

Practical Course: Vision-based Navigation (IN2106)

Exercise 4

SfM, Triangulation, PnP, Bundle Adjustment

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Exercise 3: Bundle Adjustment

1. Discuss what a robust loss function like Huber does and why should we use here?

Answer:

When data contains outliers it is better to use a robust loss function like Huber, because this kind of loss function is less sensitive to outliers. Because of wrong matches that were not yet filtered, or from wrongly triangulated landmarks that converged to some local minimum, our data also contains some outliers, in this reason we used Huber loss in our project. The corners of the dataset we used in Calibration are known. We did not have to detect the corners. In this reason there was no outlier in calibration dataset. So, we did not need robust loss function in calibration.

Exercise 4: Outlier Filtering

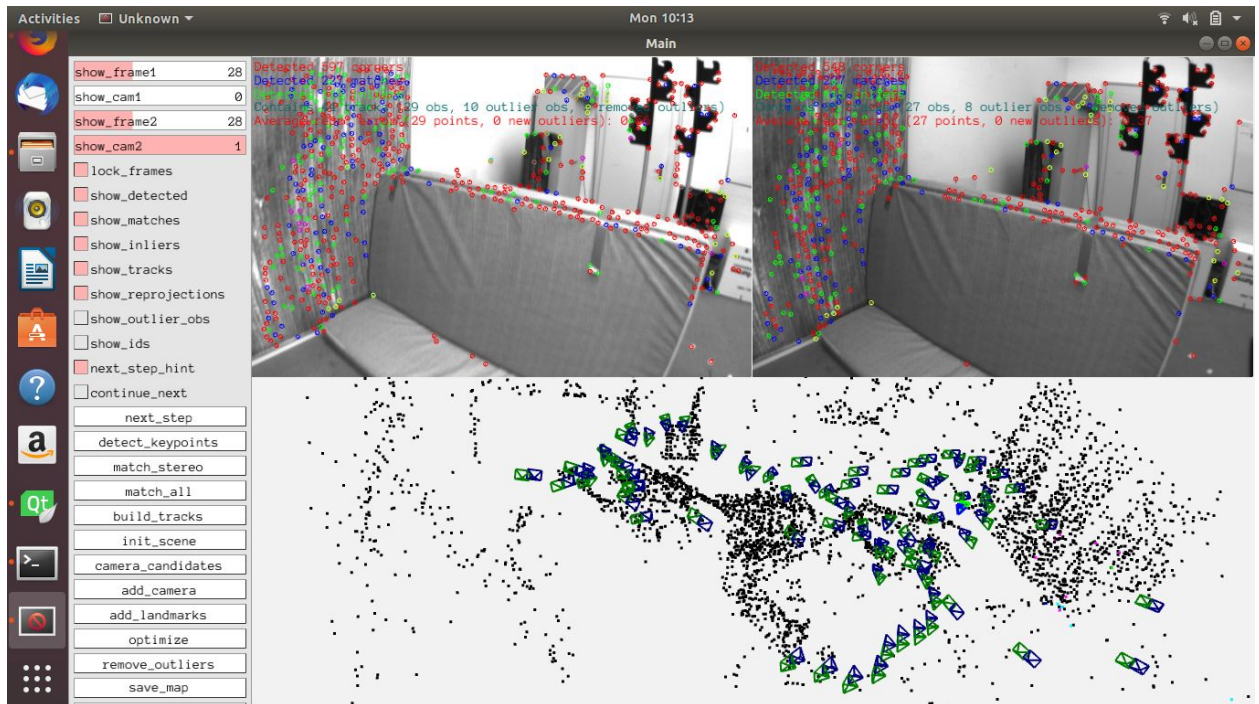
1. Describe different implemented criteria to detect outliers in remove_outlier_landmarks?

Answer:

- a. Too much huge reprojection error (OutlierReprojectionErrorHuge)
This flag means the reprojection error is huge, in this reason, the landmark and flag feature track should be removed.
- b. Too large reprojection error (OutlierReprojectionErrorNormal)
This flag means the reprojection error is normal. So, the marked outlier is only removed if no other types of outliers are present.
- c. Distance to a camera too small (OutlierCameraDistance)
This flag means the landmark is too close to a camera center. It may cause the detected keypoint blur and which may be the wrong landmark. So, this kind of landmark and flag feature track should be removed.
- d. z-coord in some camera frame too small (OutlierZCoordinate)
This flag means the landmark has too small z coordinate for some camera. So, this landmark and flag feature track should also be removed.

Exercise 5: Building a Map

1. Provide a screenshot similar to figure 1.



2. How many cameras can be added to the map?

Answer:

164 cameras can be added to the map.

3. How long does it take?

Answer:

Around 4 minutes.

4. Which part of the pipeline are taking the most time?

Answer:

Optimize part took maximum of the time as more camera added.

5. Do you have any suggestions on how to maybe speed up the map building process?

Answer:

In optimization part if we do not compare all the images available then I think it will speed up the total process as more camera and images are added into the system.