MACHINE VISION

Examination 5.11.2010

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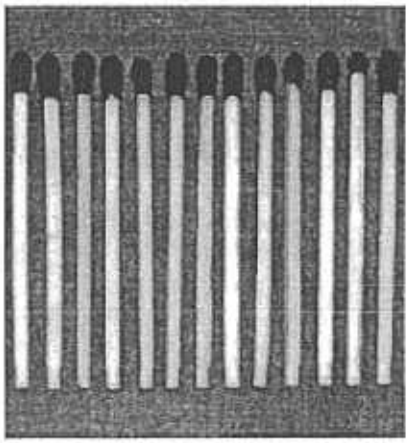
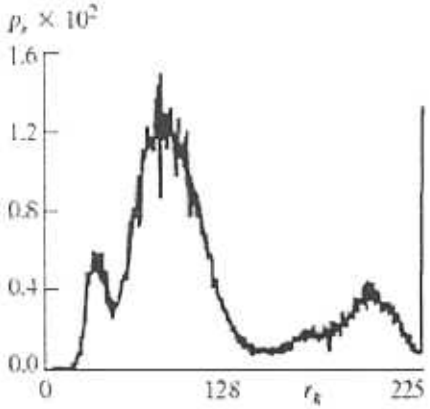
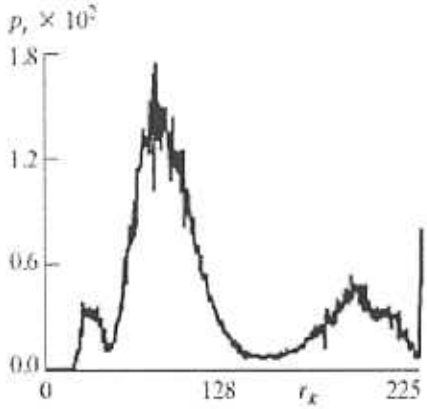
1.a) Develop a procedure for computing the median of an n x n neighborhood.
b) Propose a technique for updating the median as the center of the neighborhood is moved from pixel to pixel.
c) What is the main application of Median Filtering?

2. Below are two images containing sticks. Below them are the corresponding histograms, which are about equal. Design and describe a method with which you can classify these two stick images from each other. What can kind features should be calculated?

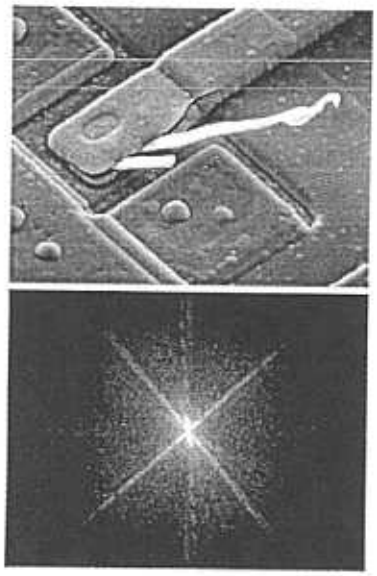






3. Calculation of distance transforms and skeletons in binary images. Present an algorithm for distance transform calculation. What kind of distance metrics are possible in distance calculations? How can distance transform be calculated in color images?

4. Below is a gray-level image and its Fourier spectrum.
   a) What can be deduced from the Fourier spectrum about the original image?
   b) What are the application areas of Fourier transform?
   c) Is it meaningful to use it with noisy images?



5. a) What is the goal of image segmentation?
   b) Design and describe in detail method(s) how to segment the liver from the left image, and from the color image on the right. The liver is the big organ on the left, and is visible (segmented out) in the middle image. In the color image it is pink.
   c) What other kind of methods could have been used in segmenting the liver, except the one(s) you described in (b) ?

Automatic modelling of liver anatomy

- Step 1 – Segment the liver