
COMPUTER VISION - LAB 5

Topics: Keypoints, Descriptors and Matching

Goal: Create a panoramic image given a sequence of unstitched images.

Write a C++ class (`PanoramicImage`) which includes methods that / for:

1. Load a set of images
2. Project the images on a cylinder surface using the provided static method `cylindricalProj()` of the `PanoramicUtils` class. The method requires as a parameter an angle value (in degrees) which is half of the FoV of the camera used to take the photos. The FoV of the camera is 66° (half FoV= 33°) for all the provided datasets excluding the “dolomites” one for which it is 54° (half FoV= 27°). See the attached “Cylindrical projection.pdf” document for further information about panoramic Images and the cylindrical projection.
3. Extract ORB or SIFT features from the images (SIFT features requires the `xfeatures2d` module that is part of the `contrib` package of OpenCV available only with installation from sources).
4. For each (consecutive) couples of images
 - a. Compute the matches between the different features extracted in (3). For this, OpenCV offers you the `cv::BFMatcher` class. Remember to use L2 distance for SIFT and the Hamming distance for ORB.
 - b. Refine the matches found above by selecting the matches with distance less than $\text{ratio} * \text{min_distance}$, where `ratio` is a user-defined threshold and `min_distance` is the minimum distance found among the matches.
 - c. By the fact that in the cylinder the images are linked together by a simple translation, using the refined matches, find the translation between the images. To this end, you can use the RANSAC algorithm. While OpenCV does not provide a direct RANSAC function, the set of inliers can be computed by using the `findHomography()` function, with `CV_RANSAC` as the third parameter (hint: the inliers can be retrieved by using the `mask` argument). Otherwise, you can implement a simplified RANSAC following the trace on the slide.
5. Using the set of translations found in (4.c). compute the final panorama merging together the input images.

Write a program to test the previous class. The program should:

1. Create an instance of the `PanoramicImage` class with the images in the data folder
2. Display the result

SAMPLE OUTPUT:

