

UNIVERSITY OF SOUTHERN DENMARK

INTRODUCTION TO ROBOTICS AND COMPUTER VISION

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## **Vision – Mandatory Exercise 1**

### **Image restoration**

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## 1 Introduction

In the real world images are sometimes affected by noise in a way that makes working with them (or looking at them) difficult. The purpose of this project is therefore look at image restoration on a set of images that are affected by different kinds of defects. The overall task is to minimize the impact of the noise and thereby to improve the quality of the image.

To come up with an analysis and a way to remove (or weaken) the defect, the following considerations are done for each image:

- Investigate the image and identify the defect, for example by using the histogram and/or the frequency spectrum of the image.
- Design a solution that removes or weakens the impact of the defect and investigate the properties of the solution.
- Investigate different solution possibilities.
- Implement and apply the solution(s)

At the end the image restored has to be resemble the original image as best as possible.



FIGURE 1: THE ORIGINAL IMAGE

## 2 Image 1

Figure 3a shows the first image which has to be restored. This image is compared to the original (Figure 1) much darker. Based on the histogram it can be seen that a large amount of black pixels appear to be on the image. The image affected by pepper noise.



FIGURE 2: ANALYSIS OF IMAGE 1

An effective way of removing salt and pepper noise it to use an median filter, which would take the median value of fixed numbered values and assign it to that pixel position, but as the amount of pepper noise is too large, would an median value mostly lead to a black pixel, hence not provide that much of an improvement as seen in Figure 3.

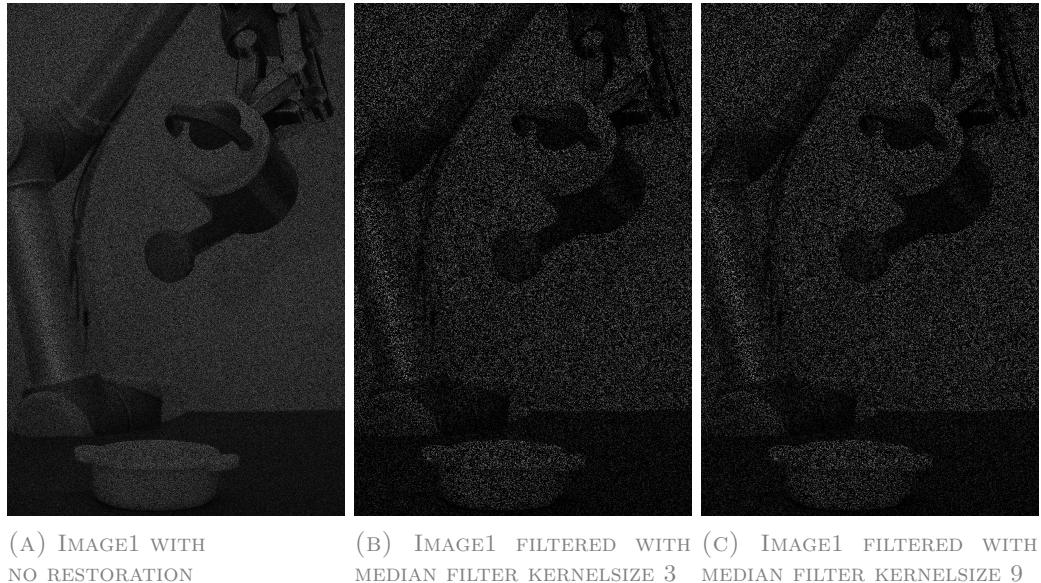


FIGURE 3: MEDIAN FILTER APPLIED TO IMAGE1