Practical 6

Q1. What transformation model did you assume for these pair of images?
I assumed 'nonreflective similarity' and ‘lwm’ transformation type for these pair of images.

Q2. Show the control point pairs you’ve selected using the cpselect function and the registration result. Explain why you selected these many pairs.

Control point pairs for lwm transformation are as below
Base points

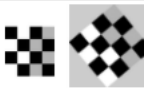
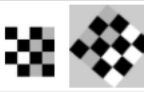
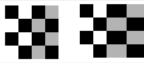
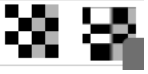
227	414.5
168	402.5
85	403.5
291	187.5
293	328.5
200	275.5
338	247.5
108	477.0
205	394
394	160.0
288	128.0
359	137.0

Float points

226	404.5
149	392.5
28	396.5
318	167.5
311	312.5
208	246.5
362	234.5
48	493
200	383
421	159
320	110
388	131

Registration result below

I selected these twelve pairs because the fitgeotrans documentation said the minimum number of control point pairs for lwm was 6 but 12 recommended.

Transformation Type	Description	Minimum Number of Control Point Pairs	Example
`'nonreflective similarity'`	Use this transformation when shapes in the moving image are unchanged, but the image is distorted by some combination of translation, rotation, and scaling. Straight lines remain straight, and parallel lines are still parallel.	2	
`'similarity'`	Same as `'nonreflective similarity'` with the addition of optional reflection.	3	
`'affine'`	Use this transformation when shapes in the moving image exhibit shearing. Straight lines remain straight, and parallel lines remain parallel, but rectangles become parallelograms.	3	
`'projective'`	Use this transformation when the scene appears tilted. Straight lines remain straight, but parallel lines converge toward a vanishing point.	4	
`'polynomial'`	Use this transformation when objects in the image are curved. The higher the order of the polynomial, the better the fit, but the result can contain more curves than the fixed image.	6 (order 2) 10 (order 3) 15 (order 4)	
`'pwl'`	Use this transformation (piecewise linear) when parts of the image appear distorted differently.	4	
`'lwm'`	Use this transformation (local weighted mean) when the distortion varies locally and piecewise linear is not sufficient.	6 (12 recommended)	

3. Comparing to the registration result in Figure 2, does your registration result suffer from the obvious ‘ghosting’ effect locally (caused by misregistration)?. If yes, can you think of a way to further eliminate it? Explain how you have done it and show an improved result again.

Yes my registration result suffers from the ‘ghosting’ effect locally.

To eliminate the ghost effect, I used the automatic registration process and changed the transformation model step function ‘fitgeotrans’ to ‘estimateGeometricTransform’. See my script **‘manualimprove.m’** (attached) for the code.

The improved result is as below

Q3. What does the variable distRatio do?
distRatio calculates the proximity of features in the first sample with respect to the second sample.
If the 128 features in the first sample are in 80% proximity of the second sample features than there is a match. We take the coordinates/indices of the first sample number and store in a new row vector match.
On the contrary if the distRatio criteria vals(1) < distRatio * vals(2) is not satisfied then drop the indices of that sample number.
So distRatio is a threshold we set to match the features.

Q4. What does degenfn parameter in the ransac function stand for?
The Degenfn parameter in ransac function discards random samples that do not result in useful models.

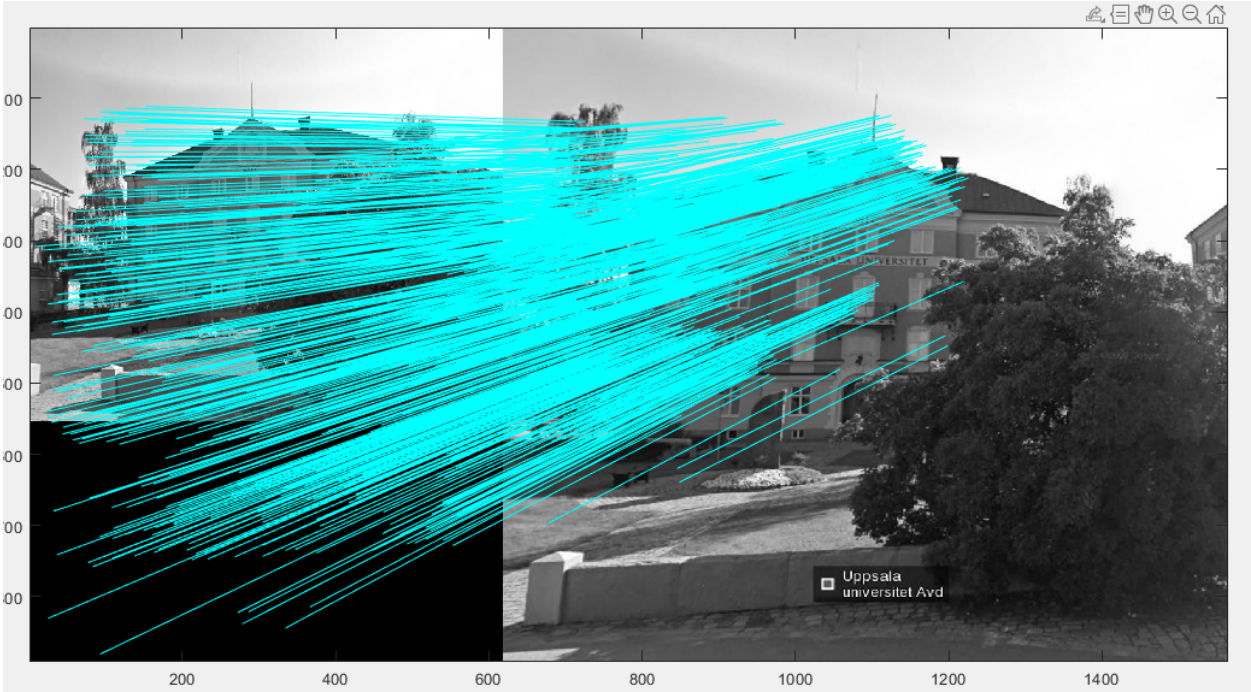
Q5. What parameter in Ransac you must change in order to diminish the amount of inliers to less than 700 inliers?
I changed the ‘transformtype’ parameter in estimateGeomatricTranform function from ‘projective’ to ‘similarity’ and the inliers reduced from 808 to 95.

Q6. What settings for the ransac did you use in order to achieve less than 700 inliers when resizing the images? Add screenshots.

Resizing the floating image to 1.5 times its original size with transform type ‘productive’ gave 906 inliers.

See the matching image and resulting infused images below

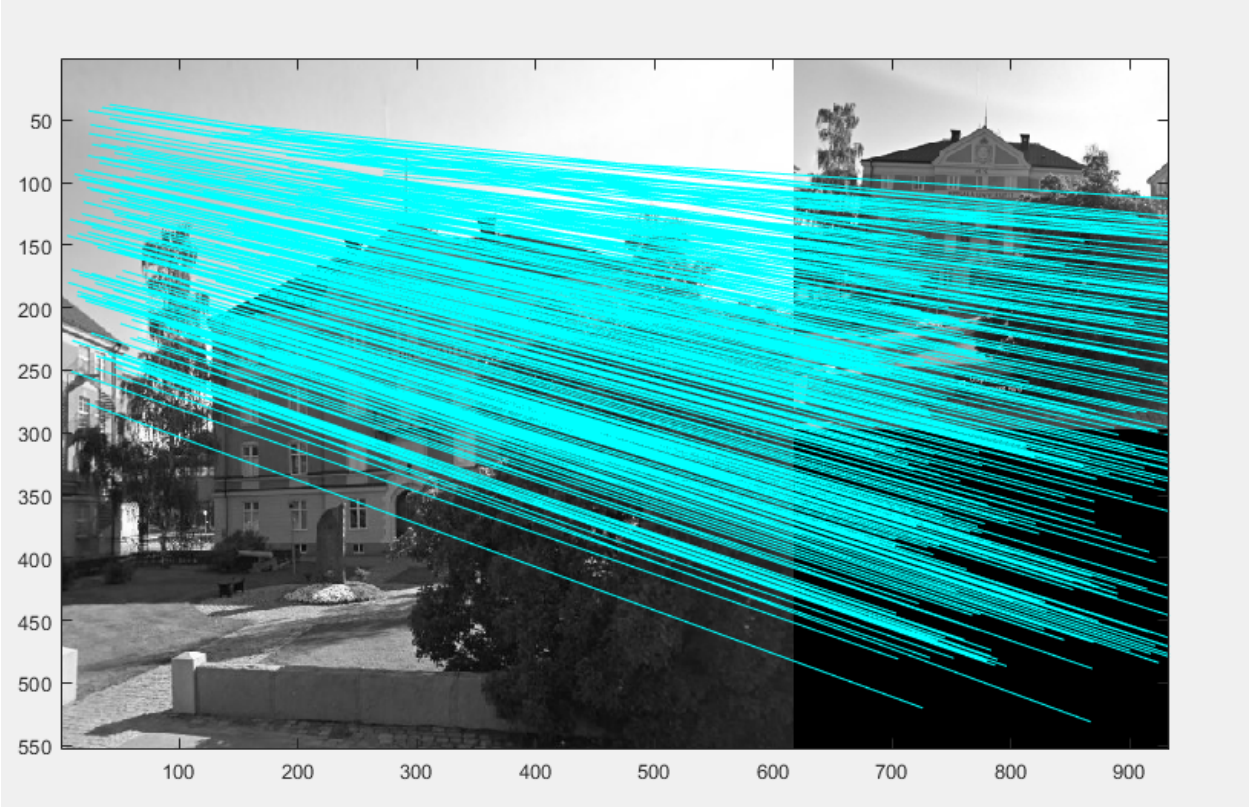
Matching at resize 1.5



Resulting infused image at resize 1.5

Resizing the floating image to 0.5 times its original size gave 345 inliers.

Matching at resize 0.5



Resulting infused image at resize 0.5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