

ENGR 391: Computer Vision

Homework Assignment # 5

Spring 2024

Problem 1: Morphological operations

For this problem we consider the images of figures 1, 2 and 3

1. Apply erosion to the image of figure 1. Pick a structuring so that the difference with the original image is visible.
2. Apply dilation to the image of figure 1. Pick a structuring so that the difference with the original image is visible.
3. Discuss the effect of erosion and dilation on the image.
4. Apply the morphological gradient to the image of figure 1. Pick a structuring element of your choice.
5. Discuss the effect of the morphological gradient on the image.



Figure 1. The homework image 1 (HW5Fig1.jpg)

6. Perform a morphological operation with the appropriate structuring element to the image of figure 2 to remove the undesirable noise
7. Perform a morphological operation with the appropriate structuring element to the image of figure 3 to remove the noise.
8. Discuss your methods.



Figure 2. The homework image 2 (HW5Fig2.jpg)

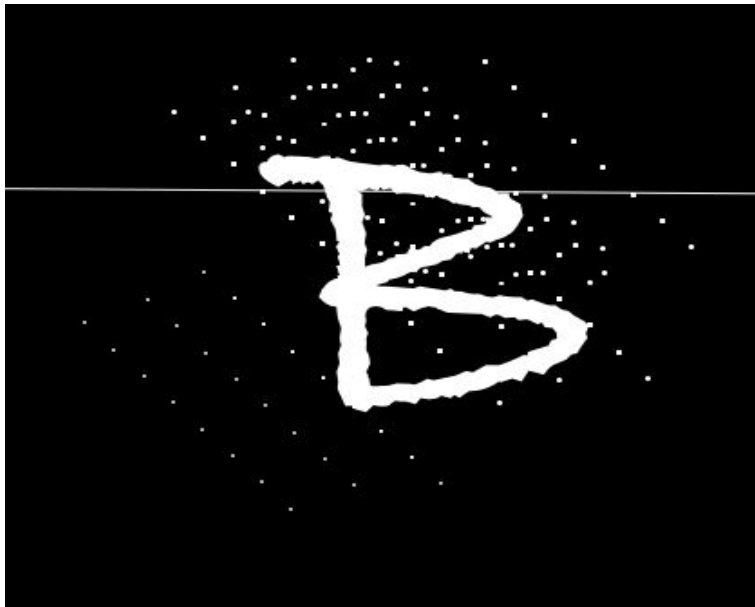


Figure 3. The homework image 3 (HW5Fig3.jpg)

Some useful functions

OpenCV functions:

- Creating structuring element: `cv2.getStructuringElement()`.
- Erosion: `cv2.erode`
- Dilation: `cv2.dilate`
- Different operations: `cv2.morphologyEx()`

Examples:

- `imgerosion = cv2.erode(img, kernel, iterations=1)`
- `imgdilation = cv2.dilate(img, kernel, iterations=1)`
- `closing = cv2.morphologyEx(img, cv2.MORPH_CLOSE, kernel)`
- `gradient = cv2.morphologyEx(img, cv2.MORPH_GRADIENT, kernel)`

Matlab functions:

- Creating structuring element: `strel`
- Erosion: `imerode`
- Dilation: `imdilate`
- Opening and closing: `imopen` and `imclose`

Examples:

- `Opening = imopen(original,se);`
- `dilatedBW = imdilate(BW, se);`
- `erodedBW = imerode(BW, se);`
- `se = strel('cube',3);`