Lecture Machine Vision 2019/20

Institut für Mess- und Regelungstechnik, Karlsruher Institut für Technologie
Dr. Martin Lauer, Christian Kinzig, M.Sc.

Practical Exercises: Line Estimation

- Consider the image file *postit2g.png* from the previous assignment. File *pixellist_postit2g.mat* contains lists of pixel coordinates belonging to the 19 most dominant edges in the image.

  Write a function in MATLAB that calculates the least-sum-of-squares estimates of line parameters (θ, c) from a list of pixel coordinates. Apply this function to the edges described in file *pixellist_postit2g.mat*. Visualise your results by plotting the lines found into the image *postit2g.png*.

  Hints:

  - you can load the file *pixellist_postit2g.mat* with the command `load 'pixellist_postit2g.mat'`. This command will create a variable named *pixellist* which is a list of 19 pixel lists. `pixellist(i).list` returns the list of pixels belonging to the *i*-th list.
  - the MATLAB command `eig` performs an Eigenvalue decomposition. See the help page of this command for further information on how to use it.

- Extend your program by a method that determines optimal start and end points for the line segment that describes the pixels in a pixel list. Thereto, calculate the orthogonal projection of all pixels onto the line found with the least-sum-of-squares estimator and determine the two outmost points.

- For those who are very quick: Implement one of the robust estimators discussed in the lecture (M-estimators, LTS, RANSAC). Take the union of the pixels belonging to the first and second pixellist and apply both, the least-sum-of-squares estimator and the robust estimator to the joint list. In which way do the results differ?