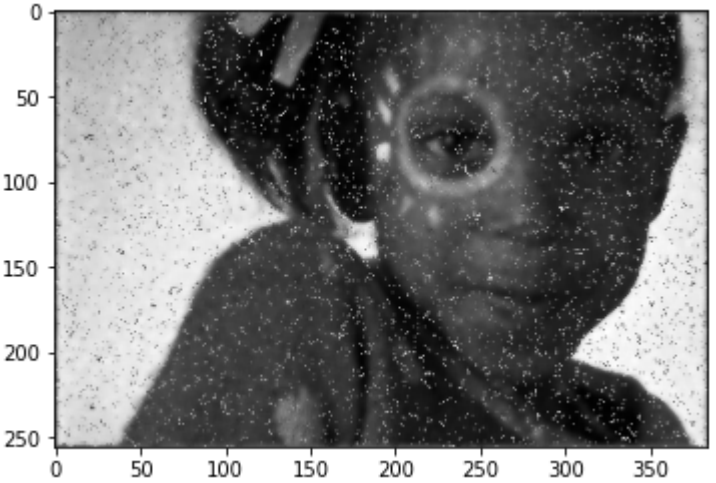
Original image



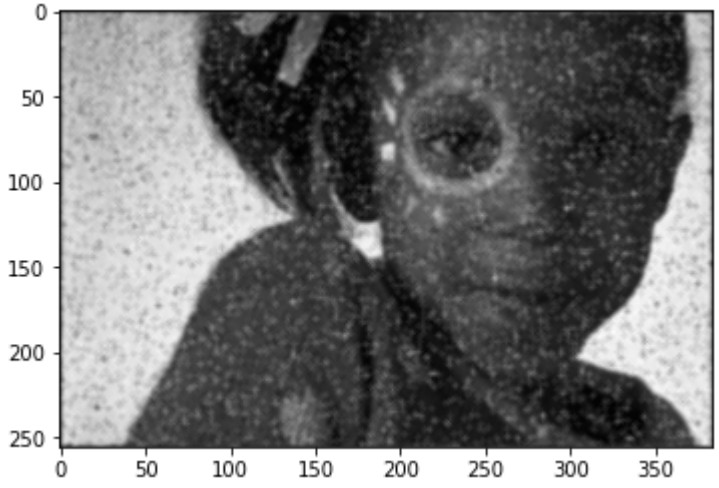
Built-in function custom function

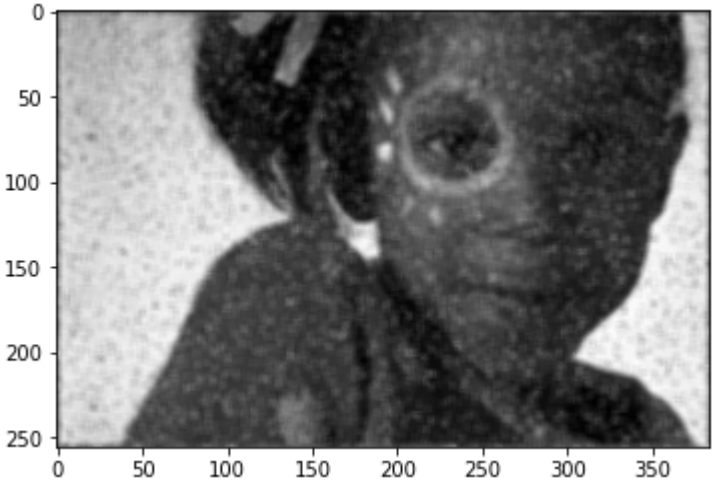
Using sigma d = 100 and sigma r = 50





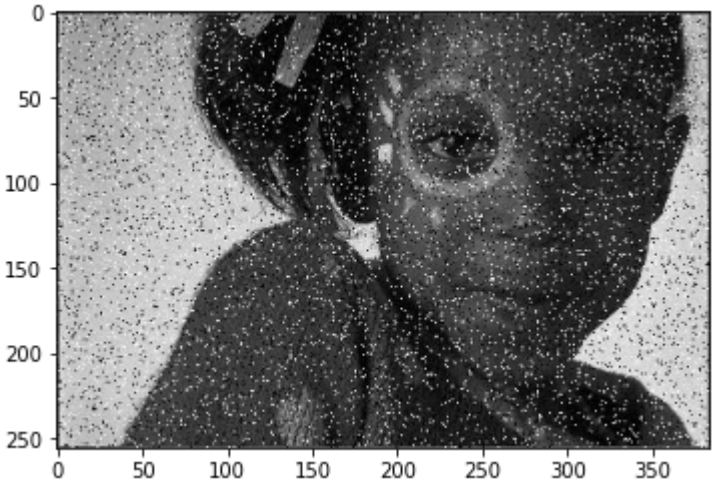
Using sigma d = 350 and sigma r = 100

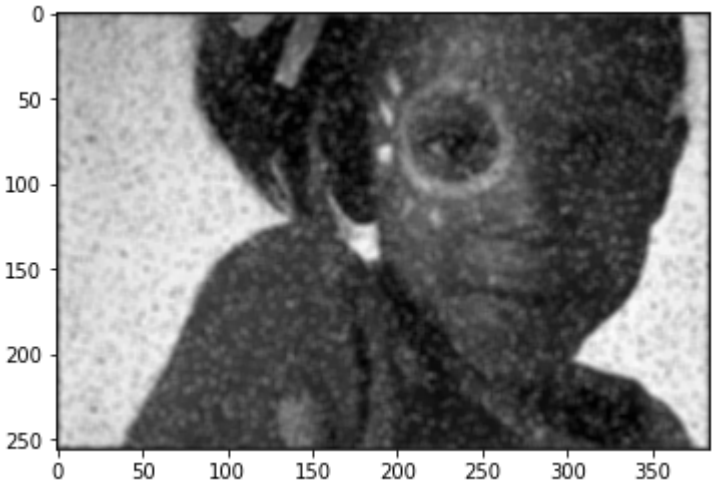




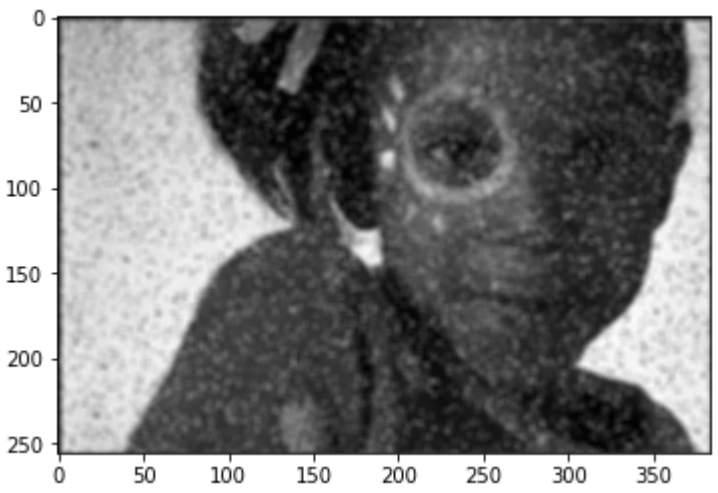
- **Gaussian filter with mask size 5 × 5**

Original image





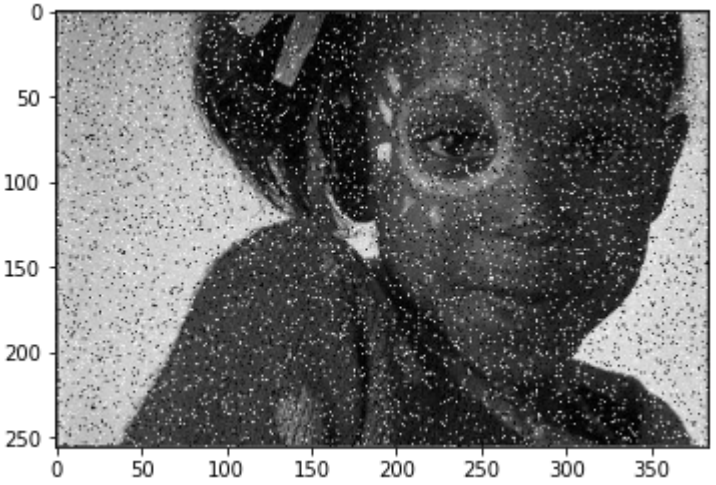
Using built-in function with sigma=2



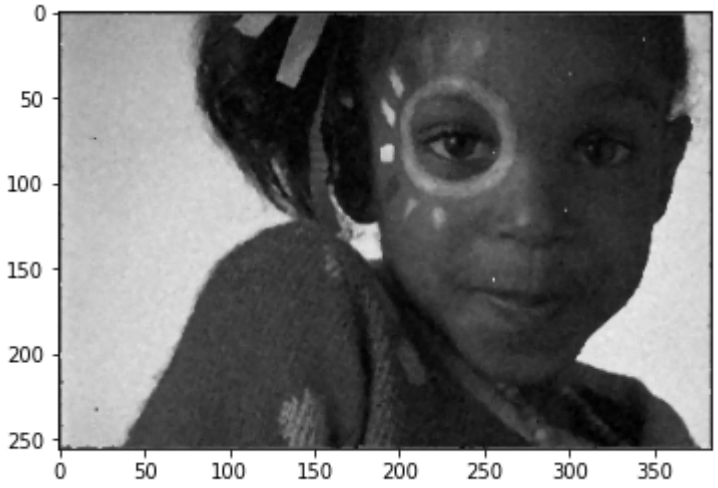
Using custom function with sigma=2

- **Median filter of appropriate window size**

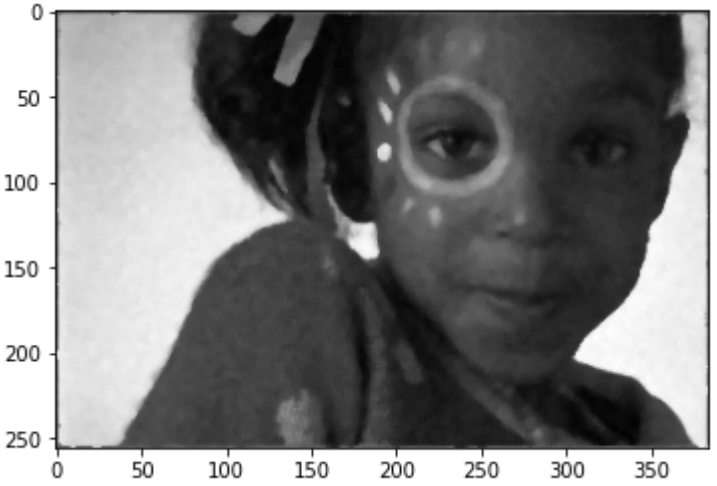
Original image



Using built in function

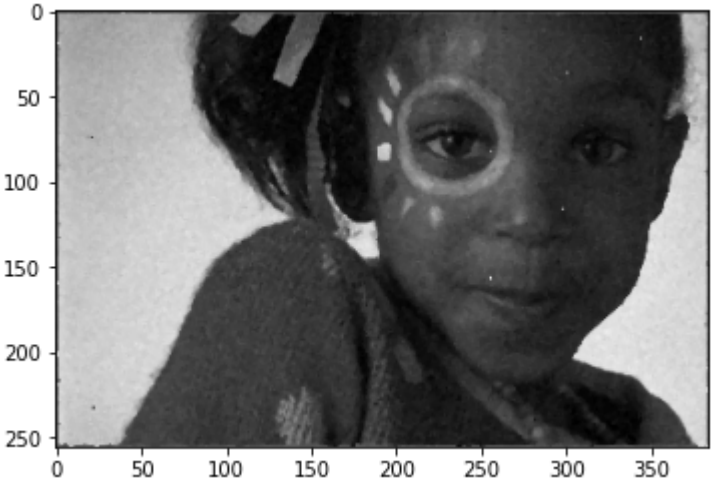


Window size = 3

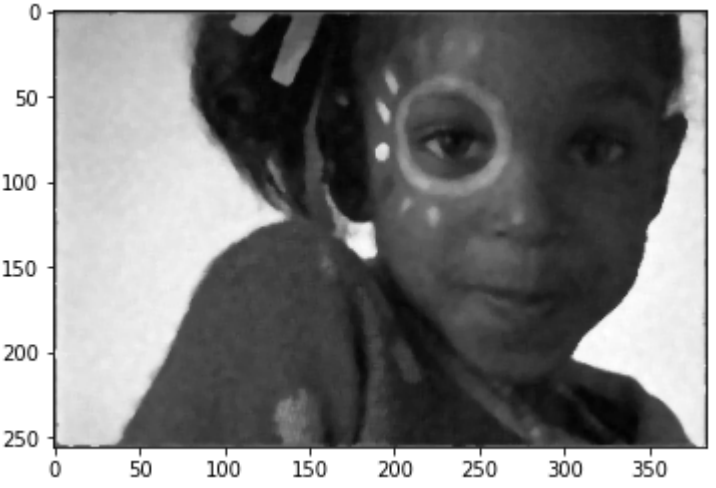


Window size = 5

Using custom function



Window size = 3



Window size = 5