Intro to Intelligent Systems
Assignment 5

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1 Assignment 1

We can see in figure 1 that adding some noise actually benefits the edge detection using derivatives, as long as it is just a tiny bit of noise. Any big noise will just make the algorithm its work impossible. Delusion isn't helped by noise at all.

The same effect of noise on the derivatives made by the Prewitt algorithm, can be seen in figure 2. Same deal with the other two methods as seen in 3 and 4.

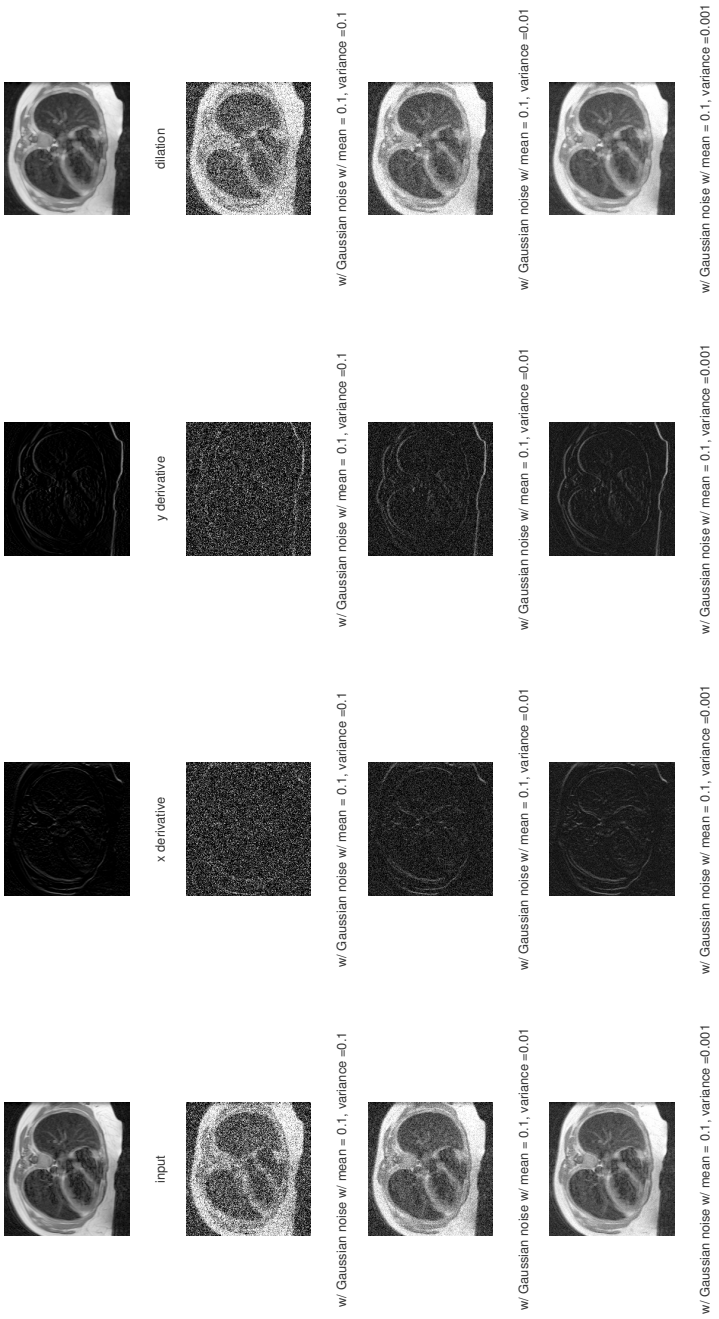

Figure 1: Plots for exercise 1

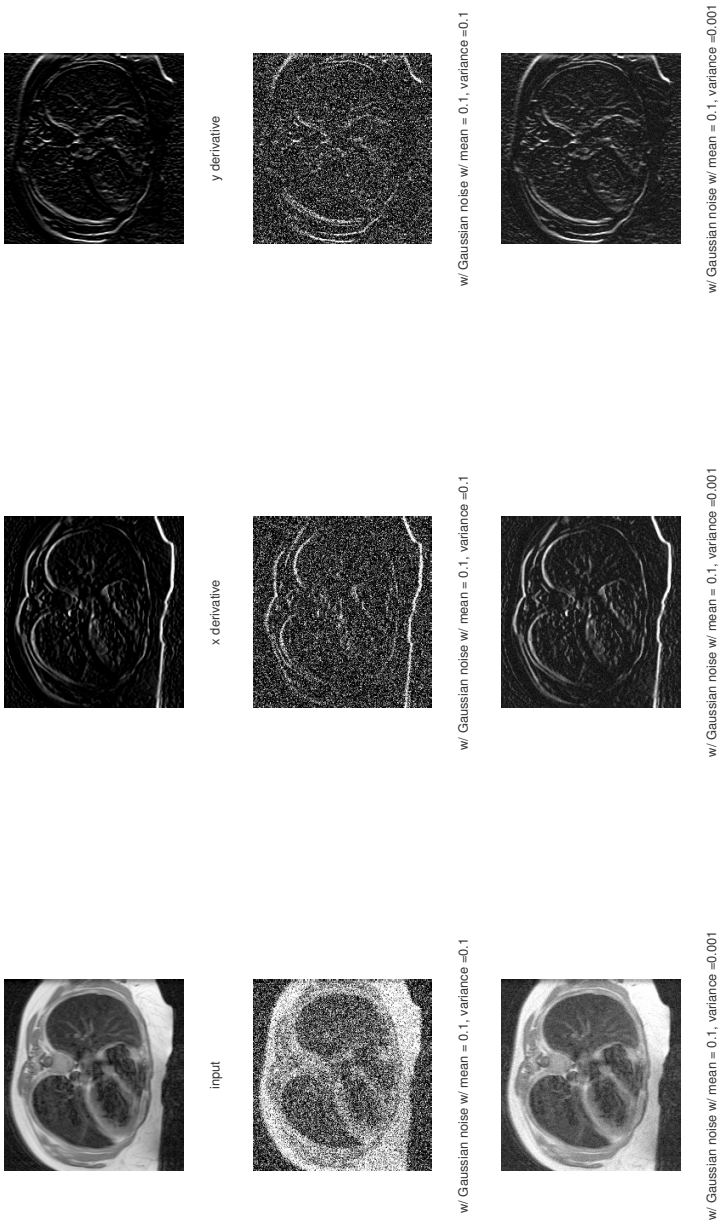

Figure 2: Plots for exercise 1, using Prewitt

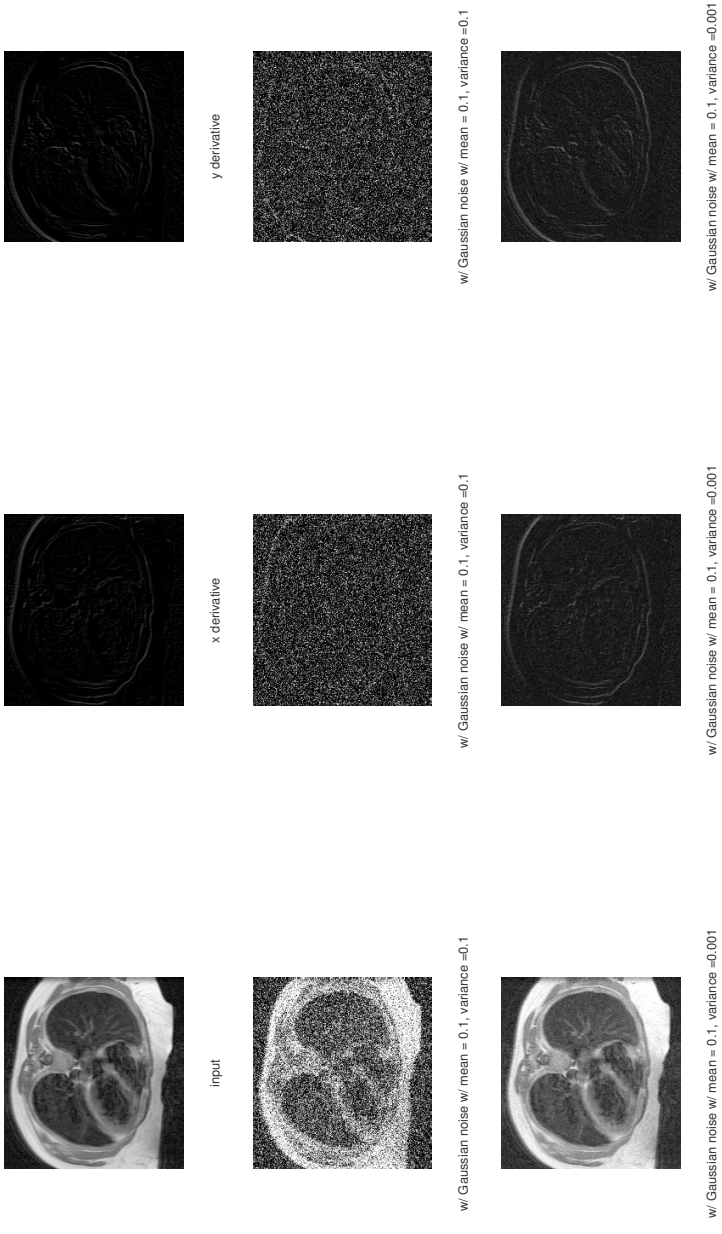

Figure 3: Plots for exercise 1, using Roberts

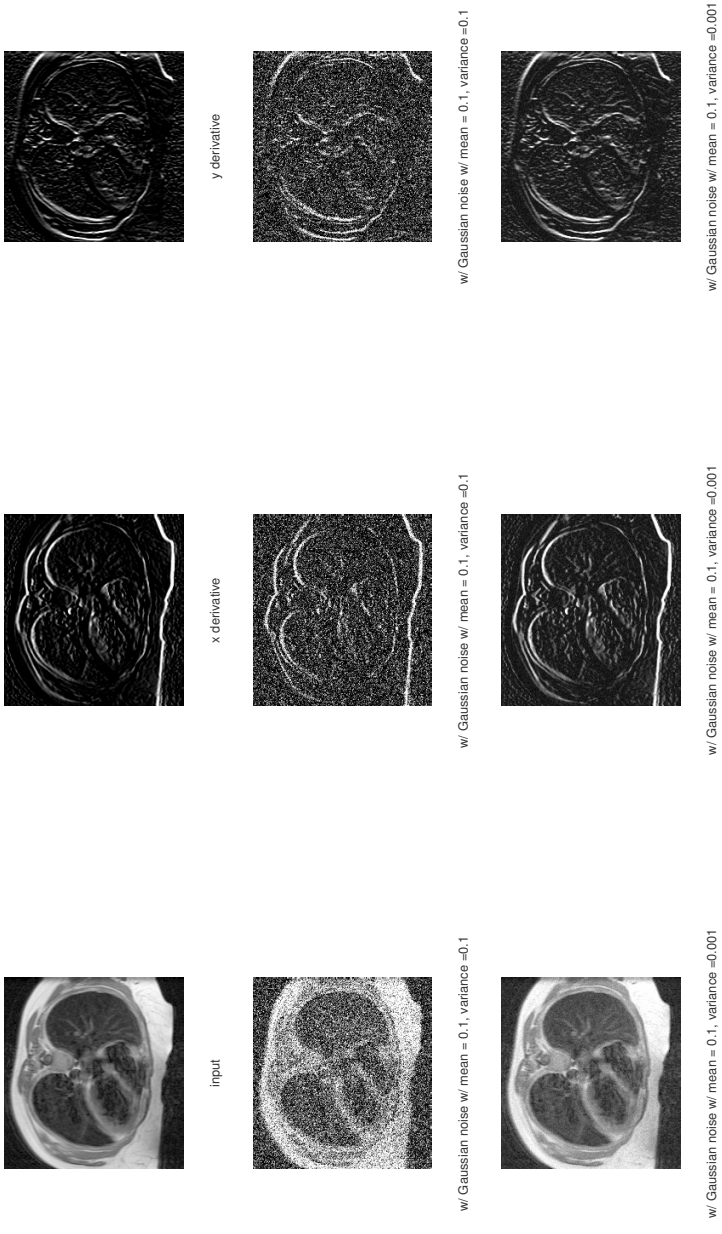

Figure 4: Plots for exercise 1, using Sobel

2 Assignment 2

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3 Assignment 3

3.1 parameters

As we can see, canny does a pretty good job at finding the edges. If we change the parameters of the low threshold and the high threshold (images 2 - 4 in figure 5), we can see that canny is primarily affected by the high threshold. The lower one doesn't change much. If we set the higher one too high (above 0.2), we get a poor image. If we set it to 0,1 and the lower threshold to 0,01 , the image is really good, with a lot of detected edges.

If we now change the sigma, we, again, can see big changes. With a sigma of 1, the canny algorithm finds even more edges. When we increase the sigma, it loses the complex edges. However, it is still pretty accurate in detecting overall edges. If detail isn't needed or distracts, a higher sigma will perform better.

3.2 filers

In figure 6 we changed the filters, so we could see how it performed with a different one. Gaussian is used by default by canny. Salt and pepper has a really bad result, this is not strange since the algorithm detects changes in colour. The specks are sudden changes and therefore seen as edges. Poisson is actually one of the better results. We can clearly see many edges that are detected, it is a pretty clean image and does not have extreme detail. Gaussian, causes some distortion. Although it does contain more detail than Poisson, it is also worse since it detects edges which aren't there. Speck also has some distortion. The distortion is not as bad as the Gaussian one, and it still contains quite a lot of detail.

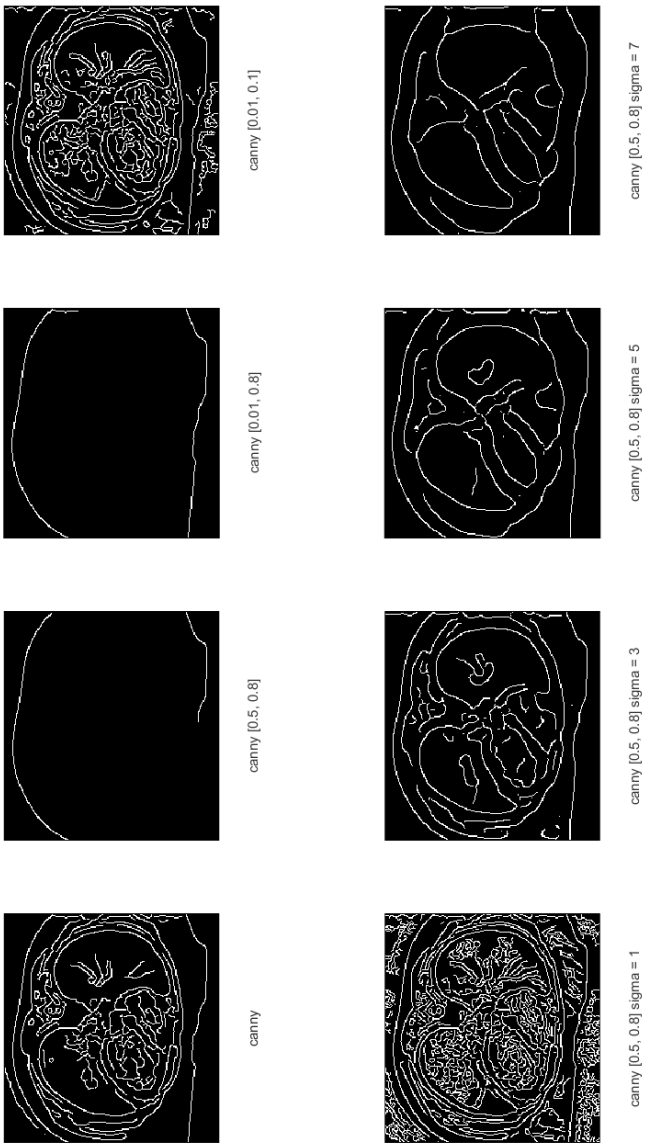

Figure 5: canny edge detections experimentations

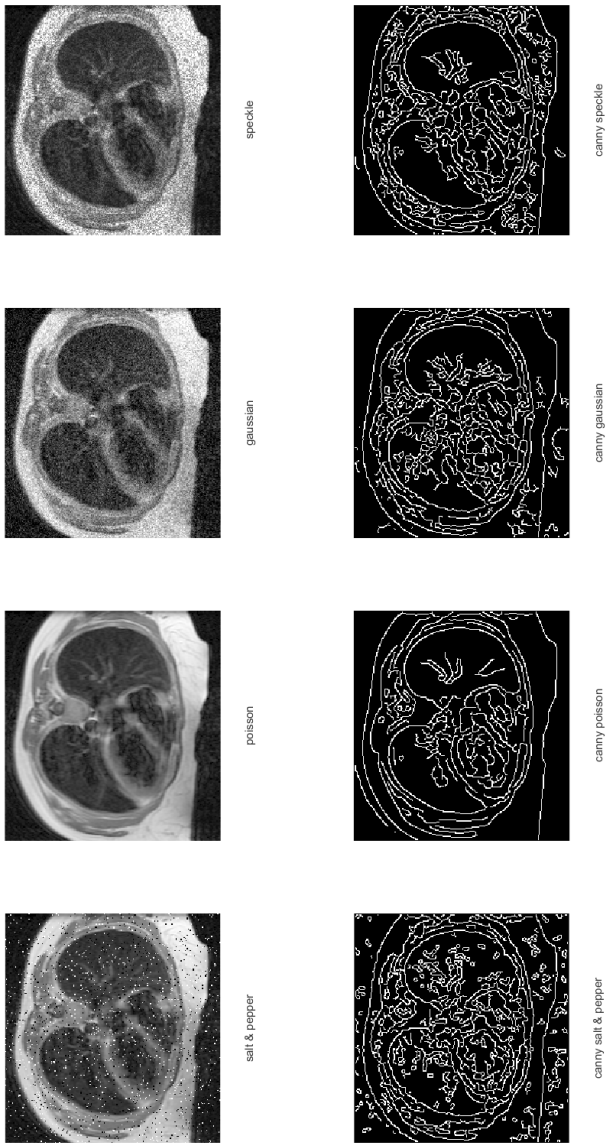

Figure 6: filters and canny edge detections on them

4 Assignment 4

When the sigma is increased, details are fading and corners aren't that sharp anymore. With a sigma of 1, the corners are very sharp. At 4, they are pretty much rounded. Surround inhibition doesn't seem to do much for kanizsa.png or popout.png, the alpha value does cause some weird behaviour though, the edges are not properly detected anymore. K1 and K2 have no effect on the image. Enable hysteresis thresholding of edge strength doesn't seem to do anything either for either images. If thinning is disabled, the lines are very wide and clotted. It does not have much detail anymore.

Both popout and kanizsa both react pretty much the same way.

5 Division of labour

Assignment 1 was done primarily by Remco with some help of Daniel. The assignment 2 was done by -, and three by Daniel. Assignment 4 was also done by Daniel.