

Image Analysis, Handin 5

These are distributed during the lecture October 11, 2013 and has to be finished by October 18, 2013. Written solutions are handed in either (i) at the lectures or (ii) to the box entitled 'inlämningsuppgift bildanalys' in the corridor on the third floor of the math building.

Note: Write your solutions neatly and explain your calculations. All exercises should be done *individually*.

1. Computer Vision

Assume that the camera matrices for two projections are

$$P_1 = \begin{pmatrix} 3 & 2 & 1 & 0 \\ 2 & 2 & 2 & 0 \\ 2 & 1 & 2 & 1 \end{pmatrix}$$

and

$$P_2 = \begin{pmatrix} 1 & 2 & 2 & 3 \\ 1 & 1 & 0 & 2 \\ 3 & 1 & 2 & 0 \end{pmatrix}.$$

The so called fundamental matrix is then

$$F = \begin{pmatrix} -4 & 2 & -6 \\ 3 & 0 & 7 \\ -6 & 9 & 1 \end{pmatrix}.$$

The following three points are detected in image 1:

$$a_1 = (1, 2), \quad a_2 = (3, 2), \quad a_3 = (0, 3).$$

In image 2 the following three points are detected:

$$b_1 = (1, 1), \quad b_2 = (5, 1), \quad b_3 = (-1, -3).$$

Which points can be in correspondence?

2. System testing

Use the algorithms from handins 1, 2 and 4 to make a small but complete OCR system for images such as those tested earlier. The system should take an image I as input and return a string of ascii characters s ,

```
function s = ocr(I,classdata)
```

Download the program `benchmark.m` from the home-page and study the program. The purpose of the program is to benchmark your system and calculate the percentage of characters that are correctly found and classified. Such test routines are important, when improving different parts of the program. It is important to have automatic test routines to verify that new versions are better or at least as good as old versions.

Benchmark your system with the images in the folder `short1`,

```
% Supply the name of your ocr function
myocr = 'ocr';
% Supply the path to your data folder
datadir = '/usr/matematik/kalle/matlab/ocr/datasets/short1';
% Benchmark your ocr function
[hitrate,confmat,res]=benchmark(myocr,datadir,classdata);
% Display the result
disp(['Using method ' myocr ' on dataset ' datadir ...
' I obtained a hitrate of ' num2str(hitrate)]);
```

In the written solution to the testing problem, supply both code (e.g. matlab code) and a printout the results of using your algorithm, i.e. supply examples of input data (e.g. as an image) and results after classification.

For this final handin, I want you to supply both the written solution (similar to previous handins) and an email with all your matlab algorithms for your OCR systems (from all handins). Send them to magnuso@maths.lth.se