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CS 4495, Computer Vision
Fall 2014
Problem Set 3

Problem Set 3, Question 1, Part 1

M =

-0.4583	0.2947	0.0140	-0.0040
0.0509	0.0546	0.5410	0.0524
-0.1090	-0.1784	0.0443	-0.5968

Residual of the last point's projection: 0.0245

Problem Set 3, Question 1, Part 2

Trial	K = 8	K = 12	K = 16
1	3.02642800641653	1.28247364682852	4.44151913242835
2	2.45691826116276	4.63992675770143	0.211652221525655
3	0.674655060628898	1.75731233335290	1.38339515462800
4	59.3142611510472	251.864531468462	0.595385847345964
5	1.21865957882760	3.20434376184088	2.44680431723205
6	1.83693527626231	1.40015723146659	2.04305013110626
7	2.70209667671853	29.3452215149362	3.64380592823140
8	3.16732366195499	2.39994700894999	2.83171925869810
9	1.45071111828063	2.53126851333089	0.303455256908579
10	2.62288290737476	0.382398544097618	3.15390024990645
Average	7.84708717	29.88075808	2.10546875
Standard Deviation	18.10230643	78.47086548	1.460829348

Minimum highlighted in yellow.
As k increases, the amount of information that is provided when constructing the model (in this case, the M matrix) also increases, which in turn decreases the likelihood that outliers and noise will strongly affect the final result. Two notable examples are the trials highlighted in green. As the selection of points is random, there is a chance that a certain subset of the points would portray a very erroneous model, and the likelihood of this decreases as k increases, as the k=16 trials had no such outlier.

BestM =

0.0069	-0.0040	-0.0013	-0.8263
0.0016	0.0010	-0.0073	-0.5630
0.0000	0.0000	-0.0000	-0.0034

Problem Set 3, Question 1, Part 3

C = < 303.0978, 307.1863, 30.4224>

Problem Set 3, Question 2, Part 1

F =

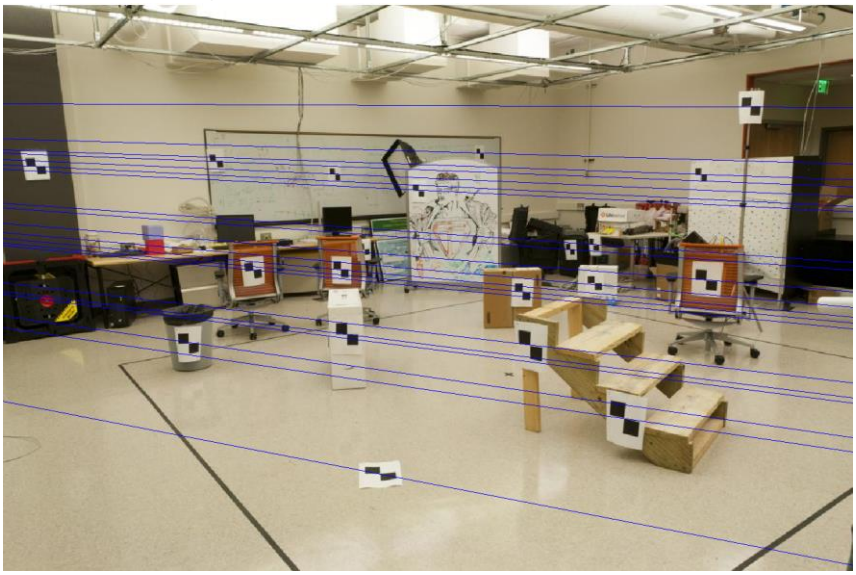
-6.60675943527704e-07	8.82674943996016e-06	-0.000908539064346732
7.90642196963890e-06	1.21863595933972e-06	-0.0264201800598200
-0.00188480992014533	0.0172276843475569	1

Problem Set 3, Question 2, Part 2

F =

-5.35615531823631e-07	8.83379370514629e-06	-0.000908085461589477
7.89578155620912e-06	1.21741311011671e-06	-0.0264069904614202
-0.00188386904042541	0.0172190838601108	0.999500775528400

Problem Set 3, Question 2, Part 3



Epipolar lines drawn on Image A using the non-reduced fundamental matrix.

Estimated epipolar lines drawn on Image B using the non-reduced fundamental matrix.

Estimated epipolar lines drawn on Image A using the reduced fundamental matrix. Note how some of the lines are not coincident with the points they originated from.

Estimated epipolar lines drawn on Image B using the reduced fundamental matrix. Note how some of the lines are not coincident with the points they originated from.