

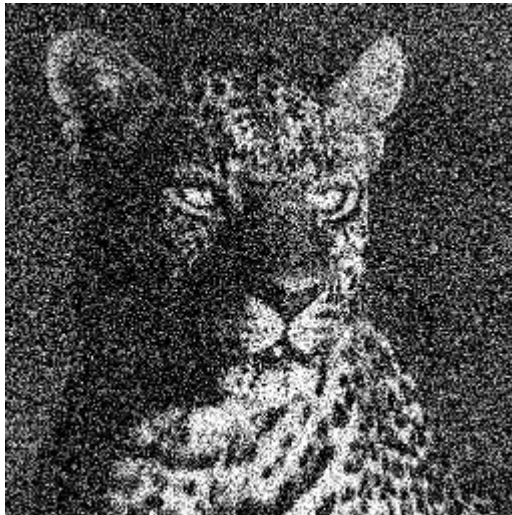
Assignment 06, Problem-3 b):

**I) Remove noise from leopard.pgm.:**

In-order to remove noise from the image, we need to **apply lowpass filters** as it removes high frequency and let low frequency pass.

We experiment here for different values of sigma i.e. (2, 3, 5).

The results are attached below: we can see that the noise have been removed.



Left: Original Image



Right: Lowpass filter with sigma = 2.



Left: Lowpass filter with sigma = 3



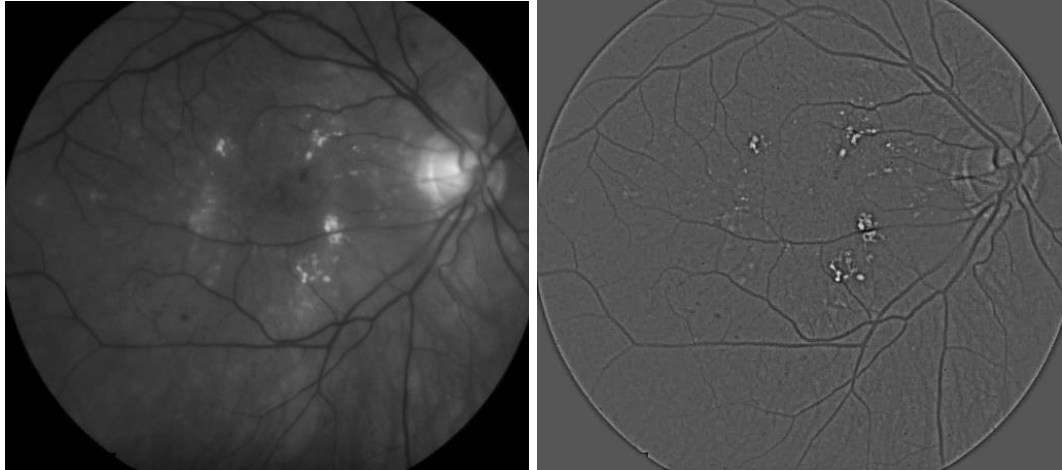
Right: Lowpass filter with sigma = 5

## II) **Remove background structures from angiogram.pgm:**

As we know, to remove background structures we need to apply highpass filters as it subtracts a Gaussian-smoothed version from the original image. Highpass filters removes low frequency and let high frequency pass.

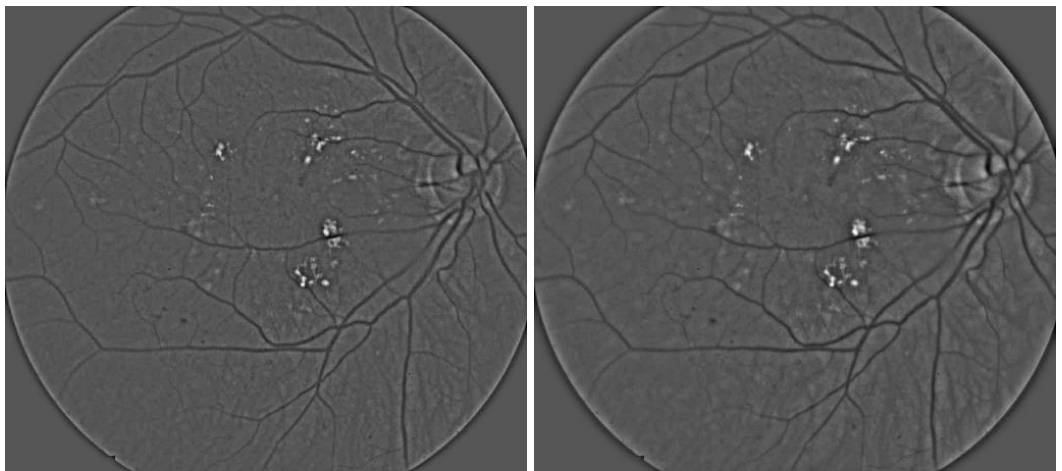
We experiment here for different values of sigma i.e. (2, 3, 5).

The results are attached below: we can see that the low frequency background structures have been removed.



Left: Original Image

Right: Highpass filter with sigma = 2.

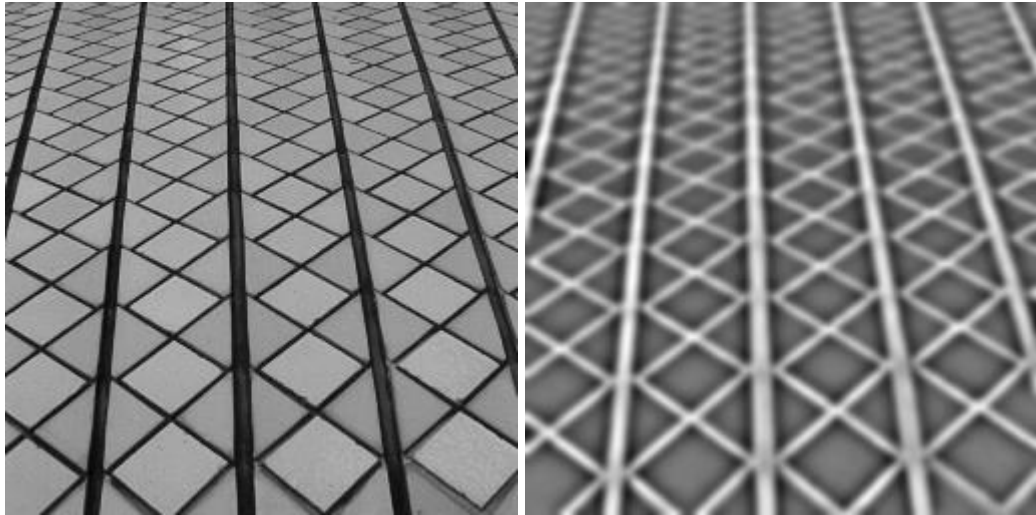


Left: Highpass filter with sigma = 3.

Right: Highpass filter with sigma = 5.

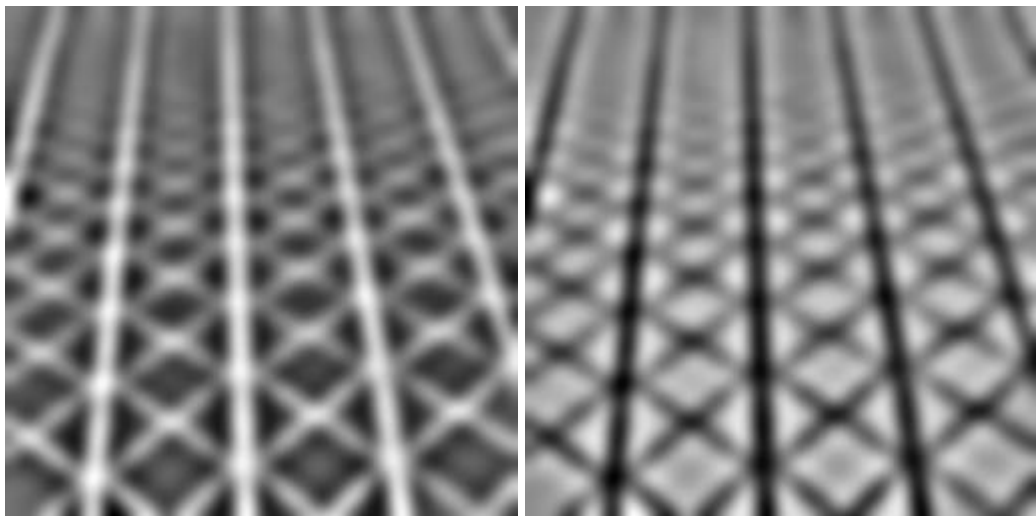
### III) Isolate the dark gaps between the tiles in tile.pgm.

Here we use Bandpass filters as we know it is useful to extracting different image structures, as it is obtained by subtracting two lowpass filters. We can see from the results below that the dark gaps between the tiles were isolated successfully for different combination of gamma 1 and gamma 2.



Left: Original image tile.pgm

Right: Bandpass filter with  $\sigma_1 = 2$  and  $\sigma_2 = 5$ .



Left: Bandpass filter with  $\sigma_1 = 5$  and  $\sigma_2 = 8$ .

Right: Bandpass filter with  $\sigma_1 = 8$  and  $\sigma_2 = 5$ .

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