Vision Based Navigation Assignment 5

Erkam Uyanik (03709181)

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Exercise 1

There are two possible scenarios for each step. It either adds new landmarks or continues without adding new landmarks. In first iteration, it will start with adding new landmarks.

1. new landmarks:
    - project landmarks
    - Using left and right images from stereo images, find new keypoints.
    - find matches between projected landmarks and keypoints
    - localize camera
    - add new landmarks and remove old keyframes
    - optimize
2. continue without adding new landmarks:
    - project landmarks
    - using only left image, find keypoints
    - find matches between projected landmarks and keypoints
    - localize camera
    - update variables if optimization is finished

As long as there are enough keypoints, it continues without adding new landmarks.
Optimization is run in a second thread, so it does not block the main process.
Right image is only used when new landmarks are added.

Exercise 3

The main difference between optimization steps of *sfm* and *odometry* is that in the latter *landmarks* are populated using only the keyframes. Thus, the size of the optimization problem is kept smaller. Also, optimization is run in a separate thread, so it runs on background while the main process continues.

opt_finished and *opt_running* are used to control and check this optimization thread. When optimization is done, variables are updated based on optimization result. Without these, we cannot update the variables and cannot control when to add new landmarks.