IN2106 Practical Course – Vision-based Navigation: Exercise #5

Topic: Backend

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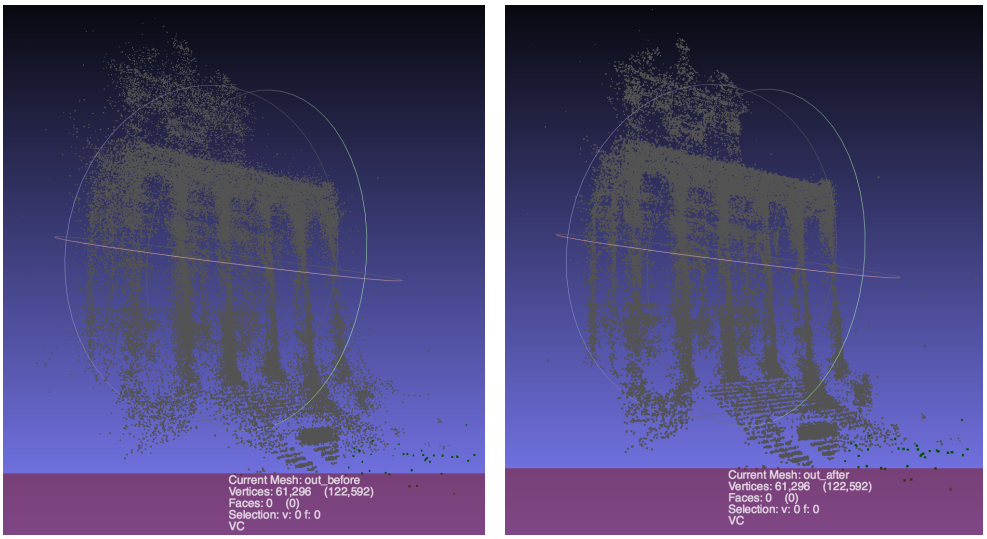
1 Bundle Adjustment

The results are from `g2o` implementation with `Ceres AutoDiff` library. As shown in Fig. 1, which is from the "Final" set of BAL dataset. As we can see after bundle adjustment, the details in the top and the ladder of the building are more clear and noisy points reduced.



(a) Before BA (b) After BA

Figure 1: BAL results for "Final" set of BAL dataset

2 Photometric Bundle Adjustment

Poses before and after PBA are shown below. Here we just pick camera 0 and camera 6 to have a general idea how results are, because for these pictures, optimization does not really change the points a lot, for they are originally good enough. Camera 0:

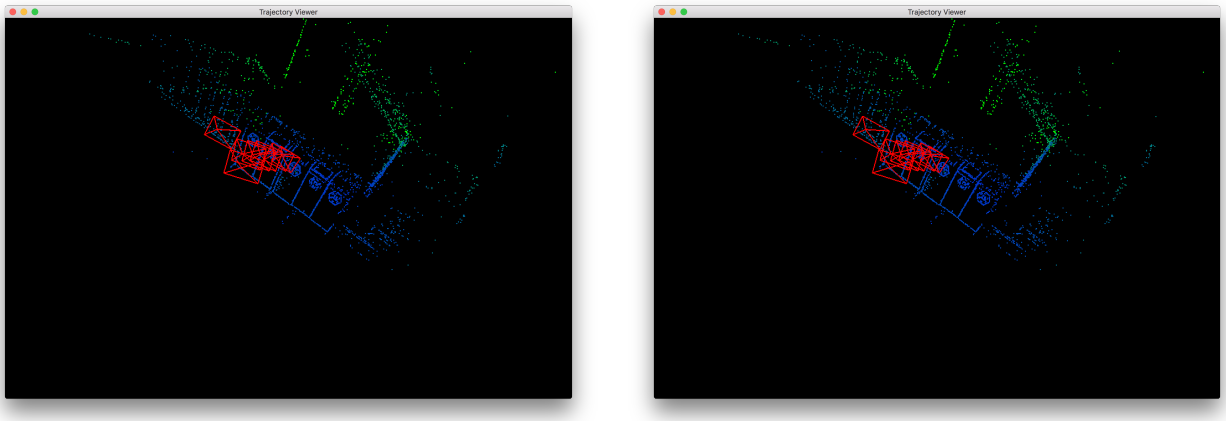
```
1 Before optimization:
2 poses 0:
3    0.92309    0.299879    0.240787    0.702775
4  -0.329161     0.93984   0.0913977    0.084358
5  -0.198893   -0.163626    0.966265 0.00503326
6           0           0           0           1
7 After optimization:
8 poses 0:
```

```
  0.923075   0.299655   0.241123   0.702736
 -0.328849   0.940016  0.0907099   0.085861
 -0.199478  -0.163025   0.966246 0.00619912
         0          0          0          1
```

Camera 6:

```
Before optimization:
poses 6:
  0.946979    0.32073 -0.0190444   0.763371
  -0.31505   0.938569   0.140827   0.172428
  0.063042  -0.127361   0.989851  0.0192505
         0          0          0          1
After optimization:
poses 6:
 0.947043  0.320569 -0.018598  0.763173
-0.314972  0.938655  0.140425  0.172626
 0.062473  -0.12713  0.989917  0.019211
        0         0         0         1
```

Visual comparison is shown in Fig. 2, which looks indistinguishable.



(a) Before PBA (b) After PBA

Figure 2: PBA results of given dataset