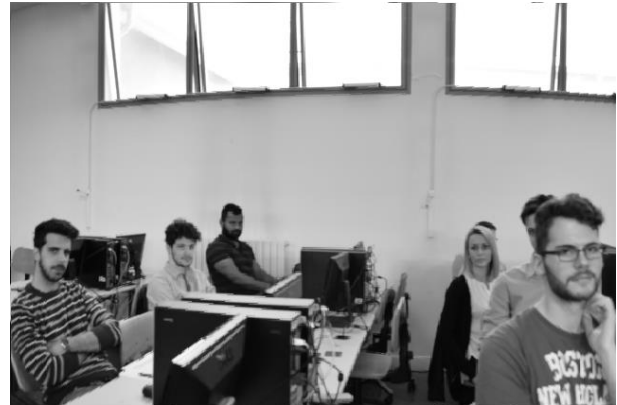


**-short report-**

This lab was really well guided and i liked it very much and I didn't spaced too much from the guidelines offered. The report will so focus only on results obtained. The code starts by loading the images contained in the name of the folder passed by command line and applying the cylindrical projection on all of them, noticeable in the example below especially looking onto the window lines.

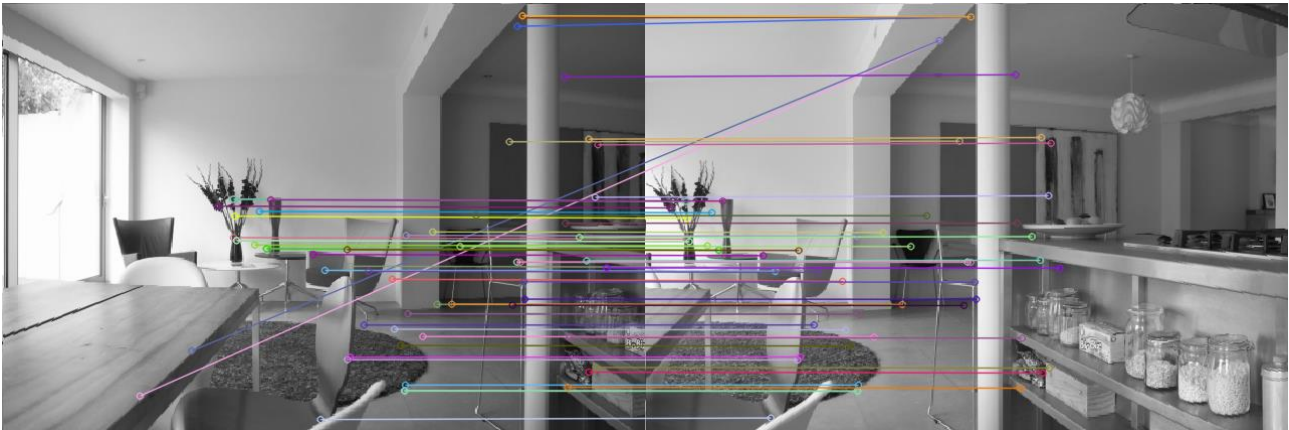
```
ctude/panoramic_utils.cpp -o main $(pkg-config --libs --cflags opencv4)
• AD\morsalb13133@dei-cv-015:~/Desktop/cpp/Lab 7 Image stitching-20240506/bin$ ./main data
Successfully loaded 12 images
Successfully projected 12 images.
```



*cylindrical projection (on the right) of image i0.png (on the left) of data folder*

After this, continues by extracting SIFT features and matches them with a BFmatcher. Right after, a “selector” of the good matches is realized, trashing all the matches whose distance is greater than 3 times the minimum match distance (in the feature space). Below is reported the application on the 1<sup>st</sup> and 2<sup>nd</sup> image of each of the three provided datasets: data, dolomites and kitchen.





SIFT feature extraction and matching with a BFMatcher with a ratio threshold=3 on the first and second images of kitchen dataset.

The last step is the computation of dx, dy of each image with the next one and the forming of the final stitched image. The code iterates two times on ds=(dx,dy) array:

1. The first time to compute the dimensions of the final image (looking for the extrema ymin (negative) and ymax(positive) to add (in absolute value) on the final image to the initial image height. The same is done for computing the width.
2. The second time to actually copy the image in the right position.

The results on the 3 datasets provided are reported below and commented right after.



In this dolomites dataset is clearly visible the human displacement error in the y-direction, and the needing for a detection of extremas ymin and ymax, not that visible in the other two datasets. The final image can be obtained by just keeping the central band.



Below the entire application process visible by command line executing the script on the data dataset.

```

c:\code\panoramatic\utils.cpp -o main -std=c++11 -I c:\code\panoramatic\include
AD\morsalib13133@dei-cv-015:~/Desktop/cpp/Lab 7 Image stitch
Successfully loaded 12 images.
Successfully projected 12 images.
QStandardPaths: wrong permissions on runtime directory /run
(main:35210): dbind-WARNING **: 15:31:50.993: Couldn't register the remote application did not send a reply, the message r the network connection was broken.
QStandardPaths: wrong permissions on runtime directory /run
Extracting features...
Extracted 1266 keypoints with a [128 x 1266] descriptor.
Extracted 992 keypoints with a [128 x 992] descriptor.
Extracted 958 keypoints with a [128 x 958] descriptor.
Extracted 820 keypoints with a [128 x 820] descriptor.
Extracted 1370 keypoints with a [128 x 1370] descriptor.
Extracted 1611 keypoints with a [128 x 1611] descriptor.
Extracted 980 keypoints with a [128 x 980] descriptor.
Extracted 1171 keypoints with a [128 x 1171] descriptor.
Extracted 1367 keypoints with a [128 x 1367] descriptor.
Extracted 1198 keypoints with a [128 x 1198] descriptor.
Extracted 1121 keypoints with a [128 x 1121] descriptor.
Extracted 1456 keypoints with a [128 x 1456] descriptor.
Successfully extracted features on 12 images.

```

```

Matching features...
Found 1266 matches on imgs 0,1. Minimum distance found: 20.8087. From 1266 kept 27 good matches.
Found 992 matches on imgs 1,2. Minimum distance found: 29.6648. From 992 kept 64 good matches.
Found 958 matches on imgs 2,3. Minimum distance found: 17.8326. From 958 kept 20 good matches.
Found 820 matches on imgs 3,4. Minimum distance found: 31.8119. From 820 kept 55 good matches.
Found 1370 matches on imgs 4,5. Minimum distance found: 22.8692. From 1370 kept 40 good matches.
Found 1611 matches on imgs 5,6. Minimum distance found: 31.9374. From 1611 kept 72 good matches.
Found 980 matches on imgs 6,7. Minimum distance found: 28.688. From 980 kept 51 good matches.
Found 1171 matches on imgs 7,8. Minimum distance found: 30.4959. From 1171 kept 76 good matches.
Found 1367 matches on imgs 8,9. Minimum distance found: 30.4467. From 1367 kept 104 good matches.
Found 1198 matches on imgs 9,10. Minimum distance found: 21.6564. From 1198 kept 45 good matches.
Found 1121 matches on imgs 10,11. Minimum distance found: 36.2353. From 1121 kept 128 good matches.
Successfully found 11 matches.
Computing translation...
From 27 kept 24 inliers for imgs 0,1. Average ds: [316.588, -0.479556]
From 64 kept 50 inliers for imgs 1,2. Average ds: [319.648, 1.93195]
From 20 kept 17 inliers for imgs 2,3. Average ds: [316.708, 0.438781]
From 55 kept 50 inliers for imgs 3,4. Average ds: [326.311, 0.582473]
From 40 kept 36 inliers for imgs 4,5. Average ds: [305.02, 0.431898]
From 72 kept 56 inliers for imgs 5,6. Average ds: [317.962, 0.492535]
From 51 kept 41 inliers for imgs 6,7. Average ds: [317.389, 0.740531]
From 76 kept 52 inliers for imgs 7,8. Average ds: [317.025, 0.547275]
From 104 kept 89 inliers for imgs 8,9. Average ds: [321.38, 0.270846]
From 45 kept 45 inliers for imgs 9,10. Average ds: [309.913, 0.335297]
From 128 kept 87 inliers for imgs 10,11. Average ds: [318.109, 0.478609]
Successfully processed 11 (dx,dy).
Size: [640 x 427] to [4126 x 433]

```