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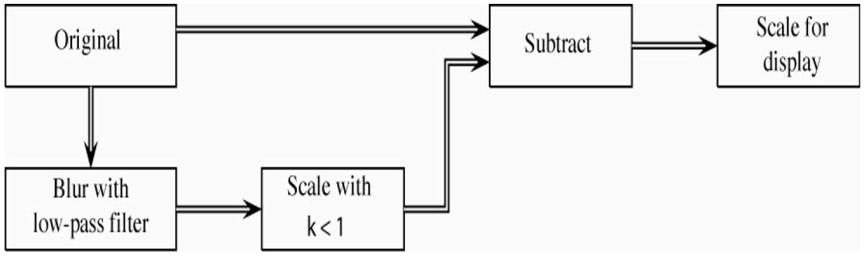
PROBLEM STATEMENT

Homework 4

1. Select an experimental image
2. Apply a 3 by 3 (a) average filter and (b) median filter to the image
3. Unsharp masking



EXPERIMENTAL RESULTS

Input image

3x3 Average filter

3x3 Median filter

Unsharp masking

SOURCE CODE

```
import cv2

img = cv2.imread("input.jpeg")

avg_filtered_img = cv2.blur(img, (3, 3))
cv2.imwrite('./output-avg.jpeg', avg_filtered_img)
```

```
me_filtered_img = cv2.medianBlur(img, 3)
cv2.imwrite('./output-me.jpeg', me_filtered_img)

low_pass_filtered_img = cv2.GaussianBlur(img, (3, 3), 0)
filtered_scaled_img = low_pass_filtered_img * (k := 0.9)
usm_img = img + (img - filtered_scaled_img)
cv2.imwrite('./output-usm.jpeg', usm_img)
cv2.imwrite('./output-mask.jpeg', img - filtered_scaled_img)
```

COMMENTS

1. 整理獲得 unsharpened image 的方法為：$\text{image} + (\text{image} - \text{blurred} \times k)$，其中 k 為 scaling factor。
2. 在過程中將加回原 image 的數值存起來得到以下圖片，可以看到愈平滑的地方愈黑，而石頭和手部不知道是不是因為紋路複雜，保留蠻多顏色的，導致最後加回原圖後這些部分變亮。