

VISNAV Exercise02

Yigit Aras Tunalı

April 2021

1 Part 1

For each Camera model the tests pick points $(x, y, 5)$ with a double for-loop for x and y, going from -10 to 10 for each. Each point is then normalized projected and unprojected. Then compared with the original point to check if the operations are correct.

2 Part 2

Both Curve Fitting and Robust Curve Fitting examples try to fit the data generated from the same curve. The difference is that the Robust Curve Fitting example uses a "Loss Function" to handle the outliers and make sure the outliers are regularized.

3 Part 3

There are 3 command line arguments. First is "-show-gui" which shows the GUI, second is "-dataset-path" which is used to supply the path for the dataset (it is also flagged as required, so it has to be provided) and finally "-cam-model" which is used to select one of the camera models we implemented on Part 1.

As a quantitative measure, we can use the initial cost and final cost for each camera model with the number of iterations required. Here are the results

- Pinhole:

Initial 1.795667e+07

Final 1.565735e+05

Change 1.780009e+07

Number of iterations: 16

- Extended Unified:

Initial 5.353182e+06

Final 1.627604e+02

Change 5.353019e+06

Minimizer iterations: 7

- Double Spherical:
Initial 5.353182e+06
Final 1.627482e+02
Change 5.353019e+06
Minimizer iterations: 15 (with 2 of them being unsuccessful steps)
- KanalaBrandt4:
Initial 5.788049e+06
Final 1.619844e+02
Change 5.787887e+06
Minimizer iterations: 8

Apart from the Pinhole camera model, the final cost of all camera models are very close with KanalaBrandt4 having the smallest value. Number of iterations-wise the fastest would be the Extended Unified model. Total time wise Pinhole took 0.42, Extended Unified took 0.19, Double Spherical took 0.36 and KanalaBrandt took 0.23 seconds in total.