

Chapter 5:Edge detection

There are many ways to perform edge detection in an image,using EIKONA.In this chapter,we show most of these ways,since edge detection is an area of image analysis of great interest.

Exercise 5.1:The compass edge detector.

The compass operator is a directional edge detector.It can detect edges having a specific direction (slope).

As an example,suppose that BABOON is loaded in BW buffer 0.We can find lines that are almost vertical by selecting the menu option "**Black and white**⇒**Analysis**⇒**Edge detection**⇒**Compass**".In the dialog box that appears, we specify BW buffer 0 and <NewBuffer> to 90 degrees as source and destination buffers respectively and set the edge direction to 90 degrees. The resulting image is given in Figure 1.

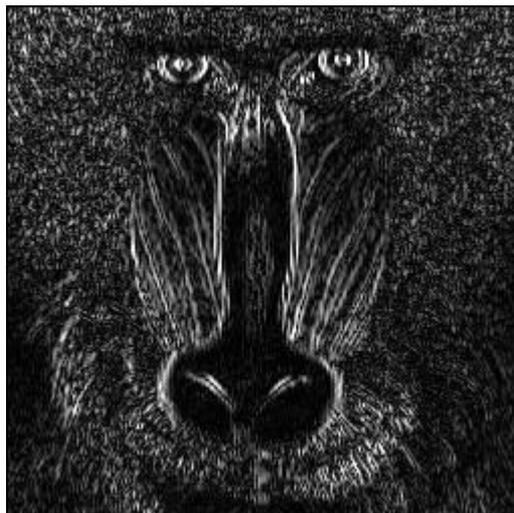


Figure 1:The result of the compass edge detector on BABOON (edge direction=90 degrees).

Exercise 5.2:The Sobel edge detector.

Another edge detector algorithm is the Sobel edge detector.Generally,it has generally good characteristics and satisfactory performance even on images corrupted with noise.

We can perform Sobel edge detection on the left half of BABOON as follows: We copy BABOON in a new buffer and define the ROI on the original

image to cover the left half of the image. We then select the menu option "**Black and White**⇒**Analysis**⇒**Edge Detection**⇒**Sobel**" and in the dialog box that appears we specify the original BABOON as source and the copy as destination. The result is shown in Figure 2.

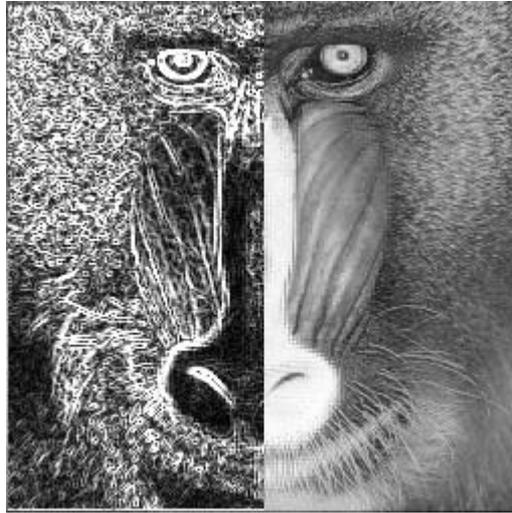


Figure 2: The result of the Sobel edge detector on the left half of BABOON.

Exercise 5.3: Line detection.

In this exercise, we give an example of line detection. Line detection finds edges in an image having a certain angle. In order to use line detection, we select the menu option "**Black and White**⇒**Analysis**⇒**Edge Detection**⇒**Line Detect**". Assuming that the image BW buffer 0 contains the image BABOON256.RAW, in the dialog box that appears we choose BW buffer 0 as the source buffer and **<NewBuffer>** for the output buffer. We should also select a line direction from the allowable range, which is: 0, 45, 90 and 135 degrees. If we select a line direction of 90 degrees, we get the result that is shown in Figure 3.



Figure 3: The result of line detector on BABOON (line direction=90 degrees).

Exercise 5.4: Point detection.

In this exercise we use EIKONA to perform isolated point detection on an image. Assuming that the image COMET is stored in BW image buffer 0, we select the menu option "**Black and White**⇒**Analysis**⇒**Edge Detection**⇒**Point Detect**". In the dialog box that appears, we specify 0 and <New Buffer> as the source and destination buffers respectively. The output image can be seen in Figure 4.



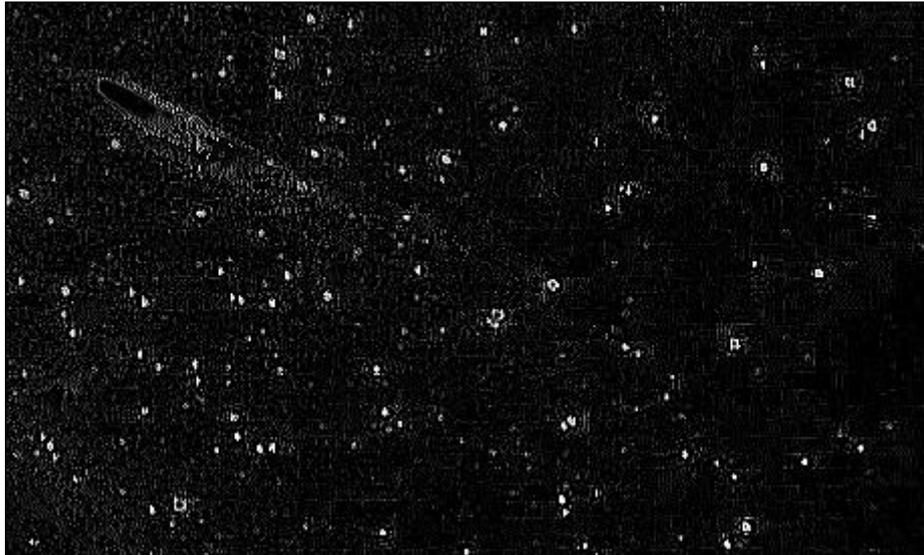
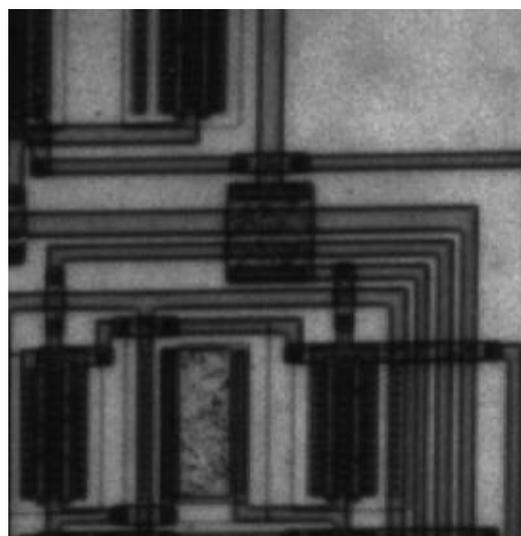


Figure 4
a)Image COMET.
b)The result of the isolated point detector on COMET.

Exercise 5.5:Edge following.

In order to perform edge following on an image,we first need to perform edge detection on it. Afterwards,we can apply an edge following algorithm on the output of the edge detector.

The edge following algorithm in EIKONA. can be accessed through the menu option *Edge following*,of the submenu "**Black and White**⇒**Analysis**⇒**Edge** ⇒**Detection**".In the following figures we present the result of this algorithm.



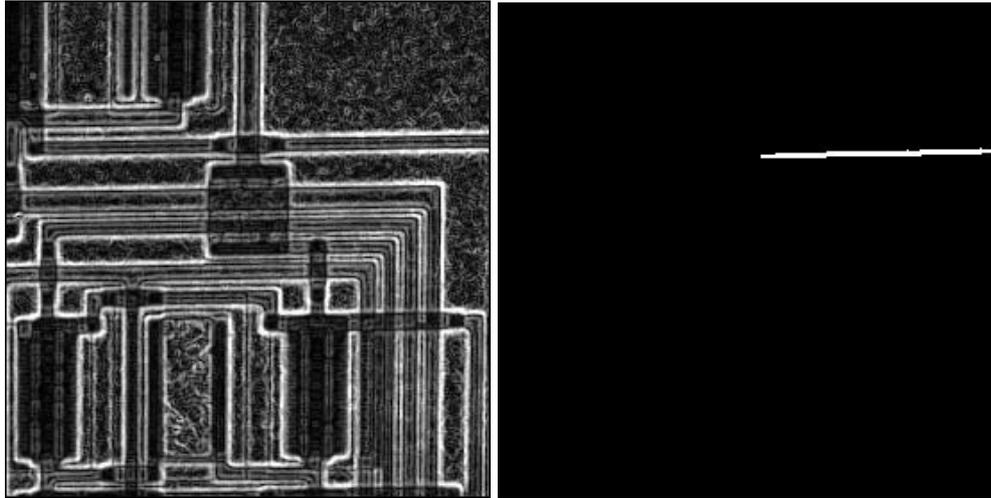


Figure 5

- a)The grayscale image CIRCUIT.
- b)Output of the Sobel edge detector on CIRCUIT.
- c)Output of the edge following algorithm.