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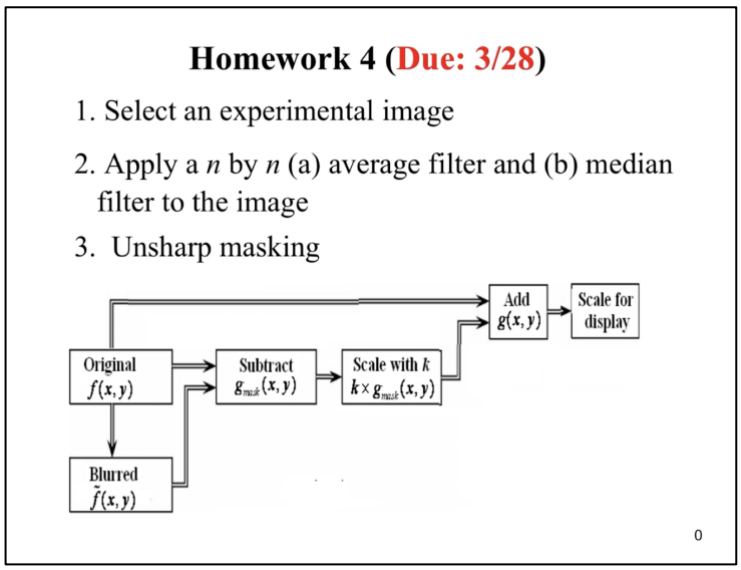
(1) Assignment statement

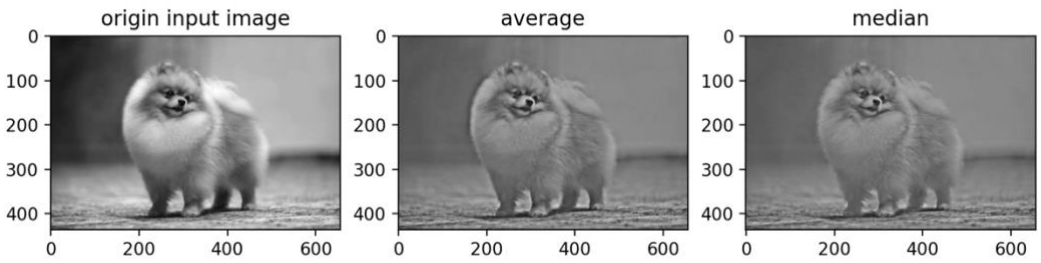


(2)

(a) Input/output images

Input:

Output:



(b) Source code

hw4.py hw3.py

hw4.py > ...

```python
import sys
import numpy as np
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
import skimage.exposure as ex
import skimage.io as io
import scipy.ndimage as ndi

x = mpimg.imread(sys.argv[1])
x = x[:,:,0].astype(float)

n = 25
k = 2

cf = ndi.uniform_filter(x, [n, n])
cf = cf.astype(float)
sub = x-cf
sub = sub*k
add = sub+x
min = np.min(add)
max = np.max(add)
cff = (add-min)/(max-min)
cff *= 255
cff = np.array(cff).astype(np.uint8)

cf2 = ndi.median_filter(x, size=(n, n))
cf2 = cf2.astype(float)
sub2 = x-cf2
sub2 = sub2*k
add2 = sub2+x
min2 = np.min(add2)
max2 = np.max(add2)
cf2f = (add2-min2)/(max2-min2)
cf2f *= 255
cf2f = np.array(cf2f).astype(np.uint8)
```

```
36
37  plt.subplot(1, 3, 1)
38  plt.imshow(x, cmap='gray')
39  plt.title("origin input image")
40
41  plt.subplot(1, 3, 2)
42  plt.imshow(cff, cmap='gray')
43  plt.title("average")
44
45  plt.subplot(1, 3, 3)
46  plt.imshow(cf2f, cmap='gray')
47  plt.title("median")
48
49  plt.show()
```

(c) Comments

不同的 n 值有不同的效果，經過嘗試後，n 的值我選擇 25。n 等於 25 的情況下，圖中動物被處理過後會有較為清晰的邊緣，而整張圖大致的明暗對比看起來會變小。另外，為了避免像素值超過 0~255，這次我也先將圖片像素值轉型為 float，計算後再轉回 uint8 的型別。