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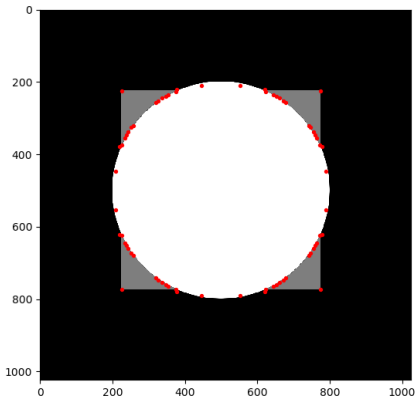
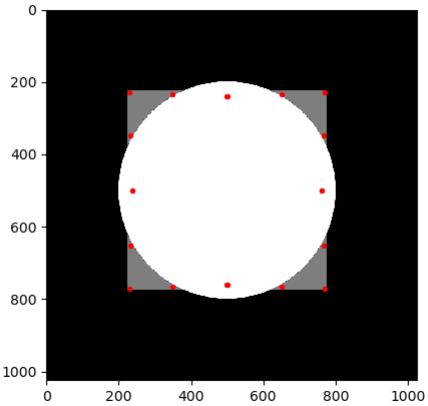
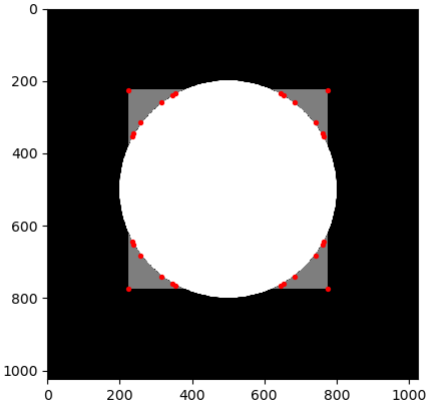
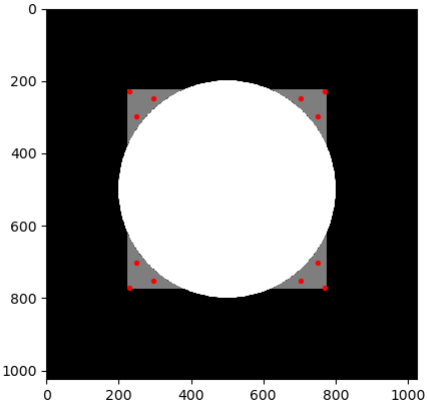
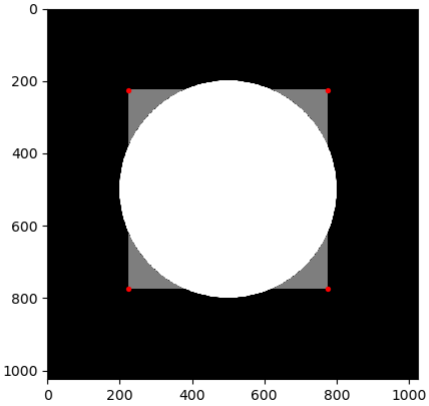
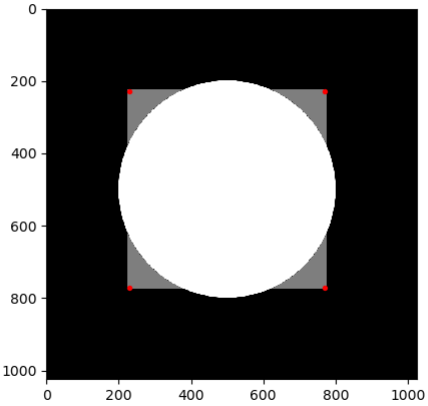
COMP 590: Computer Vision

HW 3 Report

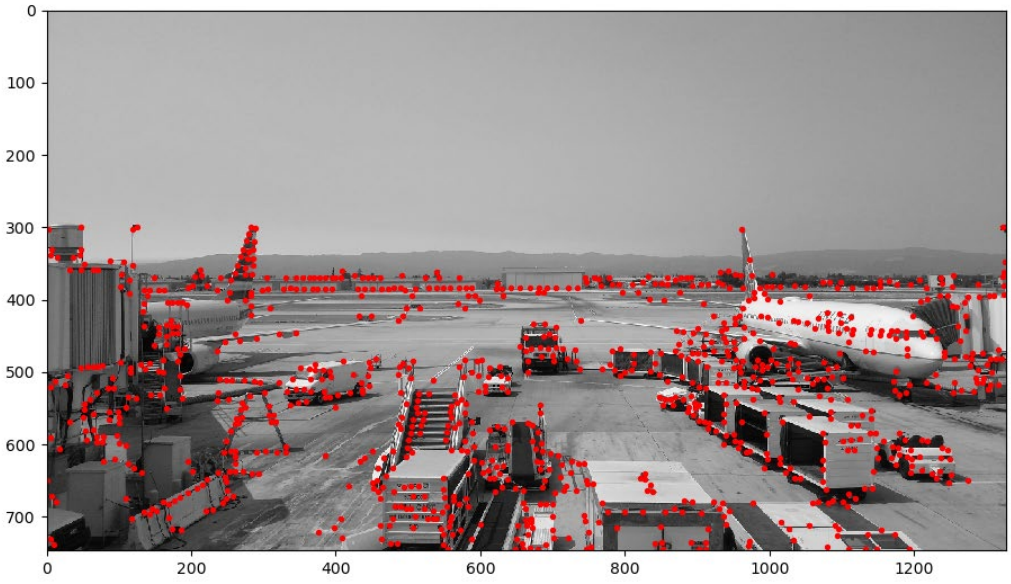
1. TEST.PNG WITH VARYING HARRIS CORNER K AND SIGMA

	Sigma = 1	Sigma = 9
k = 0.05		
k = 0.1		
k = 0.15		

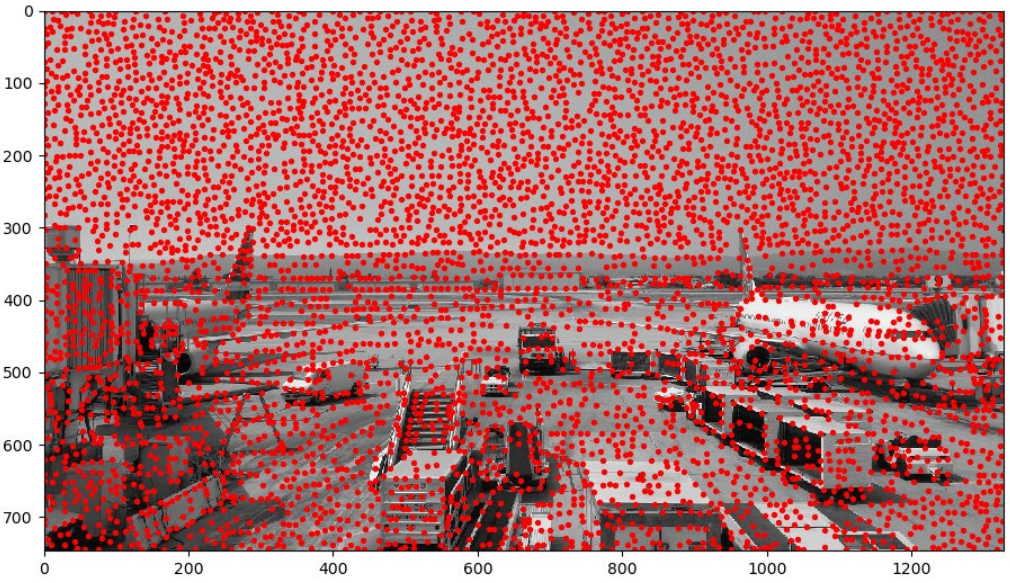
Summary: Increasing sigma seems to spread out the key points more, while increasing k decreases the number of key points left after non-maximum suppression.

2. AIRPORT_IMAGE1.PNG WITH VS. WITHOUT NON-MAXIMUM SUPRESSION

With Non-Maximum Suppression



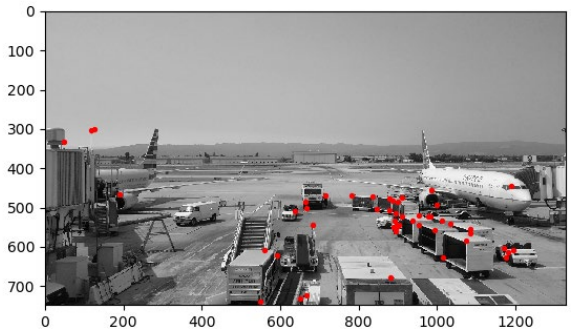
Without Non-Maximum Suppression



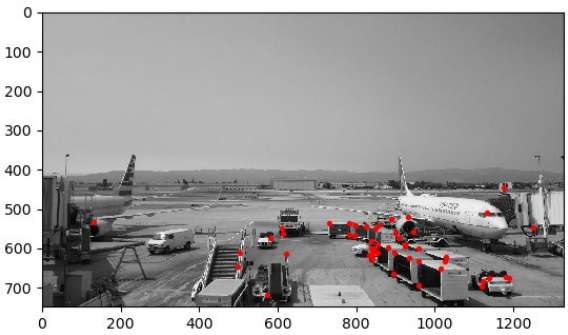
Summary: Without non-maximum suppression, the key points returned from the algorithm hold no meaning as it is simply a set of points that showed up in the computed corner map. Non-maximum suppression is desirable because it applies a threshold to how "strong" a key point must be relative to other points to be considered, both narrowing down the list of key points and picking points that are better suited to feature matching.

3. AIRPORT_IMAGE1.PNG & AIRPORT_IMAGE2.PNG MATCHES WITH K = 50, SSD

Key points in Image 1

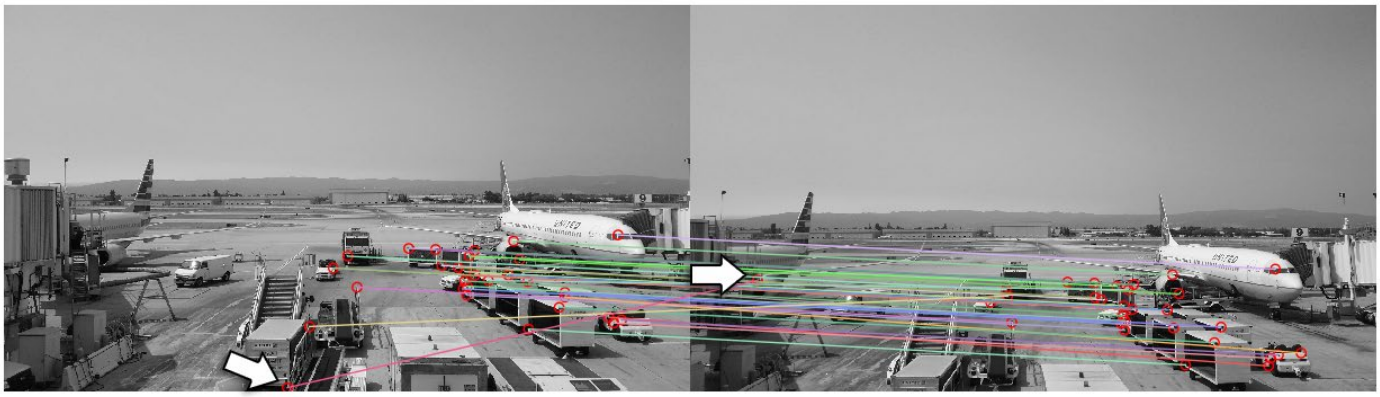


Key points in Image 2



Matches (Unlabelled)

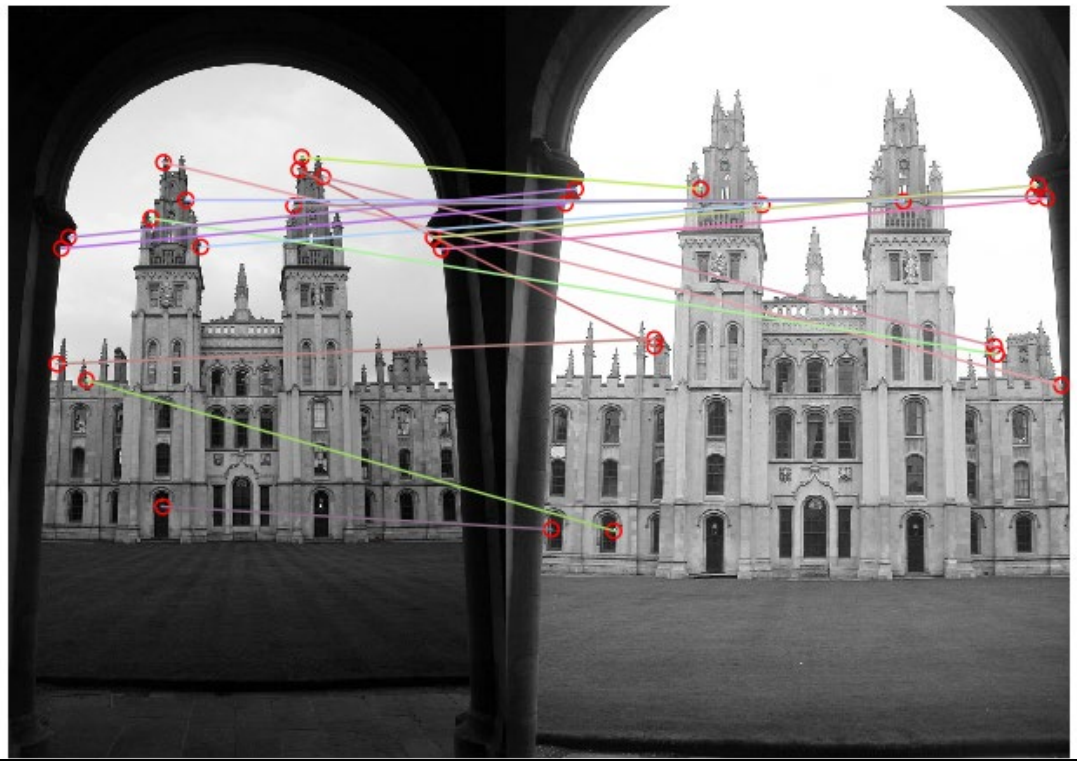
Matches (Incorrectly Matched Feature Labelled)



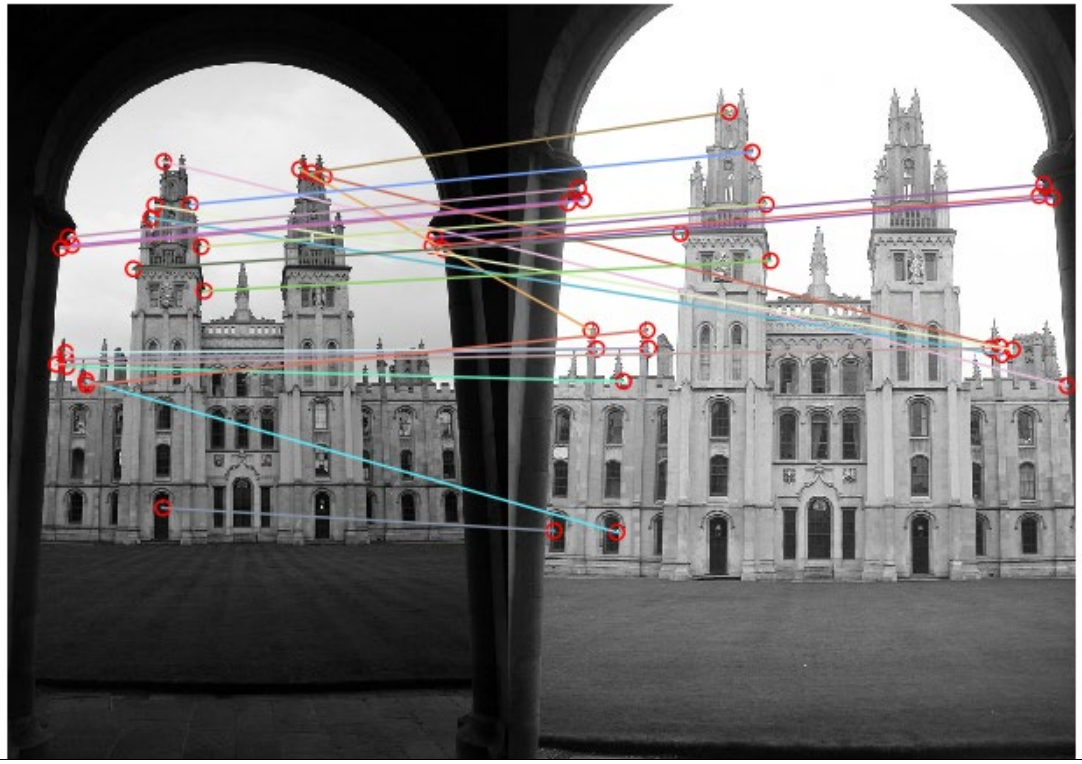
Summary: Not all features that were matched one-to-one between the two images were matched correctly. One instance is pointed out with arrows in the match plot.

4. OXFORD1.PNG & OXFORD2.PNG MATCHES WITH K = 50, SSD VS. NCC

MATCHES WITH SSD



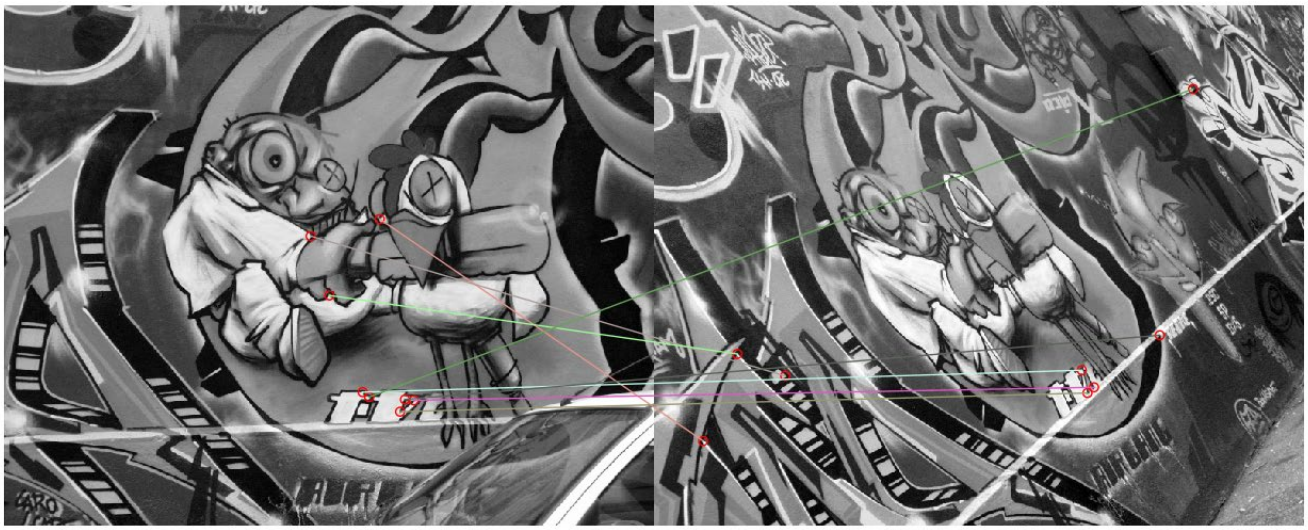
MATCHES WITH NCC



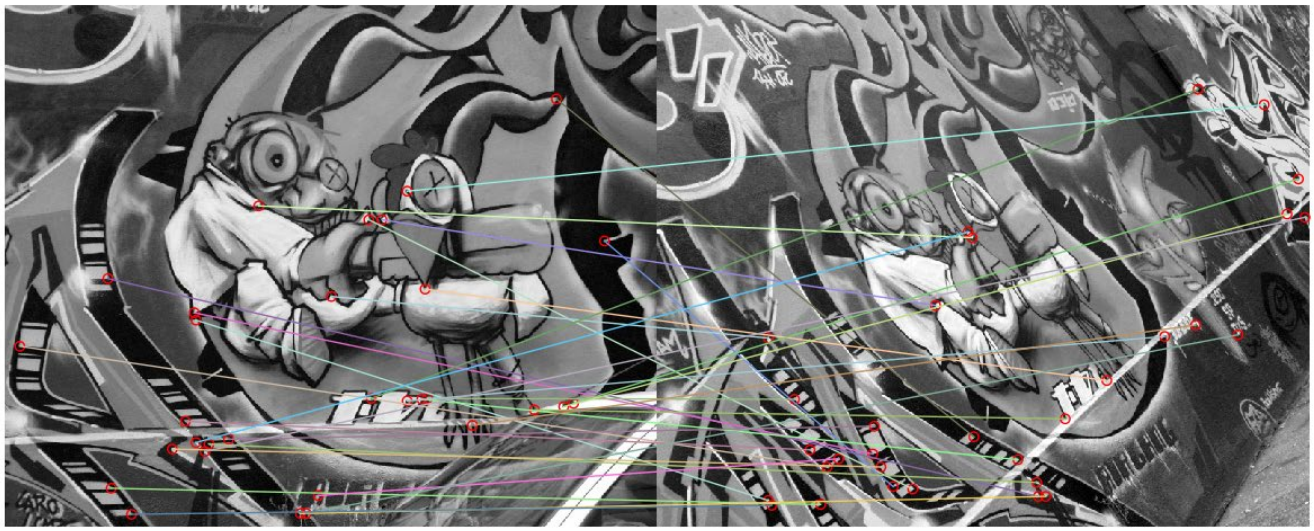
SUMMARY: NCC seems to make more matches than SSD, although it is still not perfect. However, NCC requires more calculations over the pixels in each feature than SSD does. One might prefer to use SSD for speed or to use less computation resources on especially large images.

5. GRAFFITI1.PNG & GRAFFITI2.PNG MATCHES WITH SSD, K = 20 VS. K = 100

K = 20



K = 100



Summary: In both cases, the matches do not seem to be made with very high accuracy. One would expect that increasing the increasing the number of features kept after non-maximum suppression would increase the amount of features mapped one-to-one correctly. However, many features from the second image are mapped to features that do not exist in the first at all. This may be because the detection and matching methods used are not invariant to scale and perspective, which is how the second image is transformed, and because the second image introduces many new opportunities for key points.