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Computational neuroscience
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Homework 1

d). The variable type is uint8 (Unsigned Integers of 8 bits), and the range of data is from 0 to 255.

g). Size_y is the number of rows in the matrix*(ie. number of pixels in the y-dimension).*

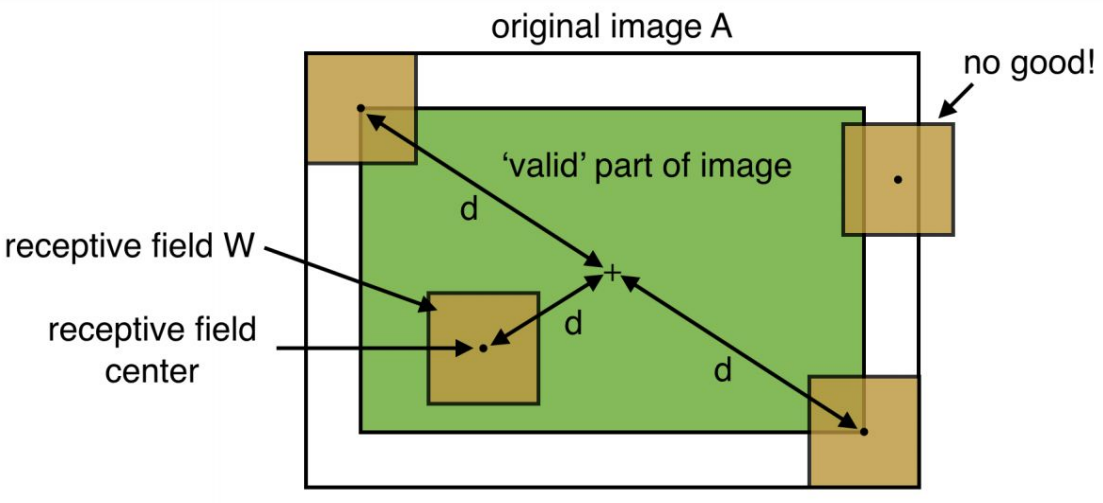
Size _x is the number of columns in the matrix *(ie. number of pixels in the x-dimension).*

Imcenter_y and Imcenter_x are the row and column which the center pixel is located at and are rounded to the nearest integers towards infinity.

h). X is a 41x41 matrix

Y is also a 41x41 matrix

i). The size of the valid part is 764928 pixel^2. I subtracted 2*k from both length and width of the original image. Therefore, the width is size_y-2*k and the length is size_x-2*k.



j). Euclidean distance d is 627.4536.

k).This step is calculating sigma, which is the standard deviation of Gaussian function. As the euclidean distance increases, the sigma will be larger, and the blurriness increases, which corresponds to that retinal ganglion cells in the peripheral tend to have larger receptive fields than those at the fovea.

W is the convolution kernel of the retinal ganglion cell whose receptive field center is that pixel.

And the third line is to normalize the convolution kernel and make sure that the sum of it equals to 1.

q). The elapsed time is 22.87 seconds.

Figure 1.

Figure 2&3