**EN2550 - Assignment 2**

**Fitting and Alignment**

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Github Repo:<https://github.com/vidurawarna/EN2550_CV/tree/main/Assignments/Assignment%202>

**Question 1**

1. Parameter selection for RANSAC algorithm
   * The initial number of points:
   * Distance threshold:

(Since the noise for radius is gaussian, 95% probability capturing is considered)

* + Consensus set size:

(Half of the points belong to the circle)

* + The probability that at least one sample is outside of outliers: (Our sample has 3 points out of 100. Therefore, )
  + outlier ratio: (50% of the total number of points)
  + The number of samples:
  + Inside the RANSAC algorithm we have to estimate the bestfit circle to obtain the final result. Following function is used to determine the bestfit circle using all the inlier points.



1. Output of the RANSAC algorithm to detect the best fit circle to a given set of points.

A picture containing diagram

Description automatically generated

* + RANSAC algorithm was able to detect the circle by considering only inlier points to that circle and ignore the outlier points completely. Therefore the algorithm gives the result we expected.

**Question 2**

1. Testing a wall design before putting the design physically.

A picture containing text, indoor, flat

Description automatically generated

1. Advertise a softdrink brand on a truck box.

A picture containing text, electronics, display, computer

Description automatically generated

1. A billboard display for a Marvel super hero movie.

A picture containing text, indoor, computer, screen

Description automatically generated

**Question 3**

1. The similarity features between two images are found using the SIFT feature mapping function in opencv.

Graffiti on a wall

Description automatically generated

* Following functions are mainly used to calculate the homography between img1.ppm and img5.ppm. The match points are generated using SIFT feature matching. Then those points are further filtered by considering geometric distance between points.
* Rather than calculating the homography () for img1.ppm and img5.ppm directly, , , , homographies are calculated. Then using matrix properties, is obtained by () = () () () ()
* Here () means homgraphy between image and image.





Homography which is calculated using written RANSAC code:

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

Given Homography:

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

* There are some slight differences of the values in the matrices. But they are not significant. Therefore, it can be concluded that this method can be used to calculate the homography between two images successfully.

1. A picture containing text, colorful

   Description automatically generatedThis is the stitched image that is obtained using the above calculated homography.

A picture containing text, colorful, decorated

Description automatically generated