Advanced Image Processing and Computer Vision Assignment-4 (optional)

Semester - 8 (Spring)

CS60052

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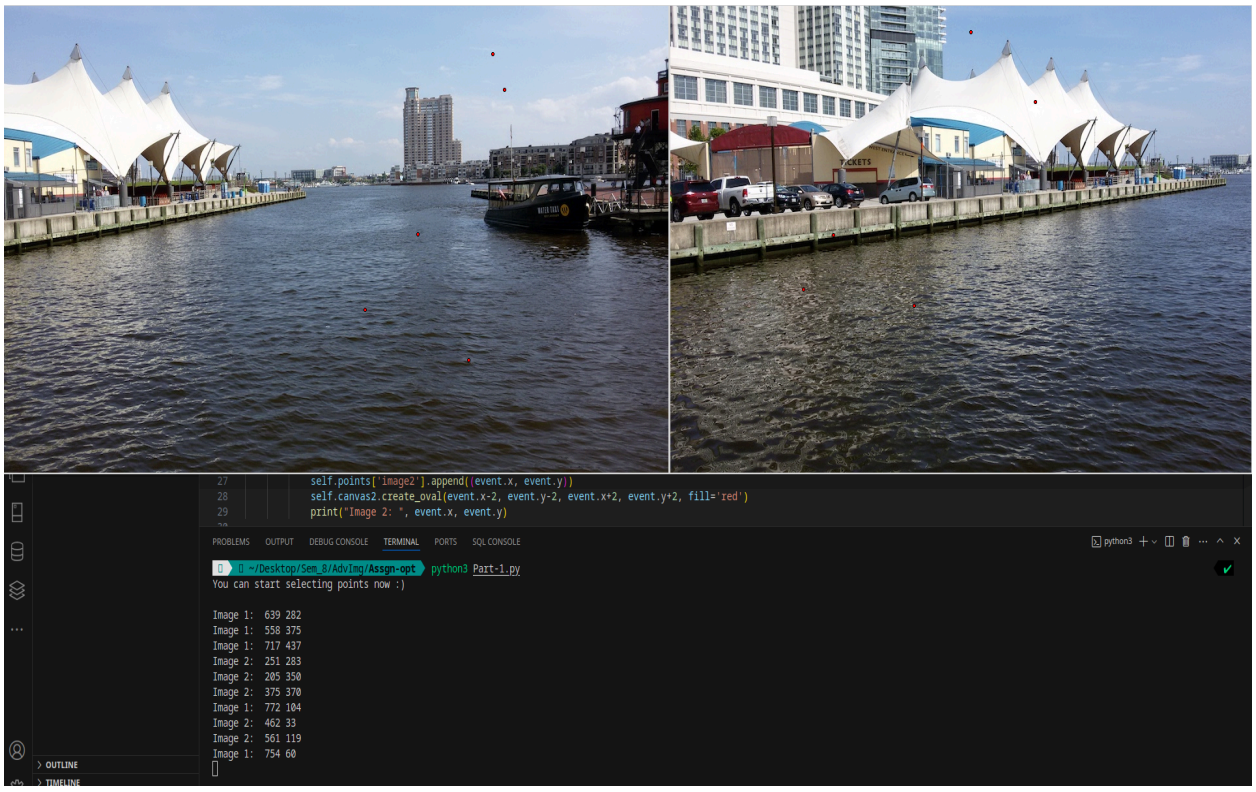
Part-1 :

We implement a graphical interface for recording a pair of corresponding points from two images of the same scene by making use of existing libraries like Tkinter for GUI.

- Load the two images of the same scene.
- Click on corresponding points in both images.
- Store the coordinates of these corresponding points.
- Visualize the selected points on the images.

A quick demo -



Instructions to run the programs:

- Make sure you have the libraries tkinter, pillow, numpy and cv2 on your system
- Type the following command in your terminal -

  python3 Part-1.py

  python3 Part-2.py

Part-2 :

We are given the calibration matrix for the images as -

$$K = \begin{vmatrix} -h/2 & 0 & h/2 \\ 0 & w/2 & w/2 \\ 0 & 0 & 1 \end{vmatrix}$$

Compute the Homography H induced by the plane at infinity:

- Select corresponding pairs of points from distant objects in the stereo images.
- We use these point correspondences to calculate the homography matrix H.

Estimate the Rotation matrix R for the second camera:

- Assuming the reference camera-centric coordinate system, we estimate the rotation matrix R for the second camera using the homography matrix H and the calibration matrix K.

Estimate the Fundamental matrix:

- We utilize the method of 8-point correspondences to estimate the fundamental matrix.

```
 ~/Desktop/Sem_8/AdvImg/Assgn-opt python3 Part-2.py
Select 8 corresponding points on each of the two images.

Homography matrix:

[[ 2.28484914e+02 -3.72668799e+02 -1.75601064e+03]
 [ 1.47156837e+02 -2.41489293e+02 -1.65821217e+03]
 [ 3.78236759e-01 -6.29508402e-01  1.00000000e+00]]


Rotation matrix:

[[-0.41511364  0.66448048  7.09725918]
 [-0.09082106  0.15784963 -4.23869565]
 [ 0.37823676 -0.6295084   1.        ]]


Fundamental matrix:

[[ 1.74642128e-06  4.49599809e-07 -1.16985528e-03]
 [ 4.49199401e-07  1.23265569e-06 -6.22048441e-04]
 [-1.29150448e-03 -8.01604741e-04  1.00000000e+00]]
 ~/Desktop/Sem_8/AdvImg/Assgn-opt
```