

Exercise: Image and Video Processing

Sheet 4 – Image Segmentation

Exercise 1 – Detect and draw lines

Design a method *lineDetection* which detects a straight line in an image (background: black, line pixel: white).

The line is defined by: $y=m*x+n$. Calculate the parameters n and m .

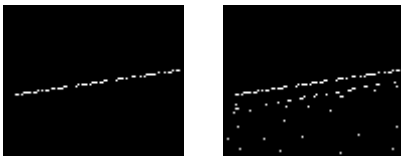
- `void drawLine (Image &src, double m, double n);`

Create an empty image of size 100x100x3 and draw a green line (RGB: 0/255/0) in an image based on the parameters n and m . Draw 3 lines: (a) $n=0$ and $m=1$ (b) $n=50$ and $m=2$ (c) $n=90$ and $m=-0.1$

- `void lineDetectionRandom (Image &src, double &m, double &n);`

Select 2 line pixels at random, and calculate the parameters n and m . Calculate the error of the line and all line pixels. The error is defined as sum of the squared vertical distances between each pixel and the line.

Repeat these steps and keep the best parameters (use at least 100 iterations). Test your algorithm with the images *test7a* and *test7b* and draw the detected line.



- `void lineDetectionLTS (Image &src, double &m, double &n);`

To get better results in case of noise (see image *test7b*), use a robust line detection method now (*least trimmed squares*). Test your algorithm with the images *test7a* and *test7b* and draw the detected line.

Exercise 2 – Presentation of Image Segmentation Algorithms

Groups:

1. K-means: Fabian, Nikolas
2. Region Growing: Francis, Daniel
3. Graph Cuts: Christian, Christoph

Tasks:

1. Read the documentation about your image segmentation algorithm (K-means, region growing, or graph cuts). Search the Web, if you need additional information (many tutorials are available online).
2. Prepare a short presentation (~15 minutes) about your segmentation algorithm. You can use PowerPoint/Open Office/PDF or the blackboard to explain the algorithm. Please prepare a short example which visualizes your algorithm.
3. If you want to present slides or images, please send an email until Sunday evening (October 25, 2009).