Part3

Localized Blurring

- Step 1: Apply Gaussian blurring to the entire image
- Step 2: Compute the final image as a weighted average of the blurred and original image

$$I'(x,y) = w(x,y) * I_b(x,y) + (1 - w(x,y)) * I(x,y)$$

where I, I_b and I' are the initial, blurred and final images respectively, w is the weight and (x,y) is the pixel location

Computing Weights

- Weight should be maximum at the clicked point and decrease on moving away
  - Easiest to use standard distributions
- Gaussian Distribution:

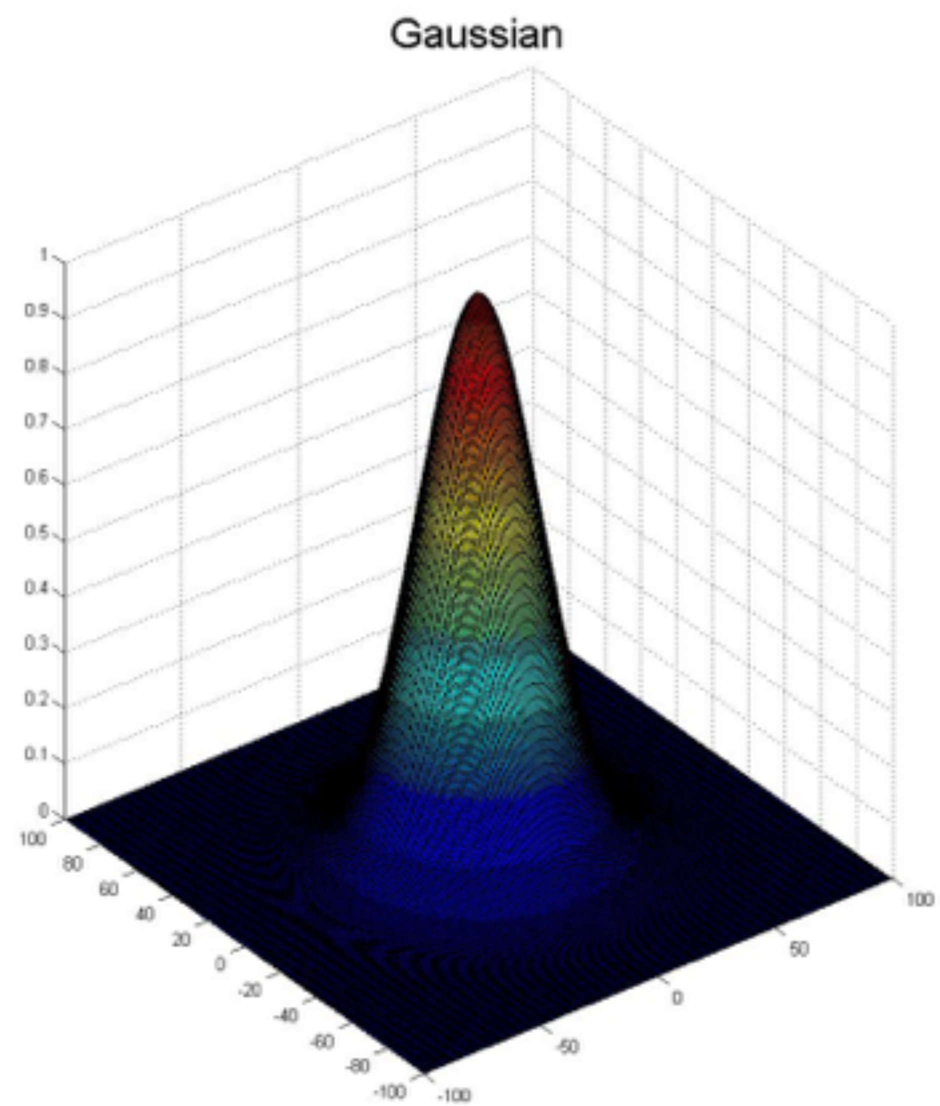
$$w(x,y) = \exp\left(-((x - x_0)^2 + (y - y_0)^2)/\sigma^2\right)$$

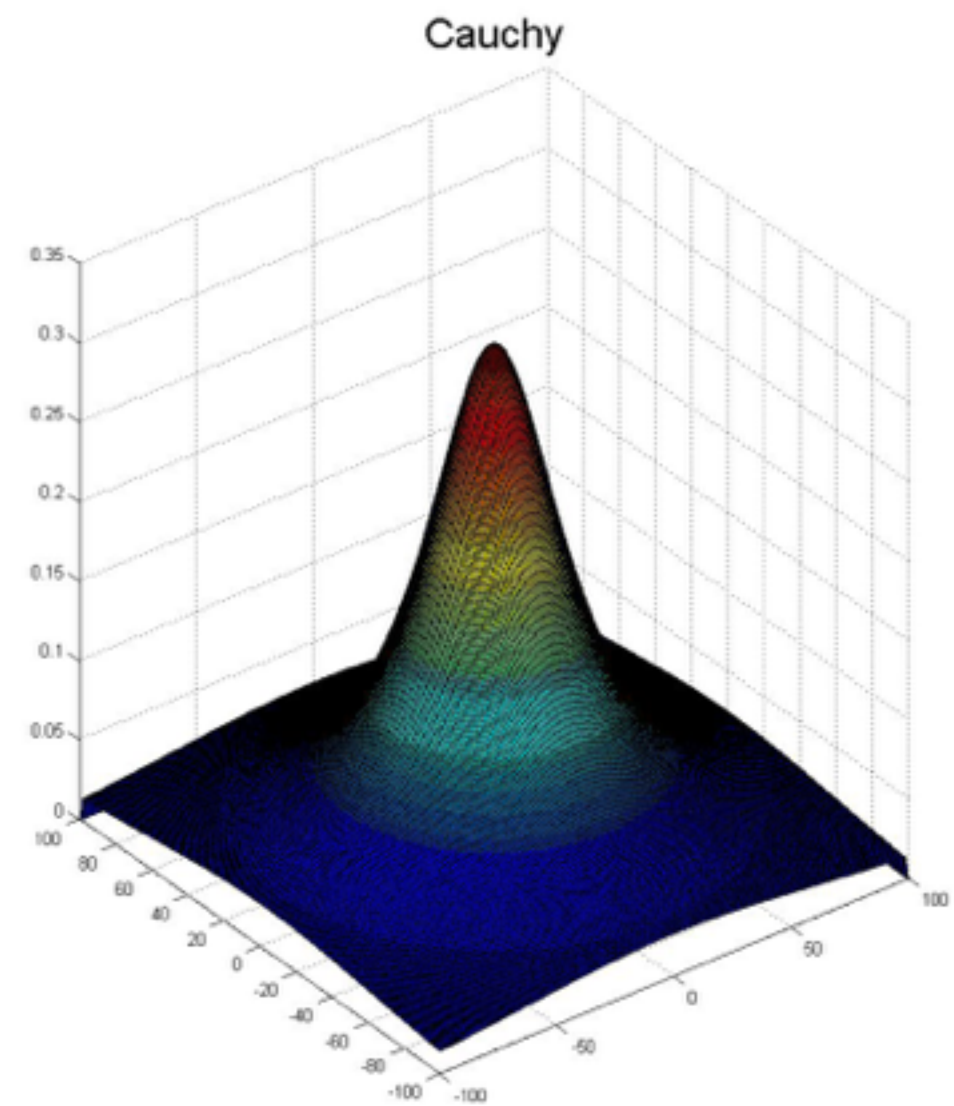
- Cauchy Distribution:

$$w(x,y) = 1/(1 + ((x - x_0)^2 + (y - y_0)^2)/\sigma^2)$$

- where (x_0, y_0) is the clicked point and σ is the standard deviation

Distribution Shapes





Implementation Trick

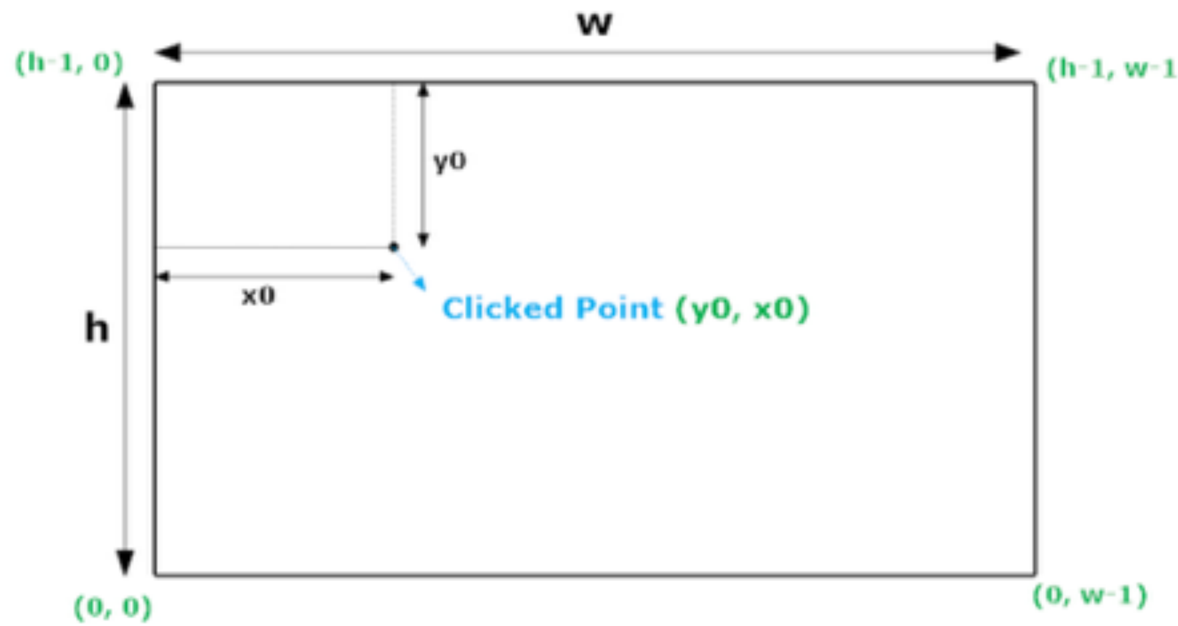
First, compute Gaussian/Cauchy mask

- The mask should be twice as large as the image, $((2*w+1) \times (2*h+1))$
- Translated center point remains within its bounds

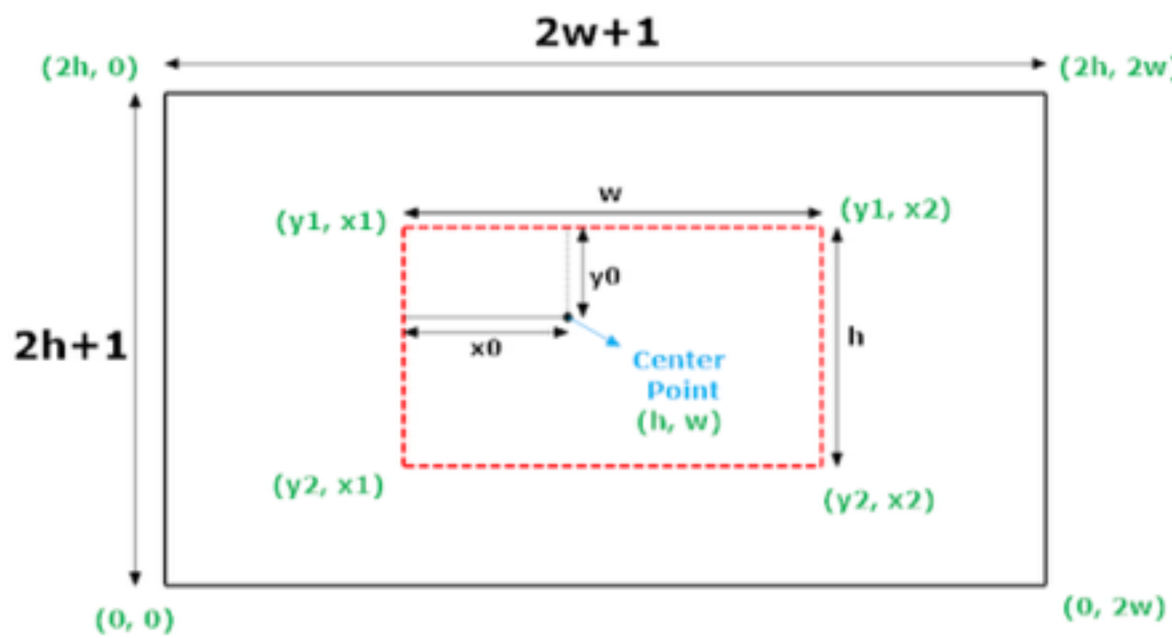
Then, extract a region from the mask

- Same size as the image
- Center of the mask is at the same location within this region as the chosen point in the image.

Translating the Mask (cont'd)

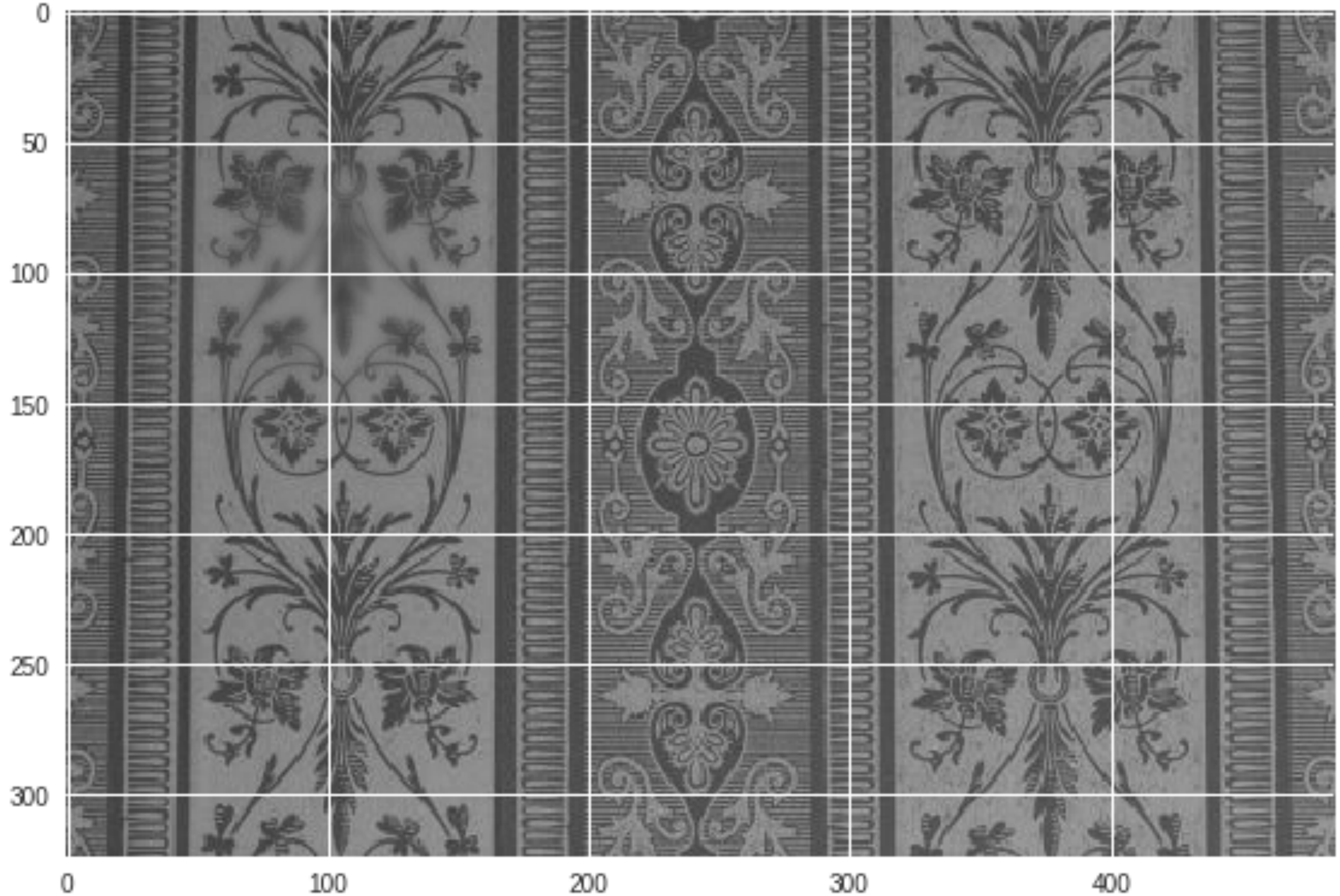


Original image with width *w* and height *h* showing the clicked point (point indices in green)



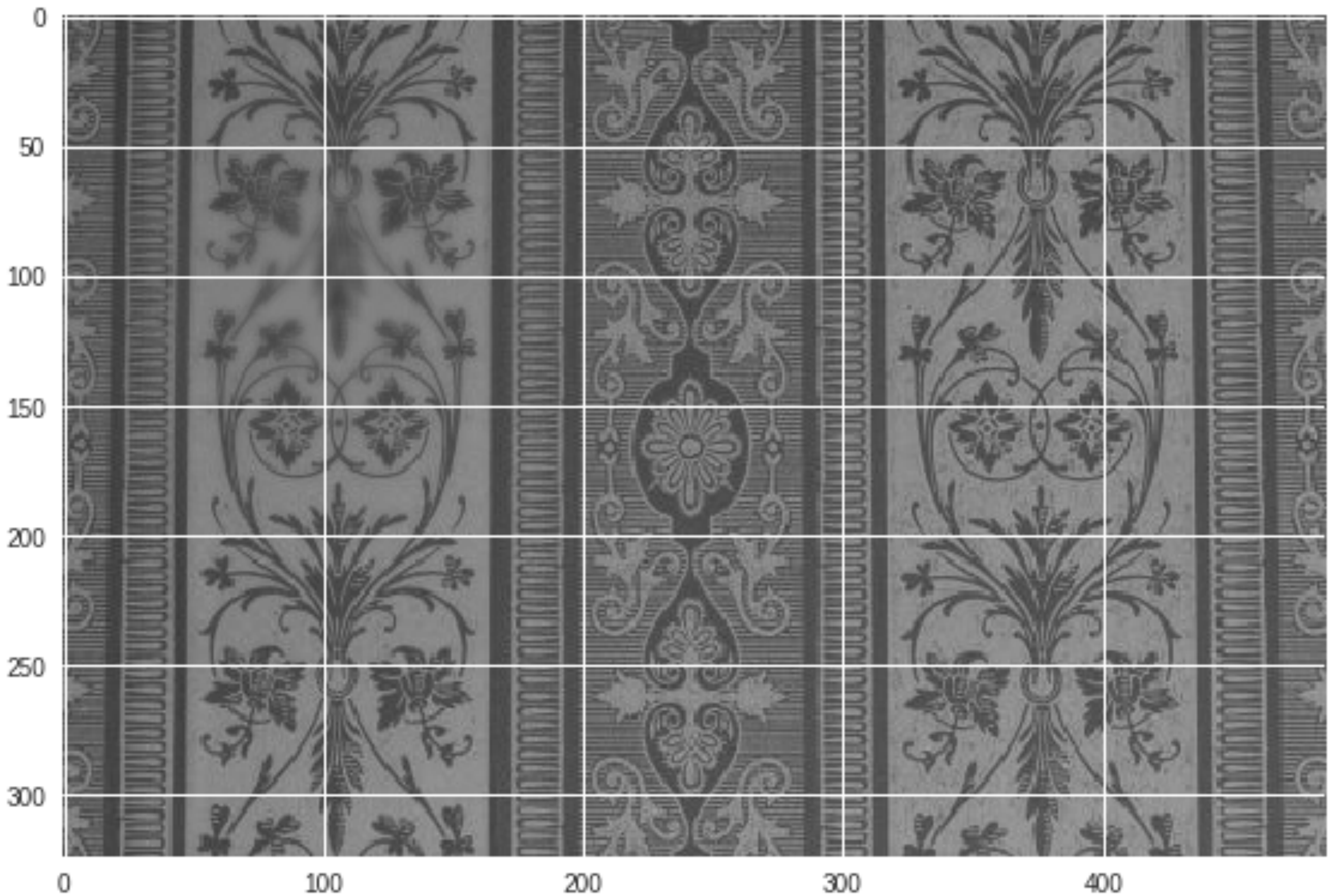
Mask with width *2w+1* and height *2h+1* showing the region to extract with red dashed lines (point indices in green)

Expected Behaviour



x=100,y=100,sigma=50,Gaussian kernel

Expected Behaviour



x=100,y=100,sigma=50,Cauchy kernel