CS 512 Assignment 3: Report

Karan Bhatiya
A20424290

Problem Statement:

Using Harris corner detection algorithm we have designed the program to perform corner detection for a given image. User will provide the test image and the program will load the image after reading it. Before processing image should be changed to grayscale. By pressing specific keys on the keyboard, program should allow the user to perform manipulations to the image. Program must include a help key for describing the functionality. Program should allow the user to control the feature matching parameters using a user input values of different parameter like “Threshold”, “Windowsize”, “Trace”, “Varaince”.

Proposed Solution:

- Perform corner detection on a particular image using user input values of parameter.
- Press specific keys to perform all the functions.
- Instead of using inbuilt openCV functions, program consists of separate algorithms for corner detection.
- Corners are detected for various resolutions of the image and are displayed using windows.
- Corners which recorded are numbered and are compared with a similar image which is done by comparing their feature vectors.

Implementation Details:

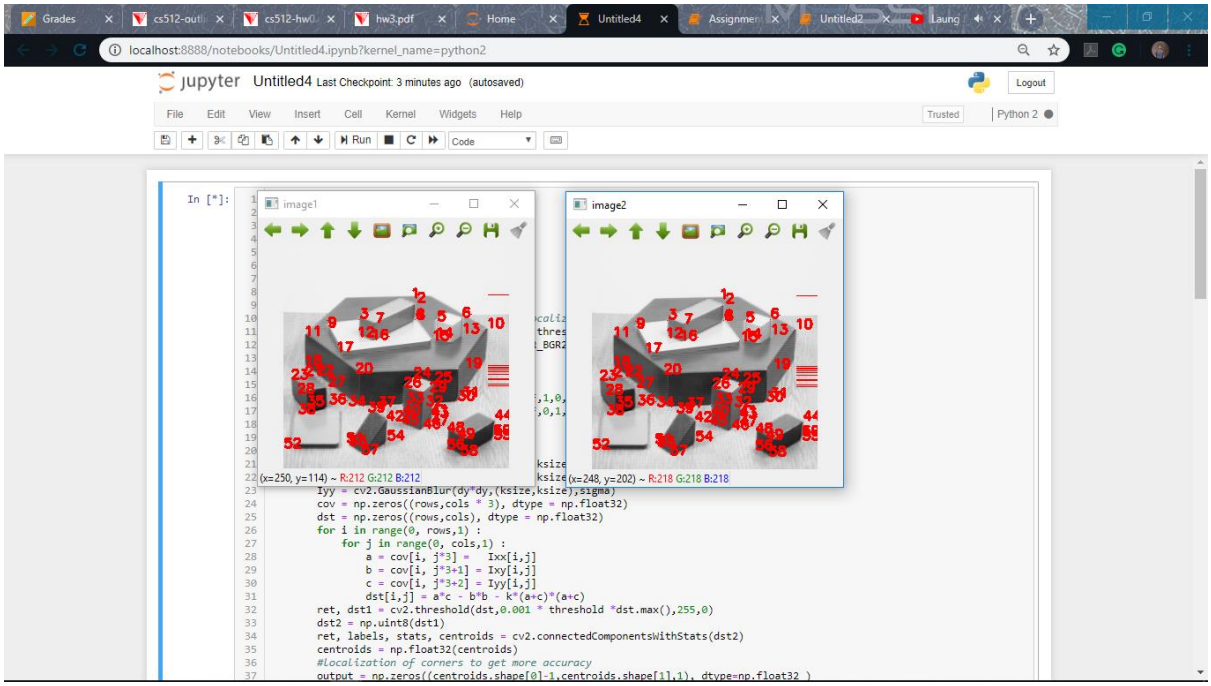
- First, input the values of parameter like “Threshold”, “Windowsize”, “Trace”, “Variance”.
- Then, find gradient vector and apply Harris corner detection algorithm for detecting corners using input values.
- For better localization of corner apply filter to get maximum accuracy of corner.
- Then apply Feature vector at each and every point to get output image as mentioned in the result.
- An offset will be computed based on the window size.
- Then derivate in the x direction, y direction and the xy direction are calculated.
- With the help of summation function in OpenCV, obtained values are summed up.
- By adding the derivative in x and y direction respectively, determinant and trace parameter is calculated and with the help of that we can generate Corner Response value
- If R > threshold then mark and color the corner point. Hence, Harris corner detection is performed.

Results:

Based on the Harris corner detection algorithm, final image is obtained along with matched features. Features are marked according to their similarities in the images.

1.

```
Variance value:0
Windowsize:5
Trace value:2
Threshold value:10
```



2.

Variance value:0
Windowsize:5
Trace value:4
Threshold value:25