

EN3160 Assignment 2

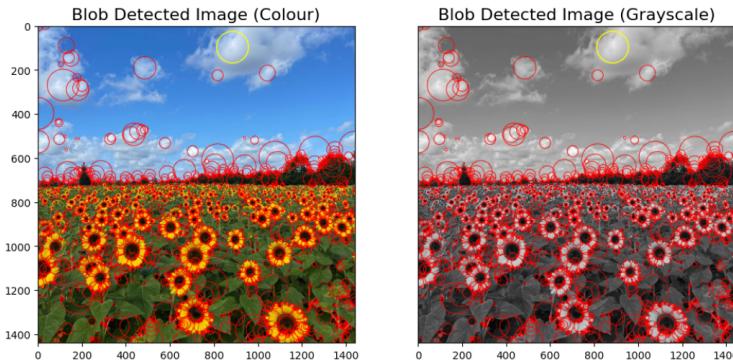
Fitting and Alignment Filtering

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GIT Link for code - [\[Q\]](#)

1 Blob Detection and Circle Detection using Laplacian of Gaussian in Scale Space

1.1 Circle Detection in Sunflower Image



1.2 Range of Sigma () Values

Minimum σ : 0.4

Maximum σ : 51.200000000000045

1.3 Parameters of Largest Circles

Radius: 72.40773439350254

Center Coordinates: $(x, y) = (98, 884)$

1.4 Fit a line and, subsequently, a circle to a set of noisy points that conform to a line and a circle

Define a function to calculate the line equation using two points

$$ax_1 + by_1 = d$$

$$ax_2 + by_2 = d$$

:

$$y = mx + c$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$c = y_1 - mx_1$$

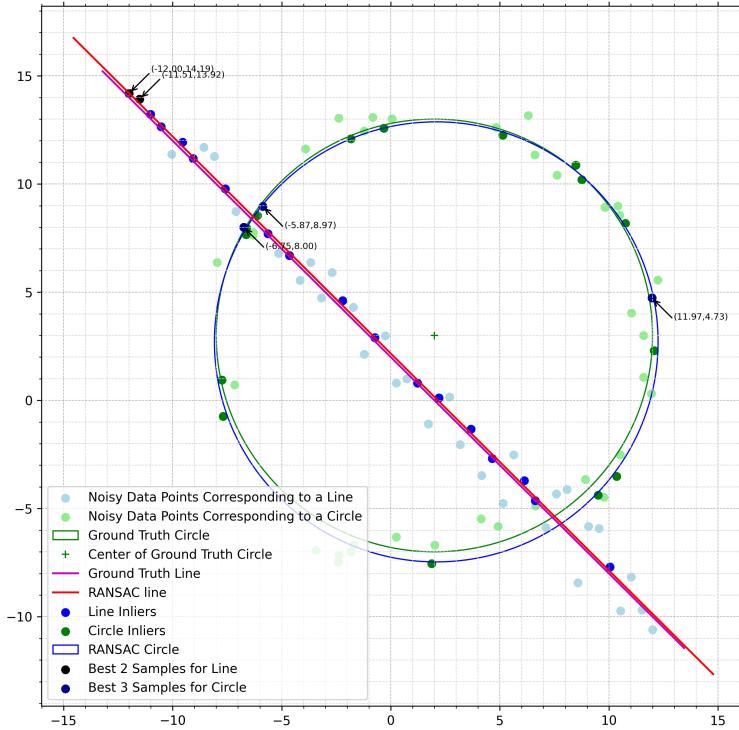
:

$$mx - y = -c$$

$$ax + by = d$$

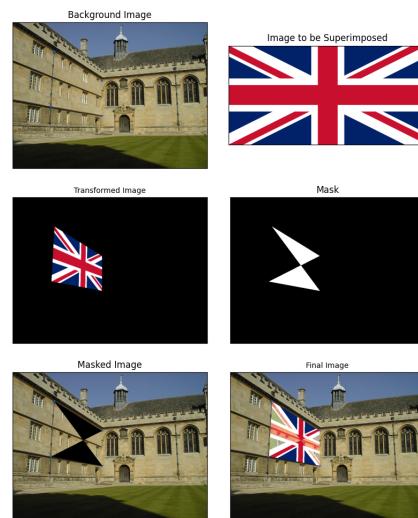
$$a = m, \quad b = -1, \quad d = -c$$

Then normalize the equation by dividing by $\sqrt{a^2 + b^2}$



Fitting the circle first can lead to misrepresentation of the data, reduced accuracy in line fitting, and challenges in model selection, ultimately compromising the effectiveness of the entire fitting process.

2 Augmented Visual Storytelling through Image Blending





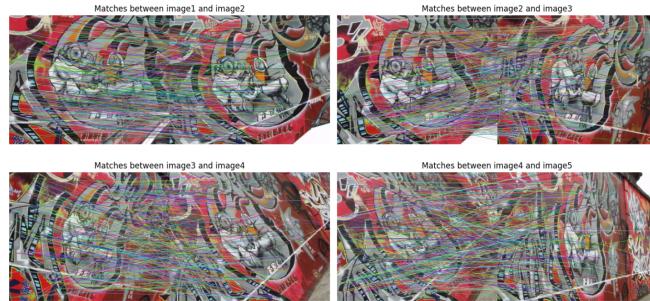
3 Image Stitching using SIFT Features and Homography Estimation with RANSAC

3.1 Compute and match SIFT features between the two images



It is evident that there are not many good matches between images 1 and 5. We will get a poor result if we use these matches to calculate the homography matrix.

In order to compute the homography matrix, I will use all of the images rather than just images IMG1 and IMG5, taking into account the matches between IMG1 and IMG2, IMG2 and IMG3, IMG3 and IMG4, and IMG4 and IMG5. The final homography matrix will then be obtained by combining all of the homography matrices.



3.2 Compute the homography using your own code within RANSAC and compare with the homography given in the dataset.

```

Calculated Homography
[[ 6.32630848e-01  5.87548657e-02  2.21152548e+02]
 [ 2.30832730e-01  1.15830463e+00  -2.64597356e+01]
 [ 5.11904786e-04  -5.67875219e-05  1.00000000e+00]]
Number of inliers 1288

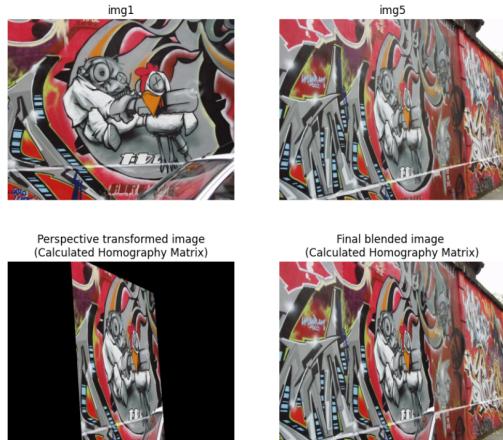
Original Homography
6.2544644e-01  5.7759174e-02  2.2201217e+02
2.2240536e-01  1.1652147e+00  -2.5605611e+01
4.9212545e-04  -3.6542424e-05  1.0000000e+00

```

We can see that the calculated homography matrix is very similar to the ground truth homography matrix.

3.3 Stitch img1.ppm onto img5.ppm.

3.3.1 Stiching images using the calculated homography matrix



3.3.2 Stiching images using the homography matrix given in the dataset

