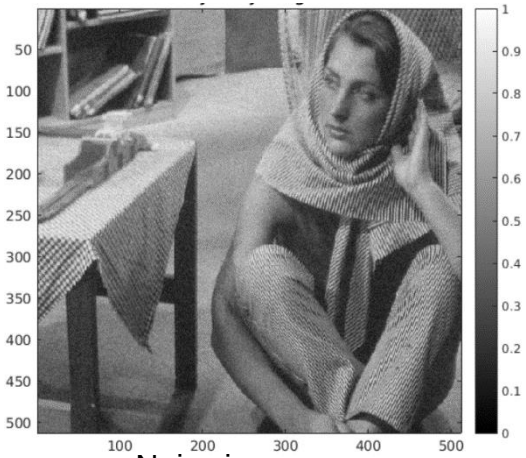
## Question 3 REPORT

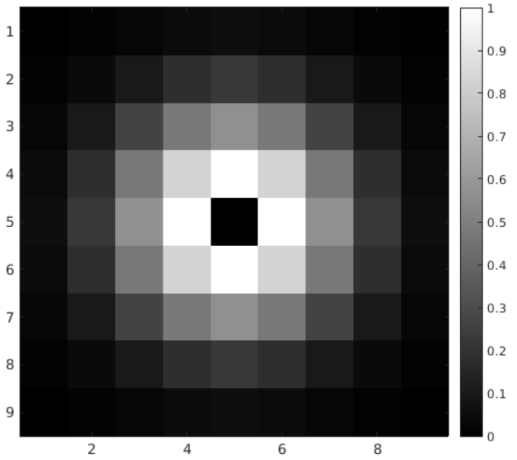
To make the patches isotropic, clipped Gaussian weights are used. The pixel, where filtered intensity is to be described, is not used in calculations to make calculations faster. Hence weight for it is 0. Hence the black dot at centre of below mask images. As per the shape of base patch, other patches in window are selected and those which do not meet the criteria are not used. If division by zero occurs, that pixel intensity, is replaced by original pixel intensity. Weights are shown for specific pixels to visualise how well algorithm identified patterns such as grass edge, chequered cloth and honeycomb.

Original image

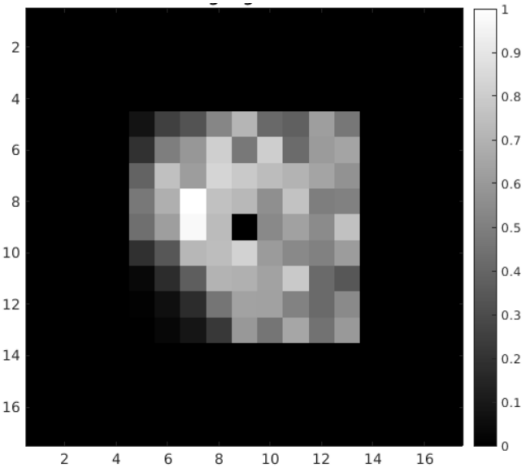


Noisy image

Filtered image

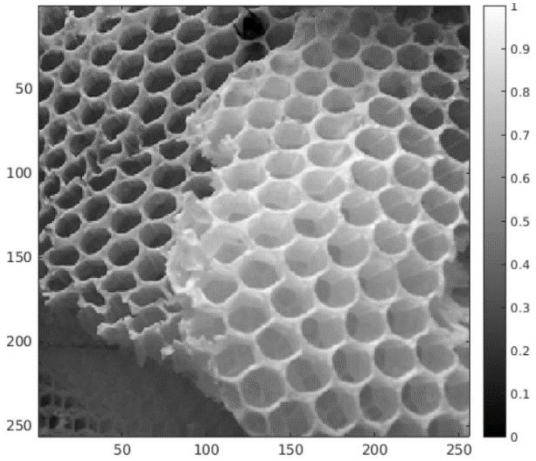


Mask for Barbara

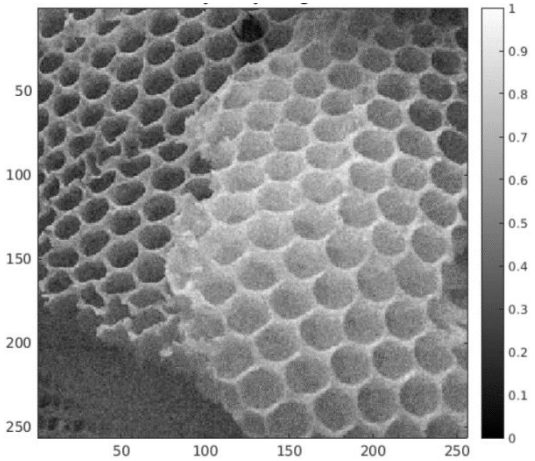


Weights for table cloth

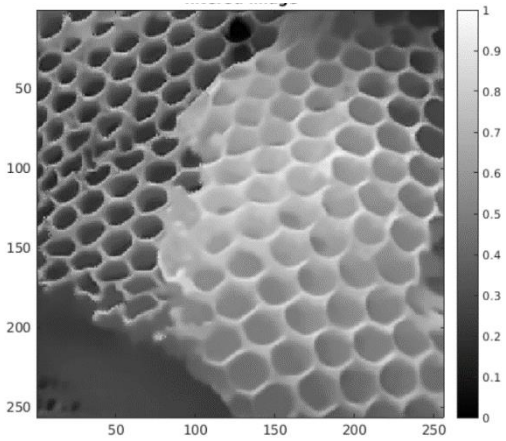
Image: '2/data/barbara.mat' Runtime: 75.01s
Gaussian patch std: 5.3 Optimal std (h) = 5.94 RMSD at optimal std = 3.152 RMSD at 0.9*std = 3.157 RMSD at 1.1*std = 3.188



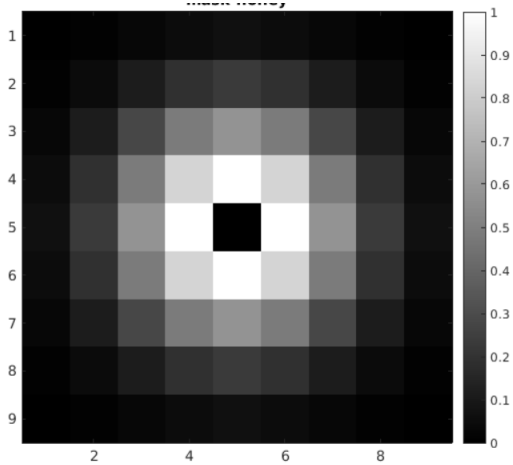
Original image



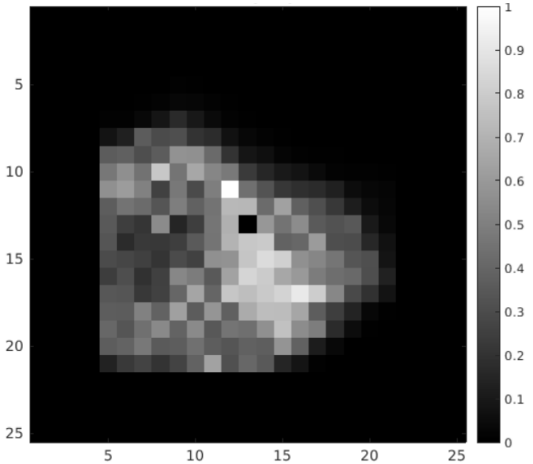
Noisy image



Filtered image

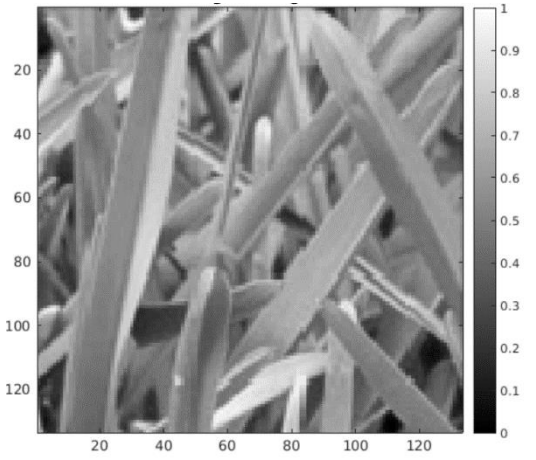


Mask for honeycomb

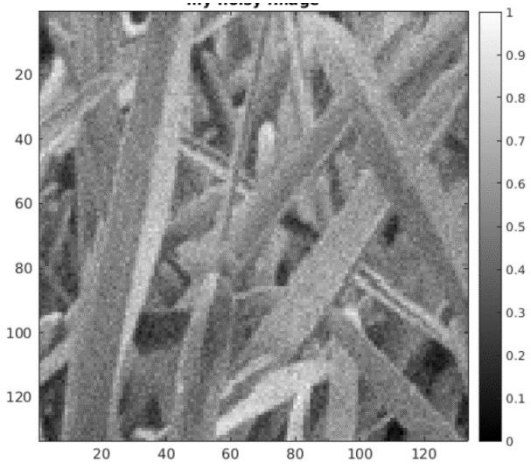


Weights for honeycomb

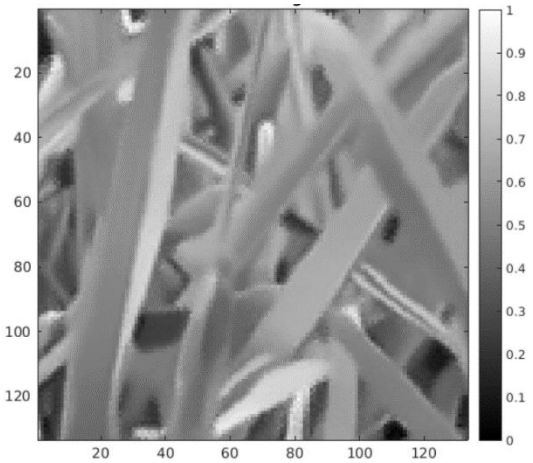
Image: ‘2/data/honeyCombReal.png’ Runtime: 56.29s
Gaussian patch std $\sigma$: 5.5
Optimal std (h) = 14.63 RMSD at optimal std =10.347 RMSD at 0.9*std = 10.369 RMSD at 1.1*std = 10.478



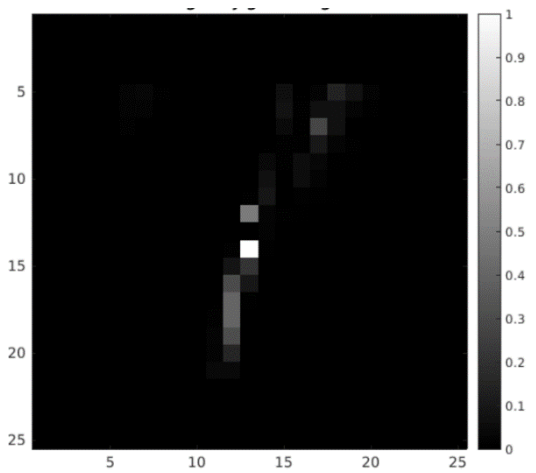
Original image



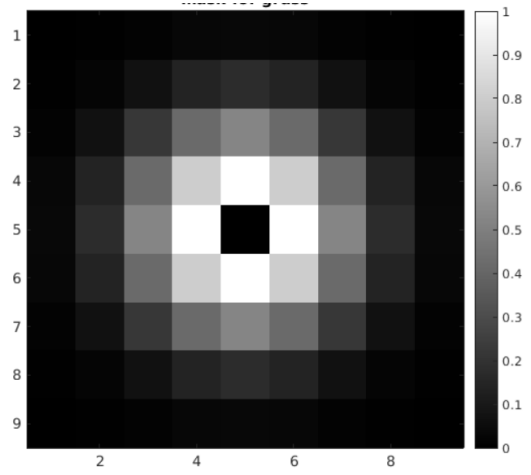
Noisy image



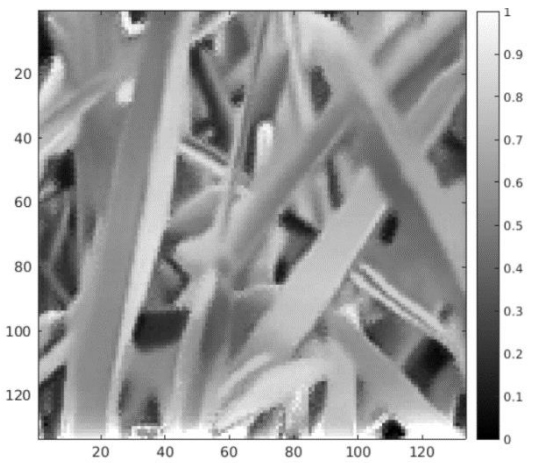
Filtered image



Grass edge weight



Mask Grass



Histogram equivalized filtered image

Image: ‘2/data/grass.png’ Runtime: 15.4s Gaussian patch std: 4.6
Optimal std (h) = 13 RMSD at optimal std =10.12 RMSD at 0.9*std = 10.152 RMSD at 1.1*std = 10.26 RMSD after Clahe: 6.19

Since intensities were not spread, I have performed histogram equalization on filtered image and it improves RMSD as can be seen above. As per the observations, if parameter h is decreased noise remains in filtered image and as h increases, over smoothing with loss of features is observed.