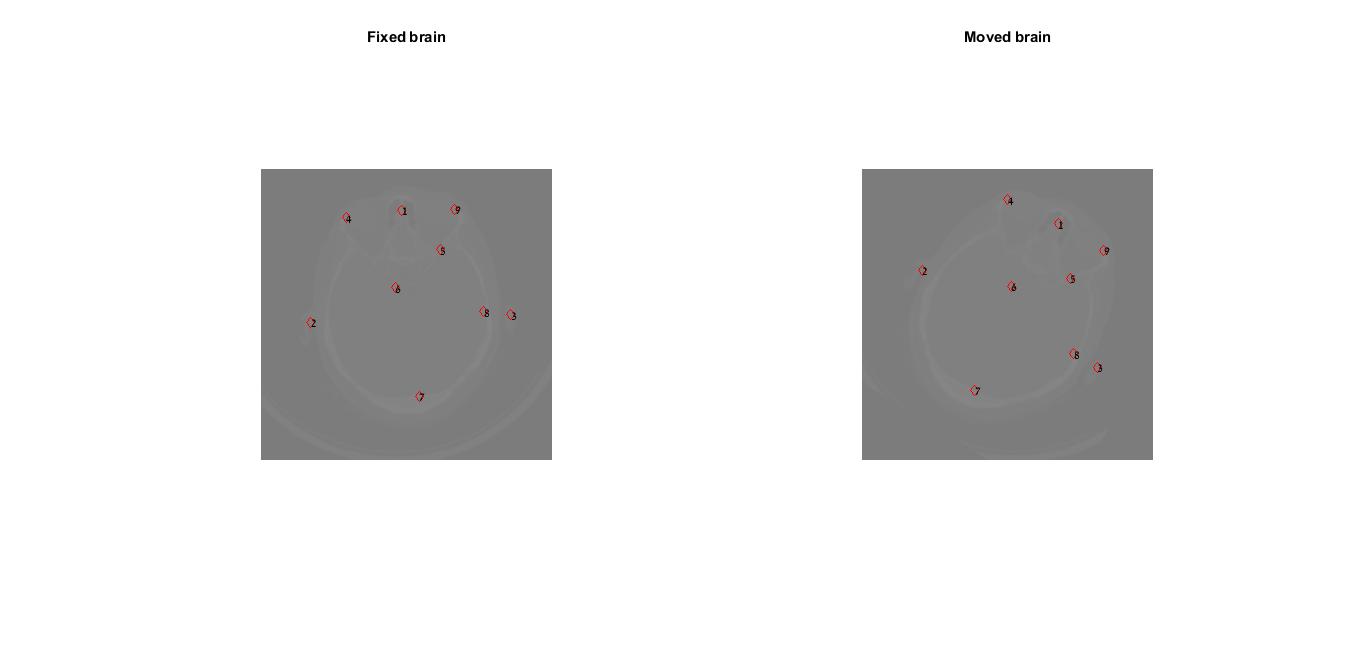
**MIP: Ex2 Part1**

Clara Herscu (login: clara.herscu; id:203319371)

**Task 1:**

1. Results:



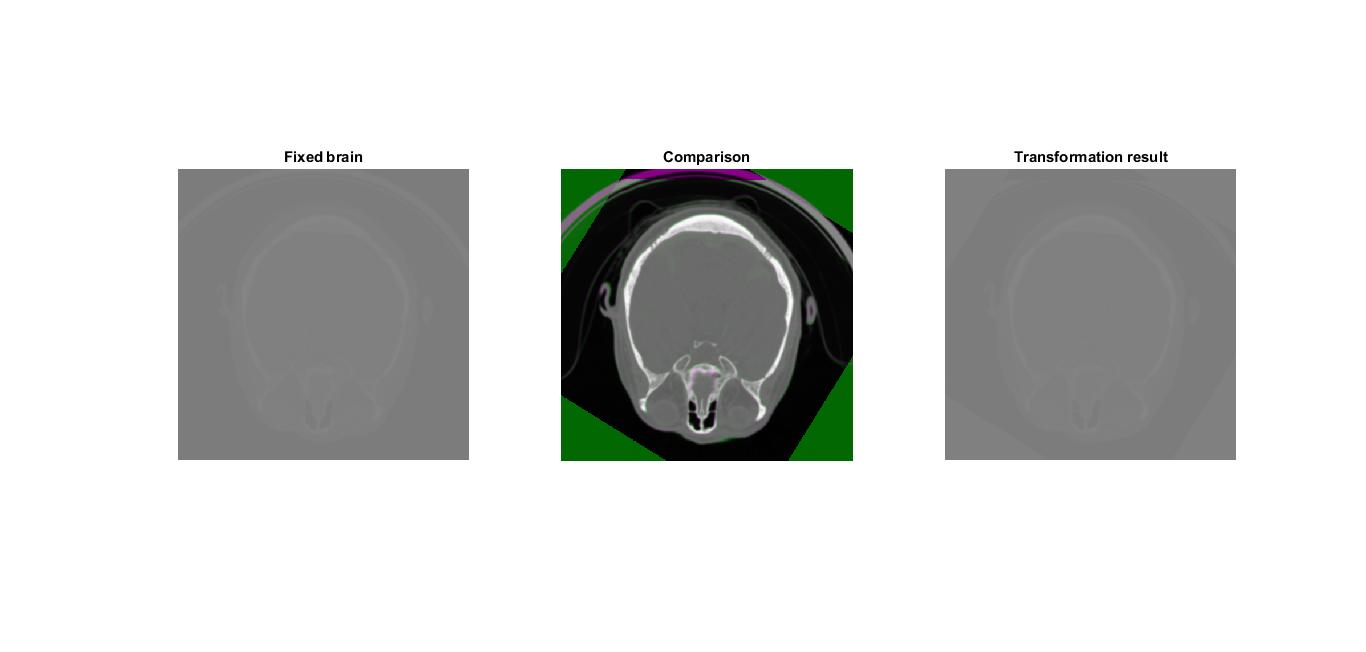
There are no visible wrong couplings in this sample.

1. I got the following rigid registration matrix:
2. The distance in pixels is:

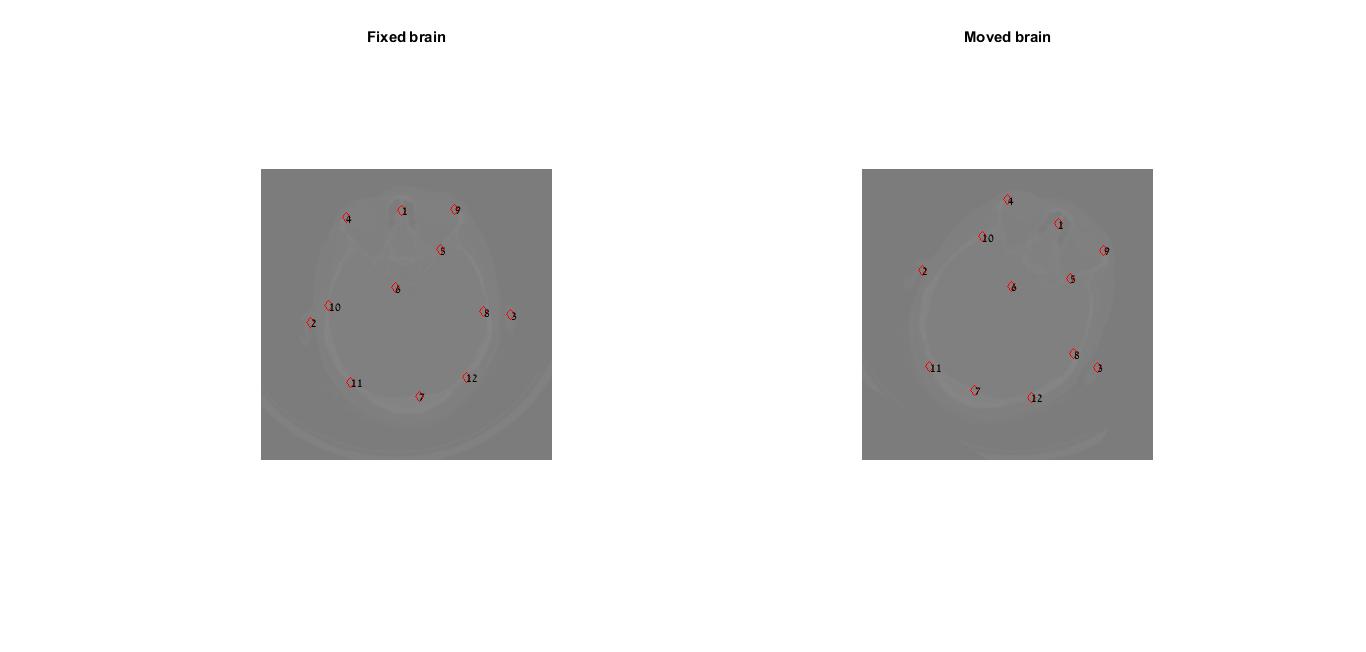
[0.8274, 0.0748, 4.5108, 1.3933, 1.7205, 1.0002, 0.9799, 2.1162, 0.7557]

(RMSE = 1.9134)

1. Result:



1. Results:



Here we do have outliers: {10, 11, 12}

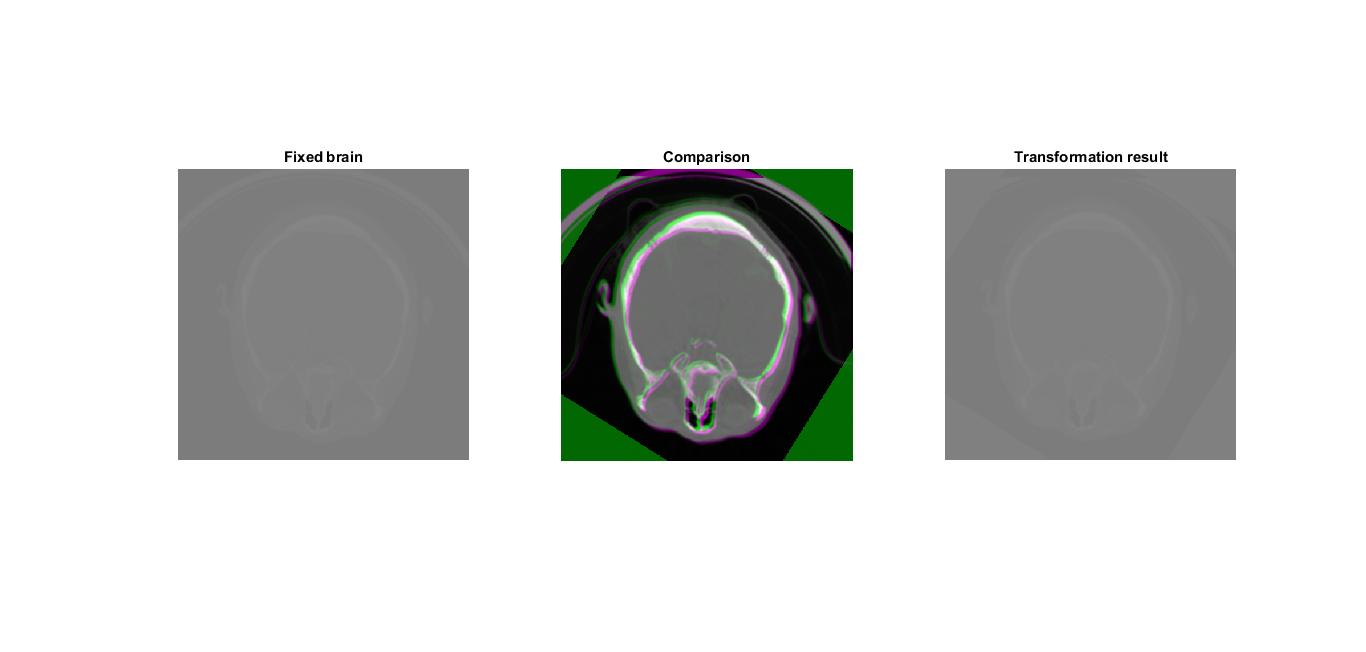
I got the following rigid registration matrix:

The distance in pixels is:

[7.4508, 7.2853, 5.1906, 6.4522, 7.6625, 7.6862, 7.5153, 8.5978, 8.0666, 75.4758, 44.3636, 5.2930]

(RMSE = 27.2849)

And the result is:

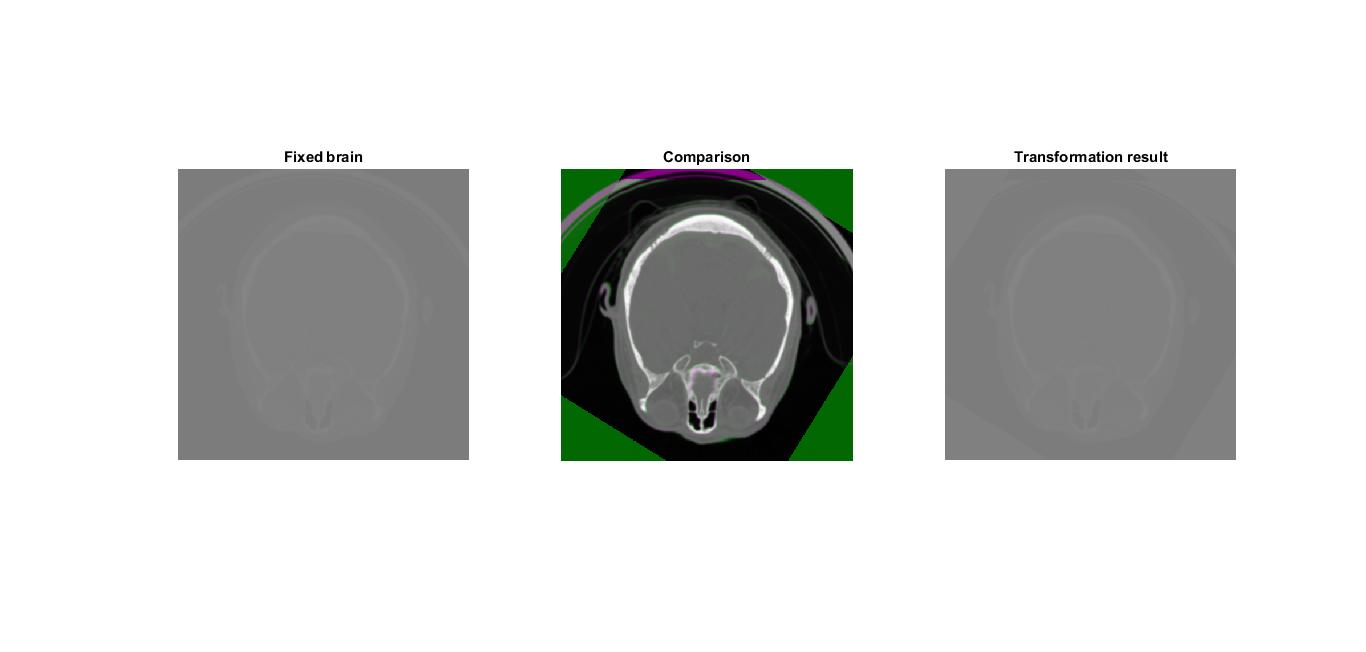


It's easy to see that the set including outliers gave worse results, shown as an imperfect registration above. In addition, the RMSE is much greater because of the existence of these data points which are not well correlated even after the registration, because they are inherently differently located.

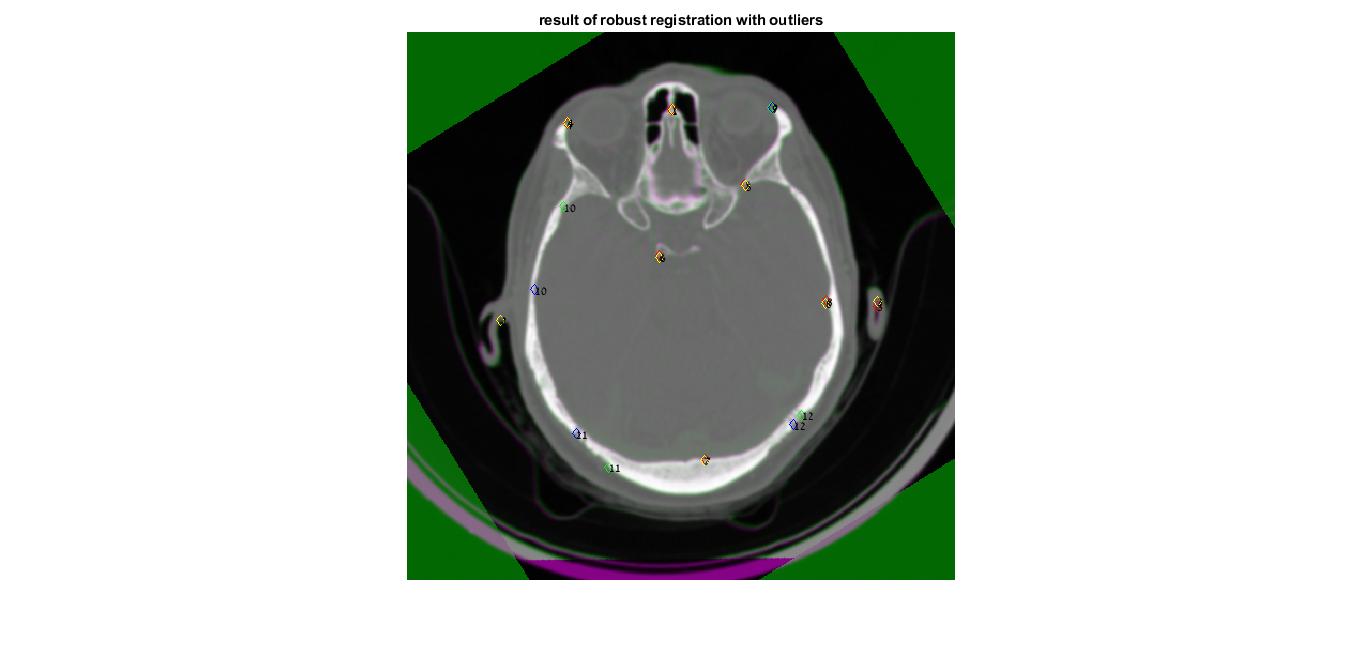
1. –
2. Here, we got again the rigid registration which is the same as the first method without outliers:

The distance vector in pixels is: [0.8274, 0.0748, 4.5108, 1.3933, 1.7205, 1.0002, 0.9799, 2.1162, 0.7557, 81.9221, 43.6597, 11.5812], where the last 3, obviously higher distance values belong to the outliers in the data (RMSE = 27.0562).

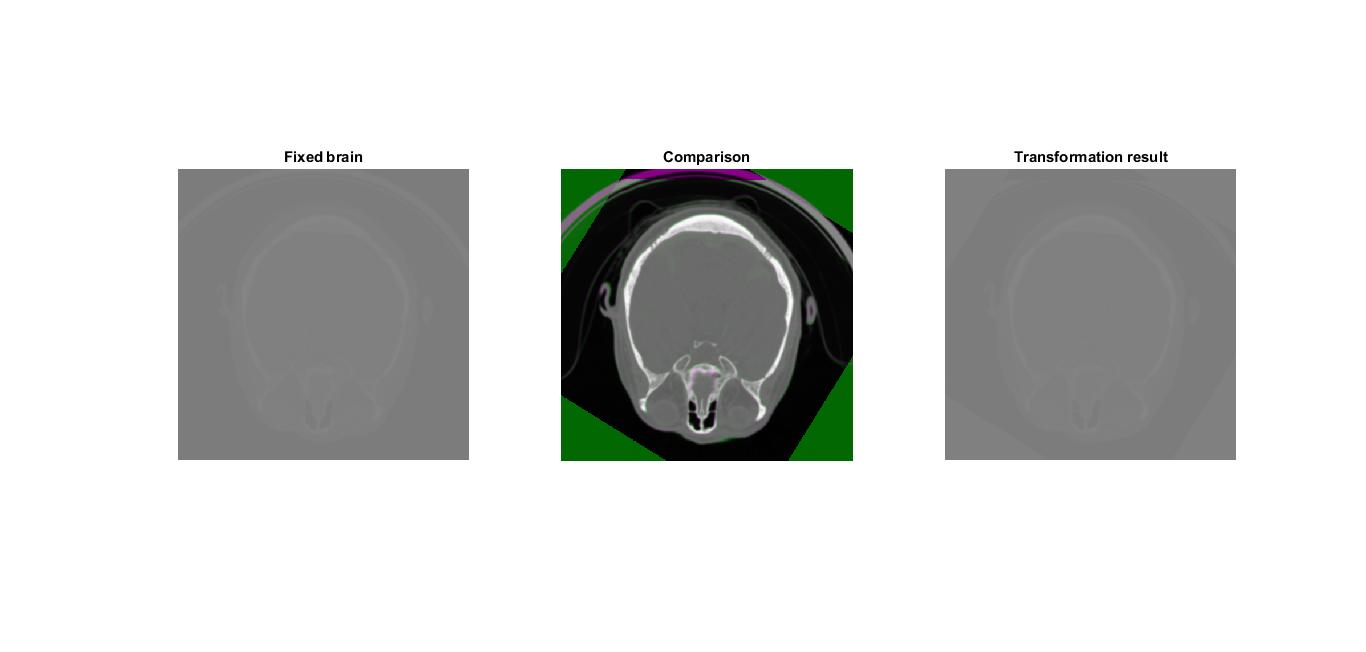
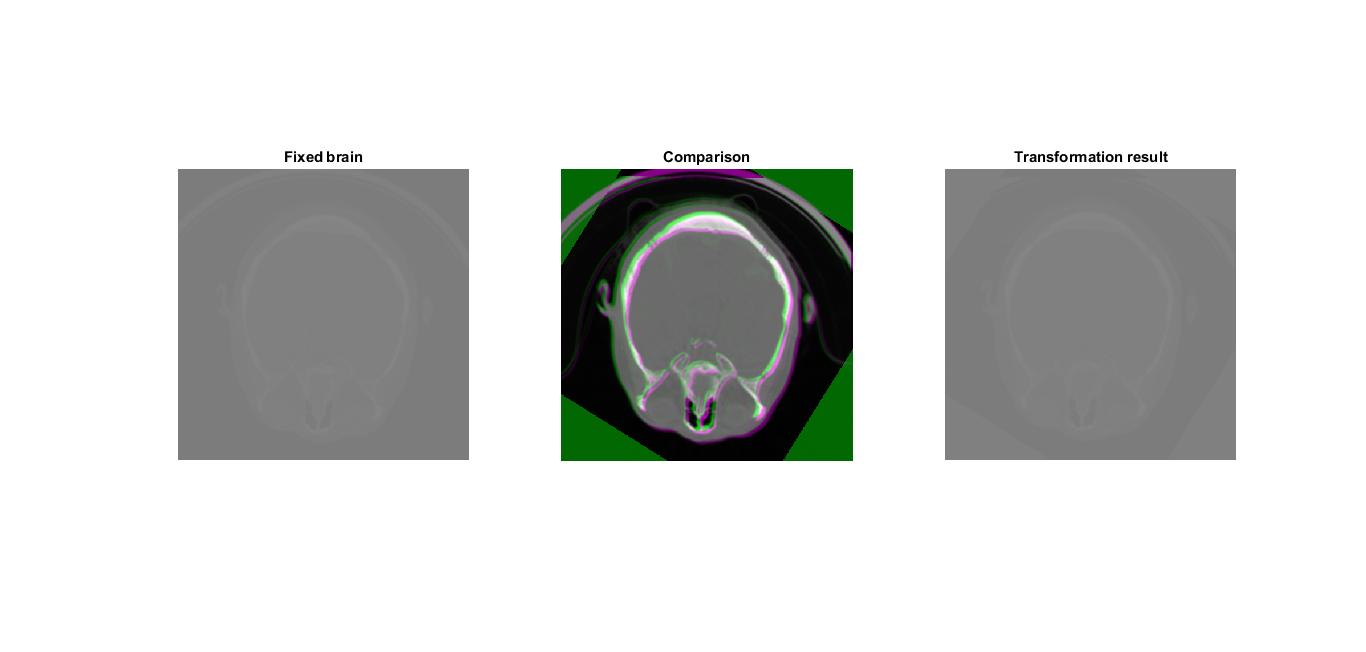
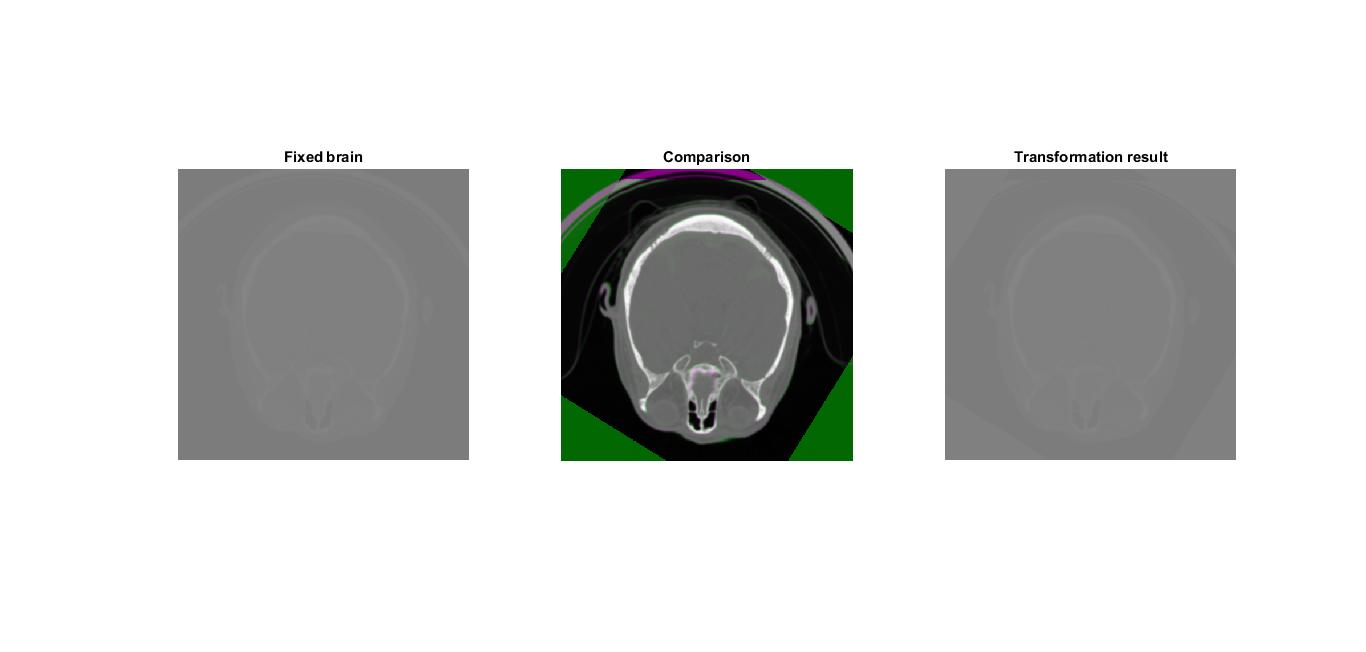
The result I got was:



Outliers in green and blue, inliers in red and yellow:

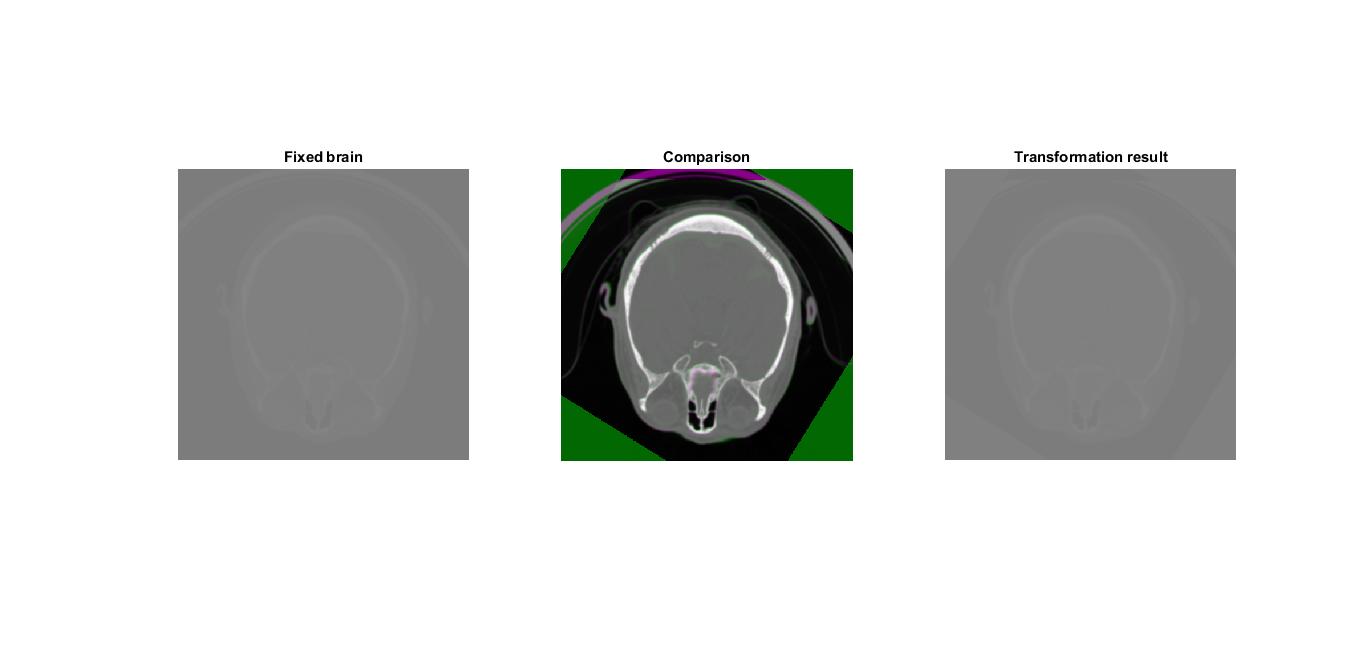


Comparing all 3 methods we see: (left to right: robust, non-robust with outliers, and without outliers).



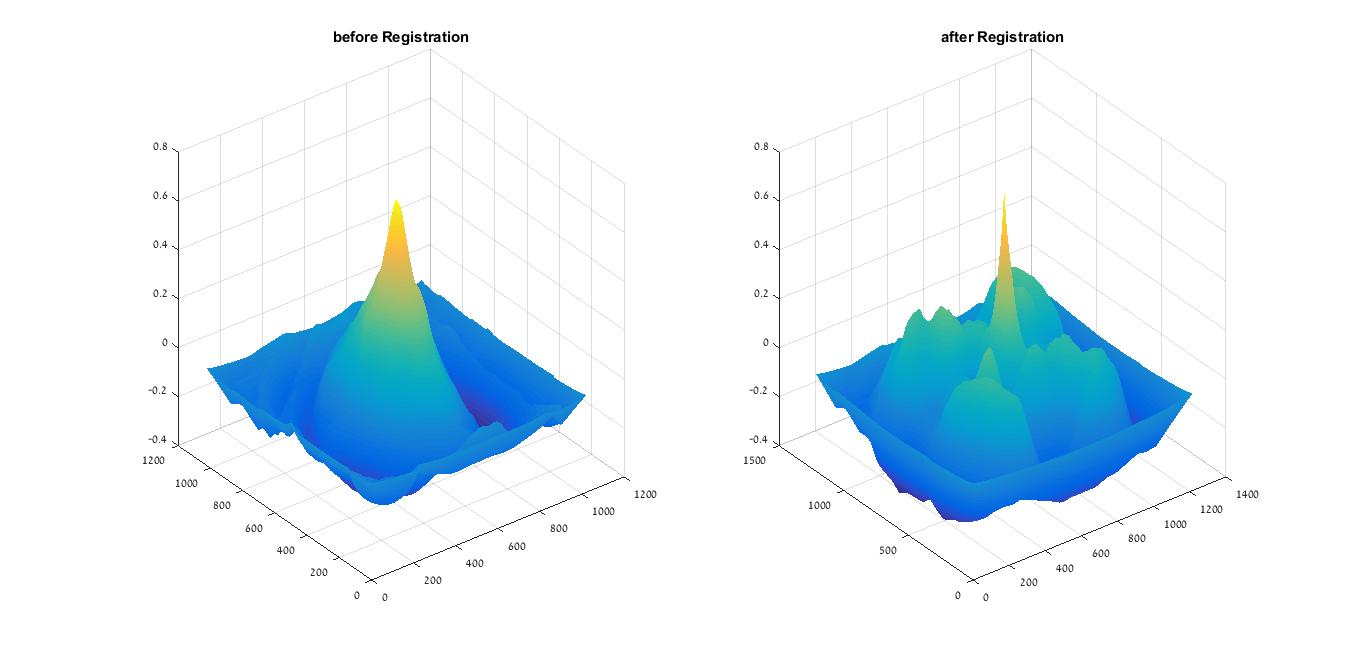
**Task 2:**

1. Results:



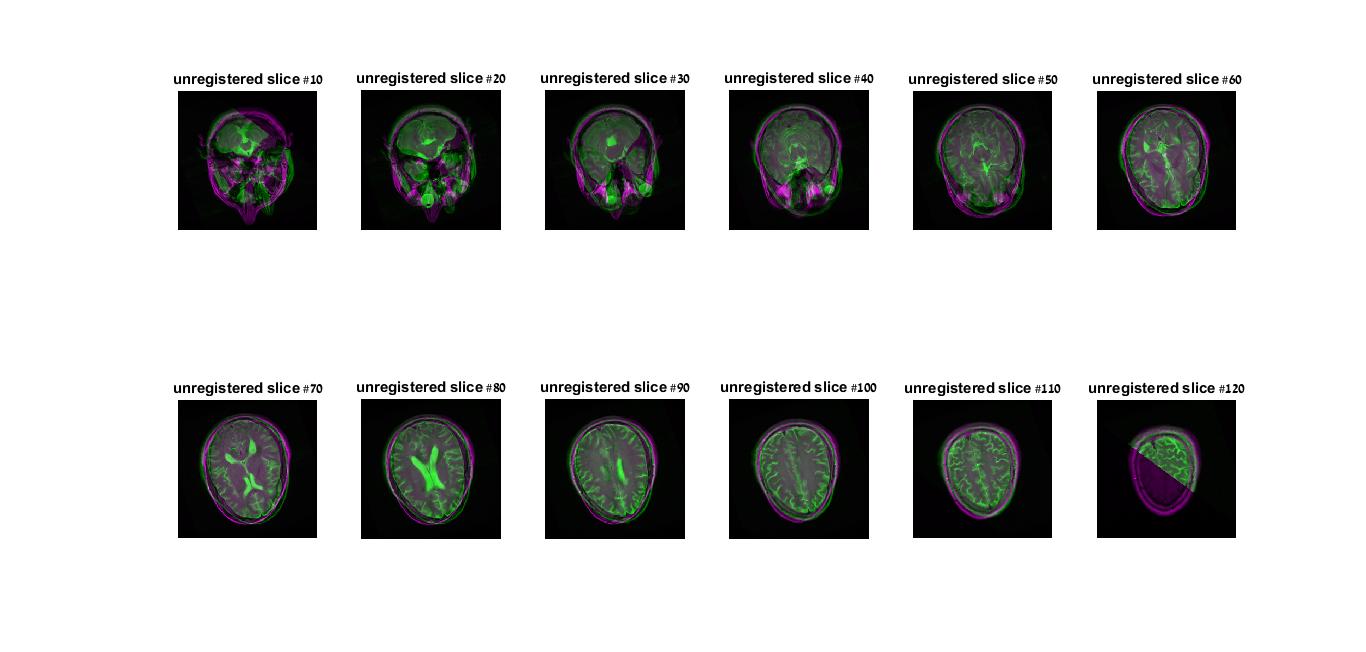
The normalized cross correlation before and after registration is:

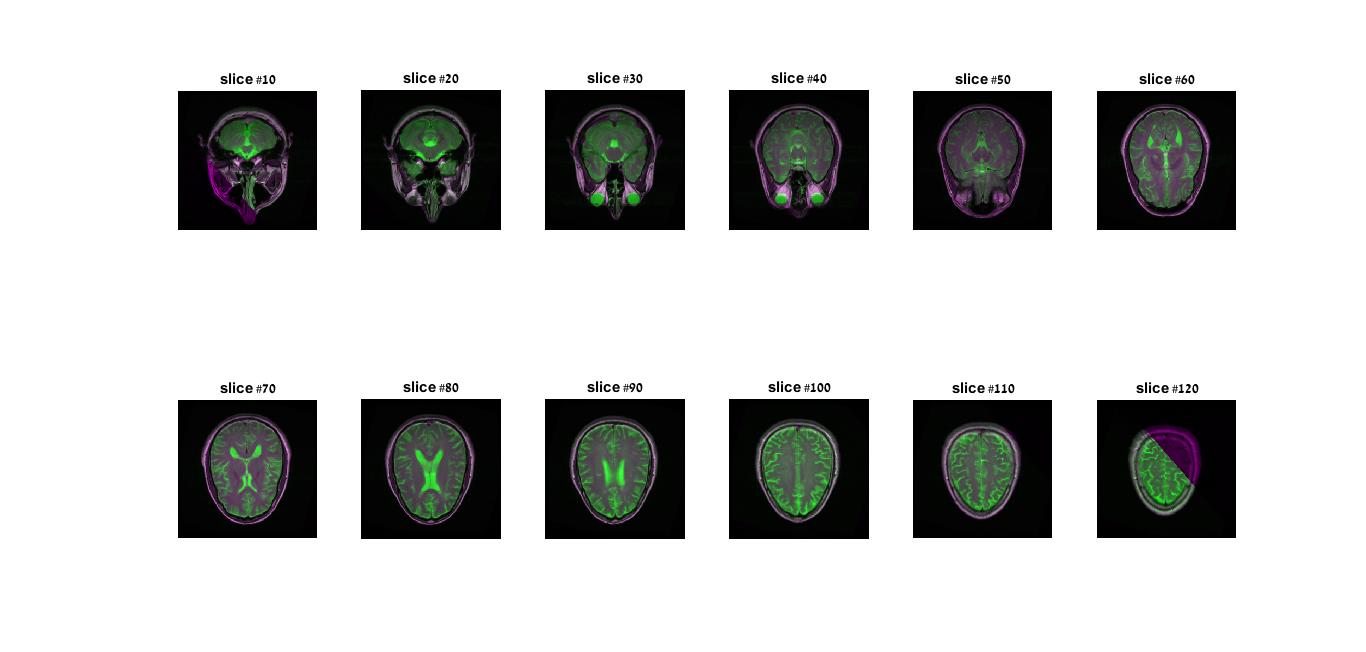
Before registration: 0. 7382; after registration: 0. 7766



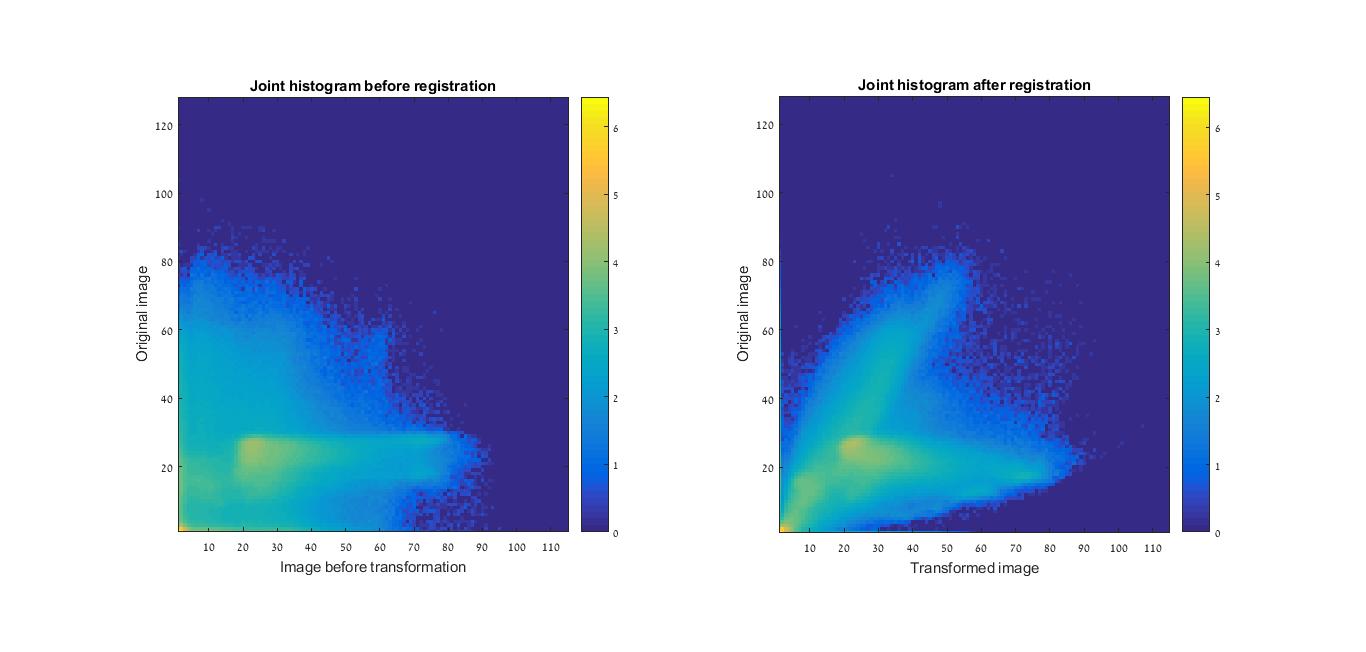
This indicates that there are greater peaks and therefore correlating parts between the two images.

1. Results:





The joint histograms give the following image:



1. NMI: NMI before registration is: 2.3318; NMI after registration is: 2.2815.