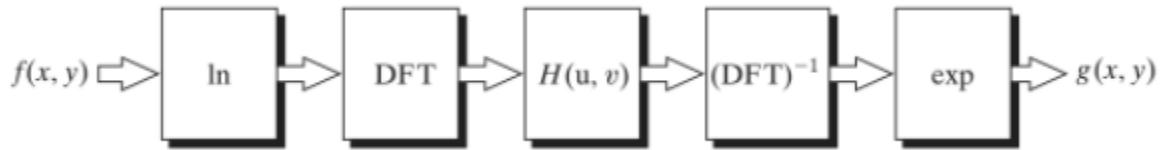


# Homomorphic Filtering

Steps involved



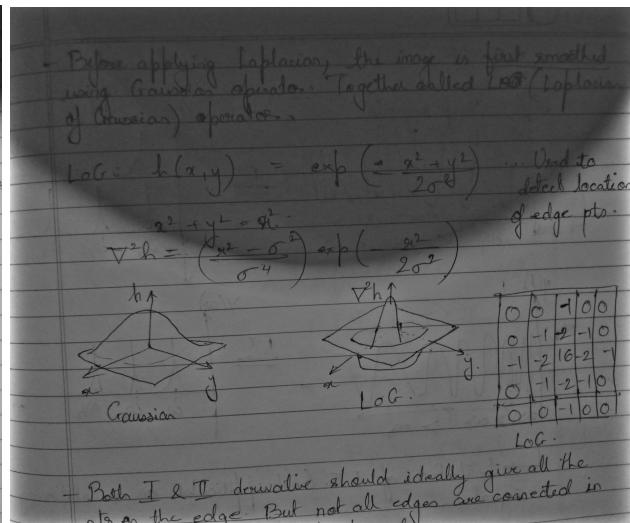
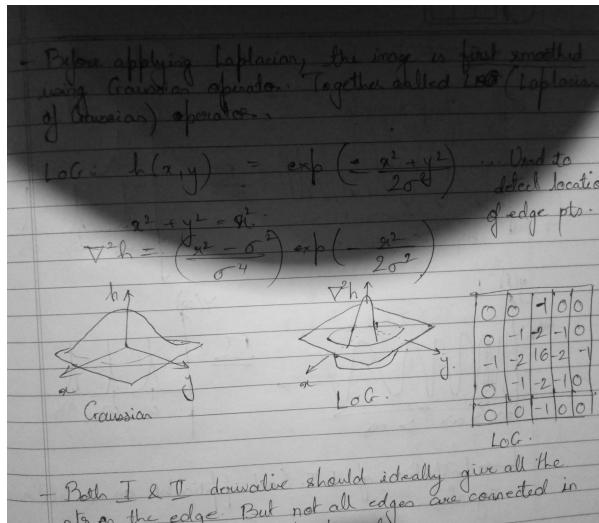
Filter  $H(u, v)$ :

$$H(u, v) = (\gamma_H - \gamma_L) \left[ 1 - e^{-c[D^2(u, v)/D_0^2]} \right] + \gamma_L$$

\*Images up till here taken from Digital Image Processing, Gonzales and Woods.

If  $\gamma_H > 1$  and  $\gamma_L < 1$ , the filter function tends to attenuate the contribution made by the low frequencies (illumination) and amplify the contribution made by high frequencies (reflectance). The net result is simultaneous dynamic range compression and contrast enhancement.

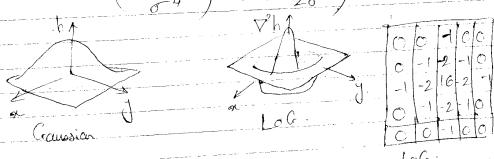
## Results



- Before applying Laplacian, the image is first smoothed using Gaussian operator. Together called LoG (Laplacian of Gaussian) operator.

$$\text{LoG: } h(x,y) = \exp\left(-\frac{x^2+y^2}{2\sigma^2}\right) \quad \text{Used to detect location}$$

$$h = \left(\frac{x^2 - y^2}{\sigma^4}\right) \exp\left(-\frac{x^2+y^2}{2\sigma^2}\right) \quad \text{of edge pts.}$$



$$\begin{matrix} 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 6 & 0 \\ 0 & 0 & 0 & 0 \end{matrix}$$

LoG

- Both I & II derivative should ideally give all the edges. But not all edges are connected in state. The edge. But not all edges are connected in state.

Figure 1. (a) Original Image clicked on smartphone. (b) Filtered image. gammaH = 3, gammaL = 0.9, c = 0.3 (c) Thresholding operation on the image in (b), threshold = 53.

I learned the concept of homomorphic filters and got hands-on experience through this small experiment.

## Code

Here is the [link](#) to the code.

## References

- Digital Image Processing, Gonzales and Woods
- <https://stackoverflow.com/questions/24731810/segmenting-license-plate-characters>