# Report Lab 6

The project is organized in three files:

- the main;
- the header in which there are the declarations of the functions;
- the cpp file in which the functions are defined.

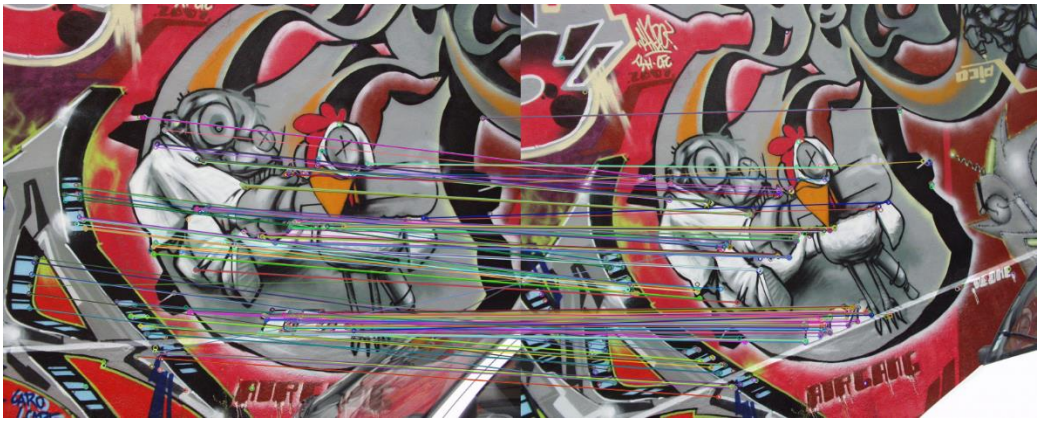
In the cpp file there are some functions, as for example, the one that allows you to detect the keypoints and compute the descriptors of the two images by using the ORB method and the one that applies the brute force approach and the Hamming distance for doing features matching between two images. In the latter function, the good matches are the ones that have distance less than five times the minimum distance between all matches.

In the main file, the command line arguments are checked, then there are some called of functions that receive two images as arguments and other variables and allow you to detect the keypoints of the two images, to calculate the descriptors and apply features matching by using the brute force approach. Then the result is displayed as an image which is the collection of the two images and in which there are some lines that show the features matched. Finally, the result is evaluated by finding the Homography matrix computed with RANSAC method, finding a threshold for the maximum distance for the feature matching and by counting the number of good matches and inliers. A match is considered as a good match if its distance is greater than 70% of the threshold. The two images are considered as they have the same content if the number of good matches is greater than 10 and the number of inliers is greater than 80% of the total number of matches; as they have similar content but are processed by a strong transformation if the number of good matches is greater than 10 and the number of inliers is less or equal to 80% of the total number of good matches. Otherwise, the two images are considered as they have different content.

One of the problems that I have found is that, at the beginning, I used the L2 NORM as method to calculate the distance during brute force method and I obtained some negative numbers which are not allowed with this calculation method and I have resolved this problem by filtering the matches by their sign. After some research, I have found that L2 NORM is not the right method to use with ORB and a good one is the Hamming distance, so I have changed it and finally I have obtained better results.

In the following, some images of the results obtained:

- Two images considered as they have similar content



- Two images considered as they have similar content but processed by a strong transformation