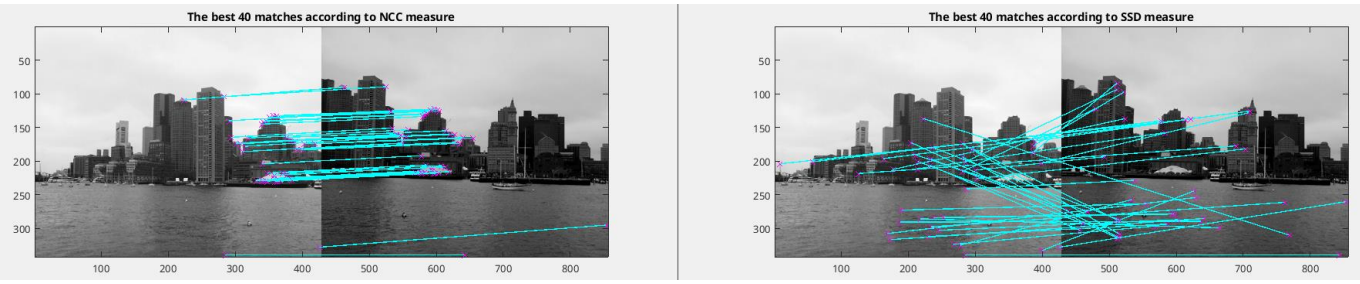
1. In this exercise, the goal is to implement NCC and compare the results with SSD on Matching
    a. As we can see (on the left NNC, on the right SSD) there are a lot of different results between both.



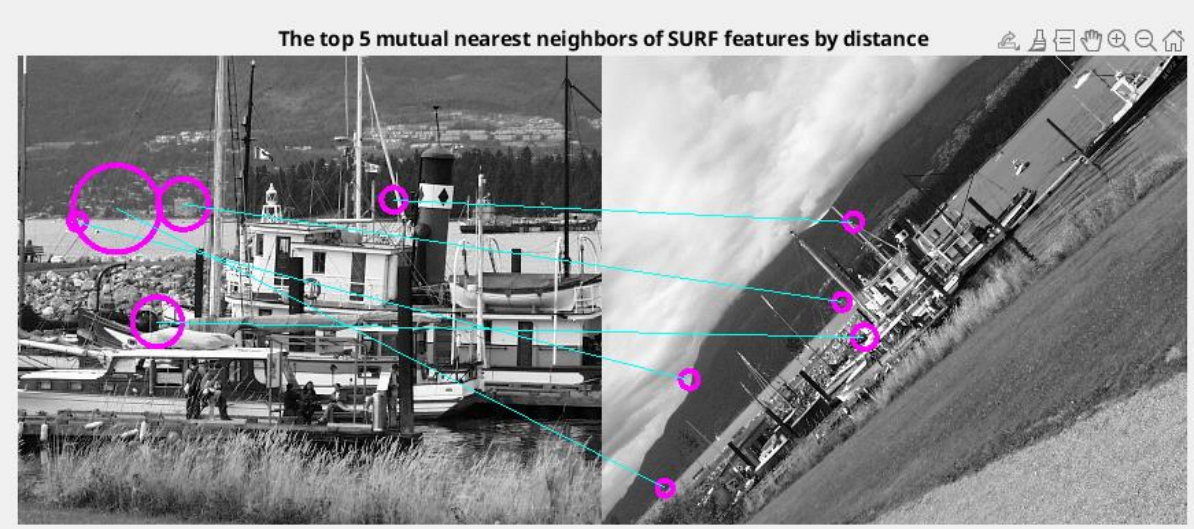
    b. How many correct correspondences do you get by using NCC instead of SSD?

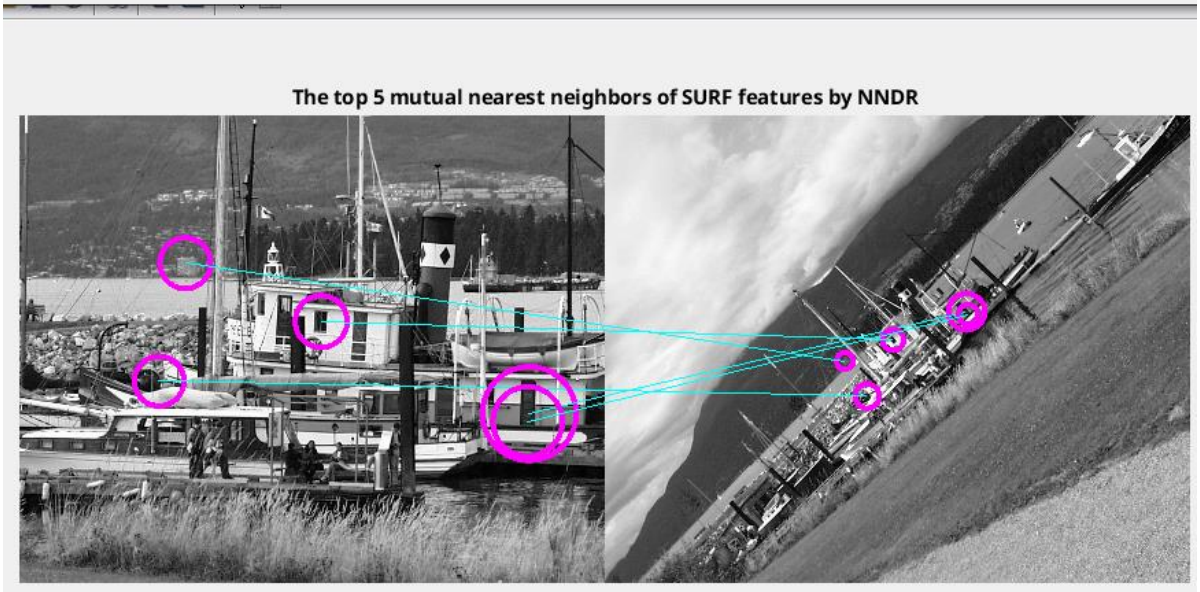
Using NNC we were able to get 70 correct correspondences against 49 using SSD.

    c. Which one of the two similarity measures performs better in this case and why?

In this case, **NCC** performs **better** than **SSD**, due to NCC is less sensitive to lightning changes and contrast.

2. In this exercise, we combine the facial images of a wolf and a man to create a hybrid image.
    a. As shown in the image below, when retrieving the extra features by distance, we only got 2 accurate matches. Using nearest neighbor distance ratio, we got 100% correct match for the top 5 features.





b.

i. **What are the benefits of using SIFT/SURF regions instead of Harris corners?**

The main strength of SIFT/SURF regions is the scale-invariance, and it is more time-consuming to be able to achieve a higher correctness and robustness. It can also handle differences in illumination.

ii. **Why would the matching approach of task 1 (i.e., Harris corners and NCC based matching) not work for the example images of**

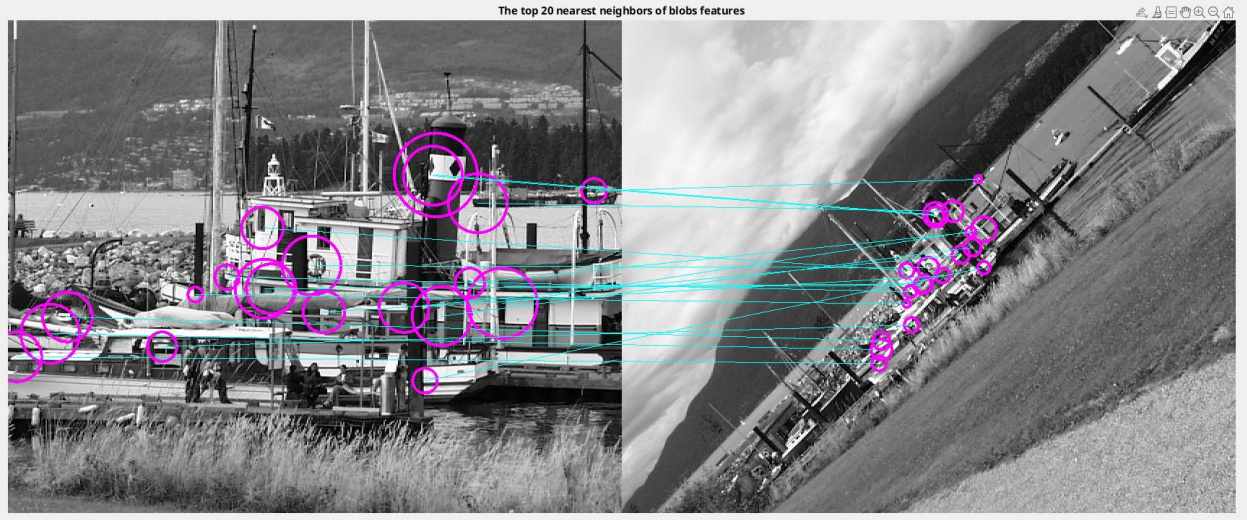
task 2? In what kind of cases may Harris corners still be more suitable than SURF and why?

The approach taken in task 1 would not work in the images of task 2, due to image scaling and rotation, which Harris corners may fail to find, since does not handle those very well.

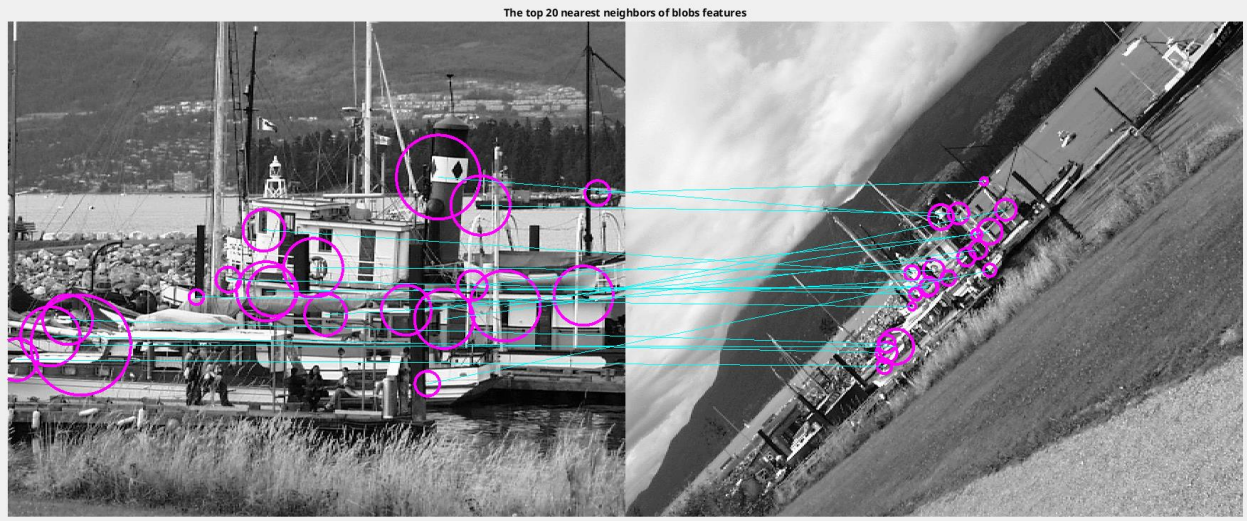
Harris corners may be more suitable than SURF in high contrast images with well-defined corners, it is also a low-time consuming algorithm.

3. In this exercise, we will compare similar regions by blob detection features between Matlab built-in implementation and a Custom implementation.

Pre-computed blob detection



Regions computed by my own implementation



Can you identify some corresponding regions in the visualized results?

From the top 20 nearest neighbors of the blob features, we observe nearly 100% matching accuracy between the pre-computed results and those generated by my own implementation. The differences between the MATLAB built-in features and the features detected by my implementation are minimal, with only small variations in the exact region boundaries. Overall, the results are highly similar, demonstrating that the custom implementation closely follows the behavior of the pre-computed method, while still capturing key blob-like regions in both images.