

### **Problem 1**

Load the grayscale image Text.bmp into Matlab.

- 1) Display the image
- 2) Plot a histogram of image pixel intensities.
- 3) Perform thresholding on the image to create a binary image. Describe the method and threshold used. Display the binary image.
- 4) Apply 5 times the erosion morphological operator on the binary image from part (3). Display the resulting image. What size kernel did you use?
- 5) Apply 5 times dilation morphological operator on image obtained in (4). Display the resulting image. What size kernel did you use?
- 6) Are the image obtained in (5) and the image in (3) identical? Comment!
- 7) Find the absolute difference of the image created in (3) and image created in (5). Map this difference to full dynamic range of 8 bits and display. Comment!
- 8) Using the same kernel size, apply 10 times the erosion morphological operator on the binary image from part (3). Display the resulting image.
- 9) Using the same kernel size, apply 10 times dilation morphological operator on image obtained in (8). Display the resulting image.
- 10) Are the image obtained in (9) and the image in (3) identical? Are the images obtained in (5) and (9) identical? Comment!
- 11) Find the absolute difference of the image created in (3) and image created in (9). Map this difference to full dynamic range of 8 bits and display. Comment!

### **Problem 2**

Find the distance transform of the image bottle.bmp.

- 1) Display the image.
- 2) Plot a histogram of image pixel intensities.
- 3) Perform thresholding to create a binary image. Describe the method and threshold used. Display the image.
- 4) Process the image to create solid foreground object without any "holes". Describe the exact approach used. Display the image
- 5) Find the distance transform. What is the maximum value of the distance transform? How many pixels have this value?
- 6) Map the values of distance transform to the full dynamic range of 8 bits and display the distance transform. Comment!
- 7) What are the area, perimeter and centroid of the object in part (4)? How did you compute those?