Visual-Based Navigation
Solution Exercise Sheet 4
Topic: SfM, Triangulation, PnP, Bundle Adjustment

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Part 3: Bundle Adjustment

Discuss in your answer PDF what a robust loss function such as Huber does and why we should use it here, but not in the calibration from sheet 2:

The main idea of a loss function is to be more robust against outliers and filter the wrong matches out. In our Calibration we did not have to do that since we knew all the feature corners.

Part 4: Outlier Filtering

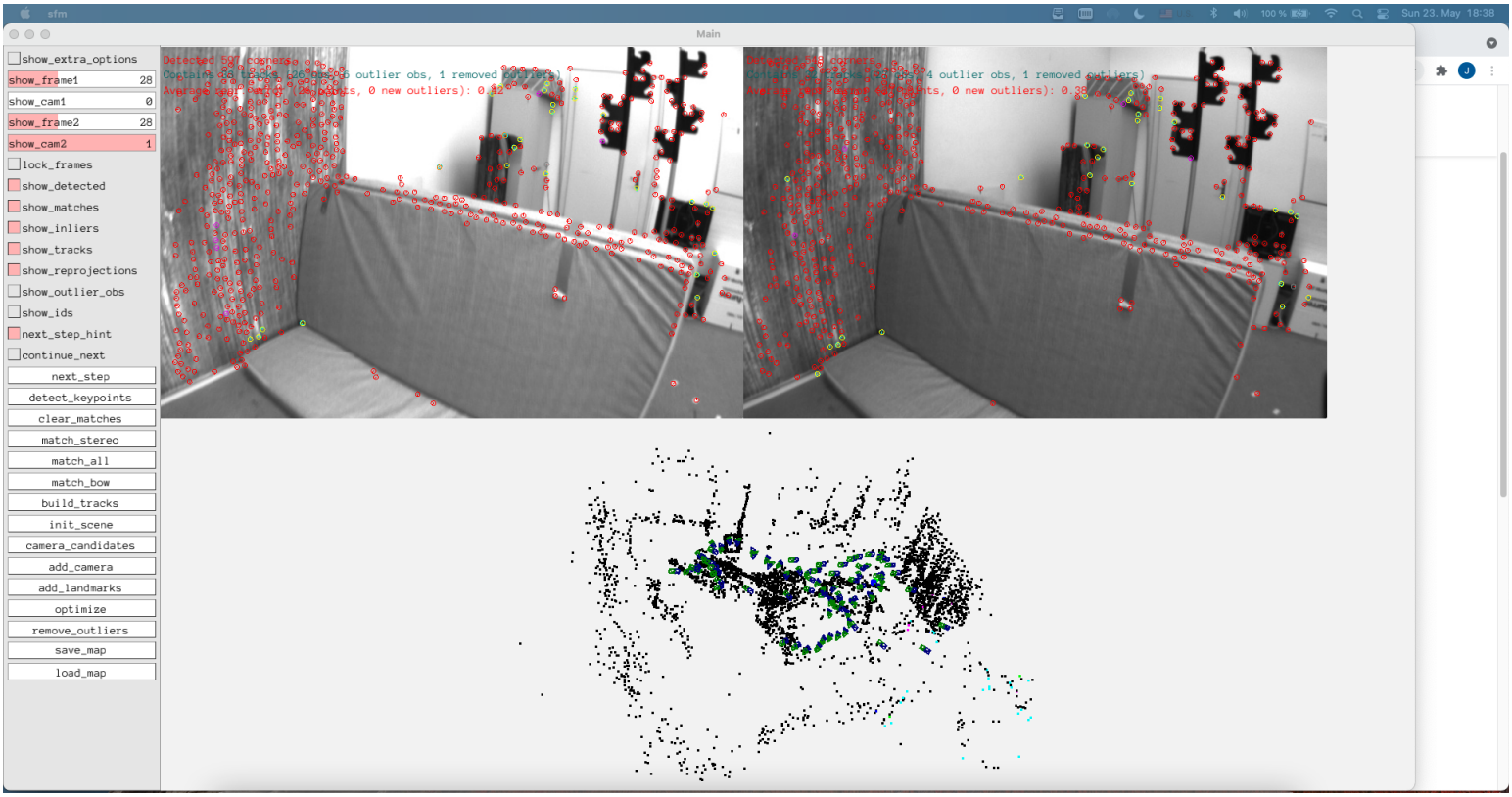
The remove_outlier_landmarks method has the following errors: $OutlierReprojectionErrorHuge$, $OutlierReprojectionErrorNormal$, $OutlierCameraDistance$, $OutlierZCoordinate$. We now will have a closer look at each error:

1. $OutlierReprojectionErrorHughe$
   This error means the reprojection error is large, the outlier should be removed
2. $OutlierReprojectionErrorNormal$
   This error means the reprojection error is normal, it gets only removed it there are no other types.
3. $OutlierCameraDistance$
   This error means the distance to a camera is too small, the outlier should be removed.
4. $OutlierZCoordinate$
   This error means the z coordinate in some camera frame is too small, the outlier should be removed.

Part 5: Building a Map

1. Provide a screenshot similar to Figure 1 in your answer PDF

2. How many cameras can be added to the map?
   164
3. How long does it take?
   Less than a minute.
4. Which parts of the pipeline are taking the most time?
   The optimization.
5. Do you have any suggestions on how to maybe speed up the map building process?
   Maybe there is a way to speed up the optimization if we do not have to look at all images.


sfm
Sun 23. May 18:38
Main
show_extra_options
show_frame1 28
show_cam1 0
show_frame2 28
show_cam2 1
lock_frames
show_detected
show_matches
show_inliers
show_tracks
show_reprojections
show_outlier_obs
show_ids
next_step_hint
continue_next
next_step
detect_keypoints
clear_matches
match_stereo
match_all
match_bow
build_tracks
init_scene
camera_candidates
add_camera
add_landmarks
optimize
remove_outliers
save_map
load_map