

INF5300 – Lab: Classification, clustering and random algorithms

This lab will use MATLAB to implement and explore topics covering clustering, classification and random algorithms in

Motion detection:

Write a very simple motion detection algorithm, using either images grabbed from workstation camera or for example an artificial set from <http://www.vis.uni-stuttgart.de/index.php?id=sabs>

- Start with developing very simple code for reading the video (Videoreader)
- Test temporal frame differencing
- Do some simple blob cleanup using morphological functions.
- Write a simple temporal averaging function, or implement Stauffer & Grimson (Hint: for reasonably sized matrices it makes sense to use

RANSAC:

Create a linear regression toy example with adjustable amounts of outliers. (Tips: slightly jitter datapoints along a line to create a "strong" set of inliers. Add random datapoints according to a Gaussian distribution. Both can be easily performed within the PRTools)

Find a RANSAC algorithm implementation and make sure you grasp the concepts. Validate the table of *#iterations needed / % outliers* experimentally.

Random forests:

Use the built-in (under PRTools) iris.m dataset. Split the dataset appropriately for training and test. Train a tree classifier on the full dimensional dataset, and analyze performance. Try to visualize the classifiers in an appropriate low dimensional representation.

Some useful tips:

Grabbing a Git-repository in Linux:

```
mainframe:/your_toolbox_folder/ $git clone git://github.com/karpathy/Random-Forest-Matlab.git
```

Extensions to Image Processing Toolbox: <http://vision.ucsd.edu/~pdollar/toolbox/doc/index.html>

Random forest implementation for Matlab: <https://github.com/karpathy/Random-Forest-Matlab>

RANSAC implementation for Matlab: <https://github.com/RANSAC/RANSAC-Toolbox>

Useful image processing functions for this and future labs:
<http://www.csse.uwa.edu.au/~pk/research/matlabfns/>