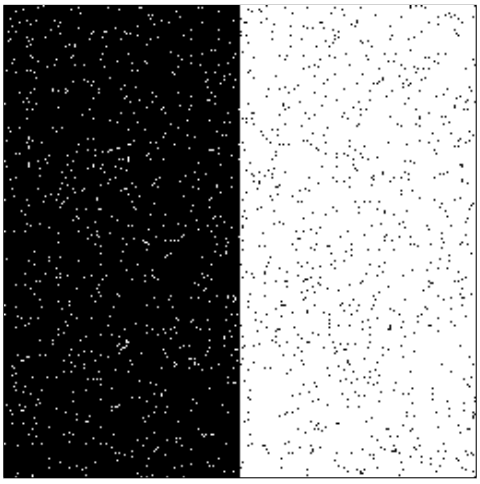
Exercise 8a

Let I be the input image in file `isn_256.pgm`, which has a binary impulsive noise added("salt-and-pepper" noise). Let B be a structuring element square of size 3×3.

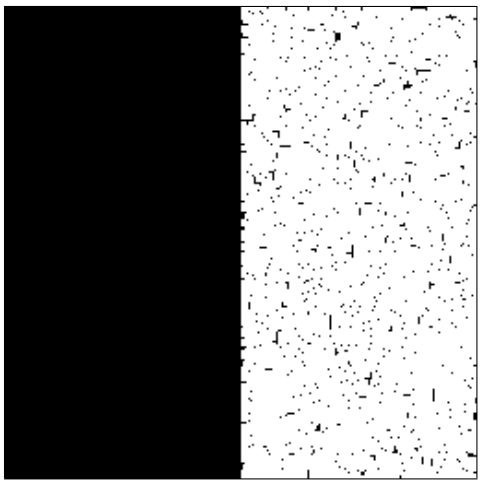
The results of executing the respective filters can be seen in Fig. 1. The best results are obtained using Filter 4 (Opening-Closing $\gamma\varphi$) where it is easy to see there is only one artifact left in the image (on top of the black part).

The second best filter is Filter 3 (Closing-Opening $\varphi\gamma$) where a few more artifacts remain in the image, in this case, in the white part.

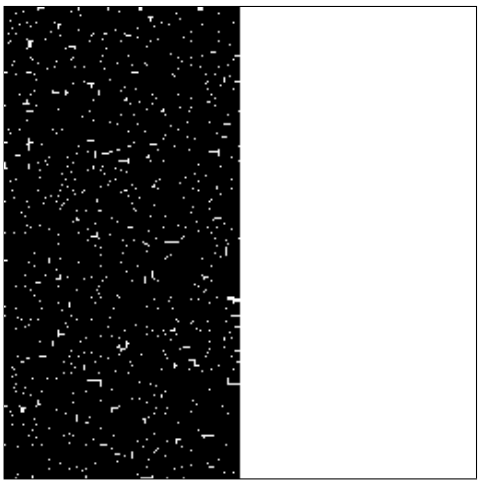
As we can see in Filters 1 (Opening γ) and 2 (Closing φ), each operation removes artifacts from one of the parts, and thus, the combinations of both are the ones that obtain better results.



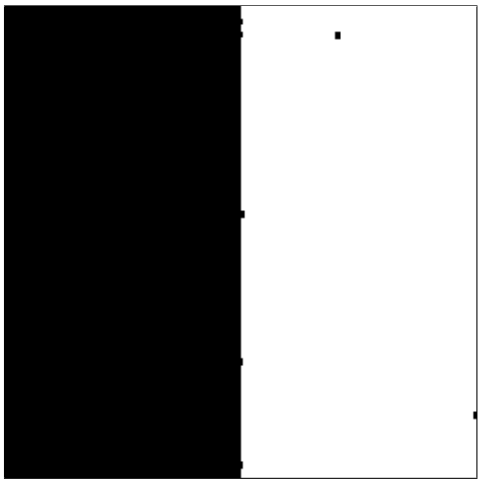
Orignal image: `isn_256.pgm`



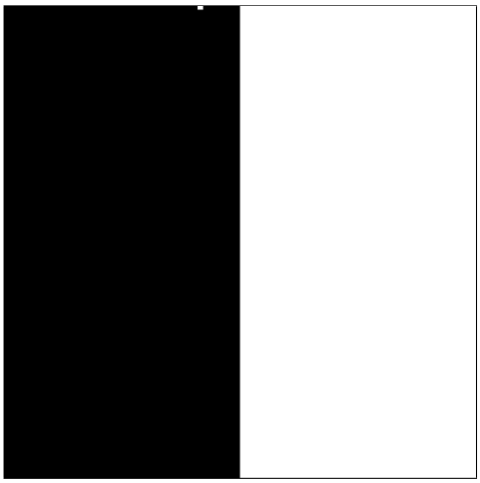
Filter 1: Opening $\gamma_B(I)$



Filter 2: Closing $\varphi_B(I)$



Filter 3: Closing-Opening $\varphi_B\gamma_B(I)$



Filter 4: Opening-Closing $\gamma_B\varphi_B(I)$

Figure 1: Images from Exercise 8a