CS512 Assignment 3: Report

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Abstract

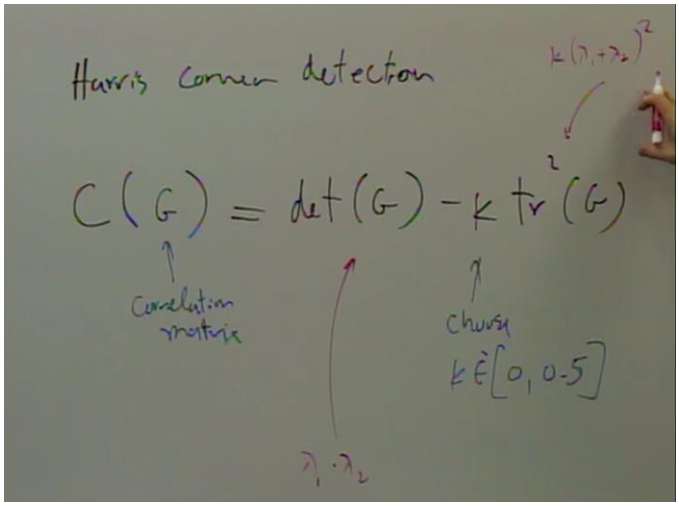
Corner detection by implementing Harris Corner Detection algorithm with non-maximum suppression and thresholding is carried out in this project.

Problem statement

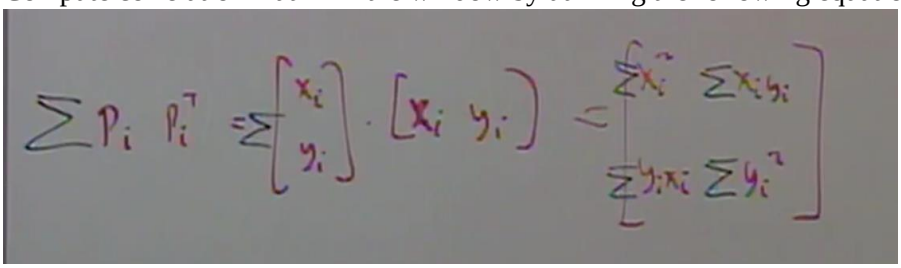
- Harris Corner Detection algorithm implementation without using directly open cv method to detect corners
- Identification of proper corners by application of thresholding and non-maximum suppression

Proposed solution

- Harris corner detection algorithm is done by taking into consideration the following equation



- Step over the whole image using a window defined by a scalar value
- Compute correlation matrix in the window by utilizing the following equation



- Utilize the corners measure to compute the possibility of a corner in the window using the Harris corner detection equation

- Apply thresholding
    - If the cornerness measure is lesser than a particular threshold value discard the corner
- Non maximum suppression is applied on corner list
    - Sort the corner list in descending order
    - Considering the corners one by one delete those corners which are in the vicinity having lesser cornerness measure
    - Perform the above until certain amount of corners are discovered
- Identify the discovered corners on the original image by highlighting it

Current Implementation

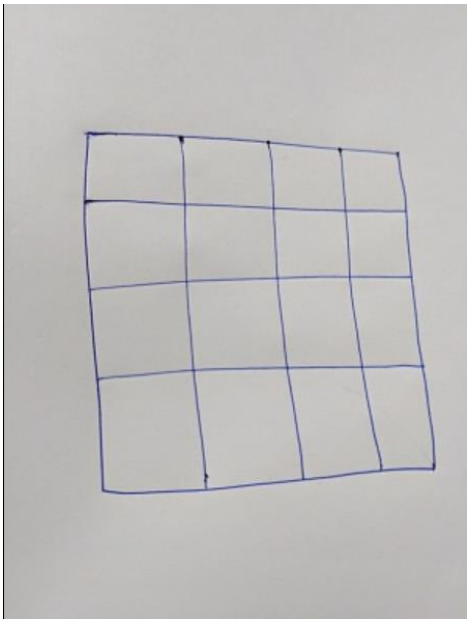
- Implements Harris Corner Detection Algorithm
- Thresholding and Non-Maximum suppression is carried out
- Identification of corners by highlighting them on the original image

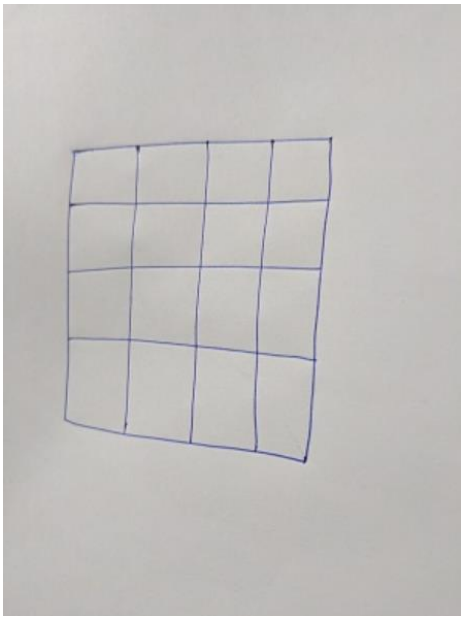
Future Enhancements

- Perform localization on the corners to improve the corner accuracy
- Compute feature vectors for each corners
- Perform stereo matching on images taken from different viewing angles
- Reduction of corner detection sensitivity to noise by utilizing better smoothing method
- Utilization of cython to improve the speed of execution

Usage Information

Script name – test.py
Package requirements – cv2, numpy
Images being considered –“11.jpg” and “12.jpg”

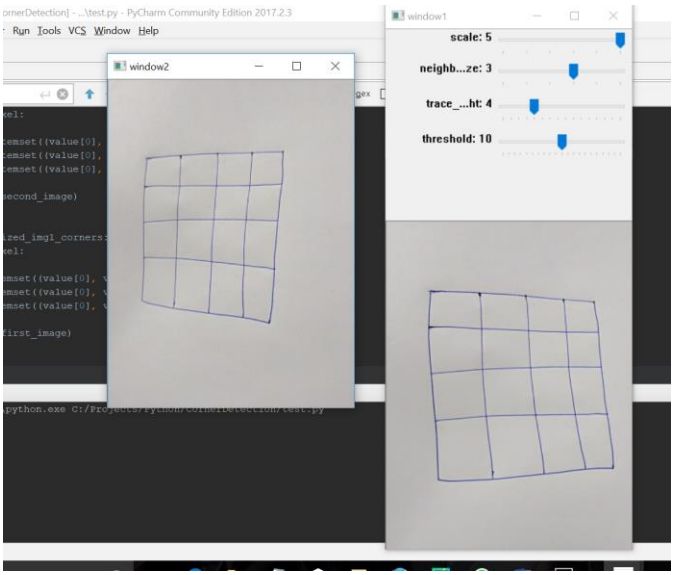




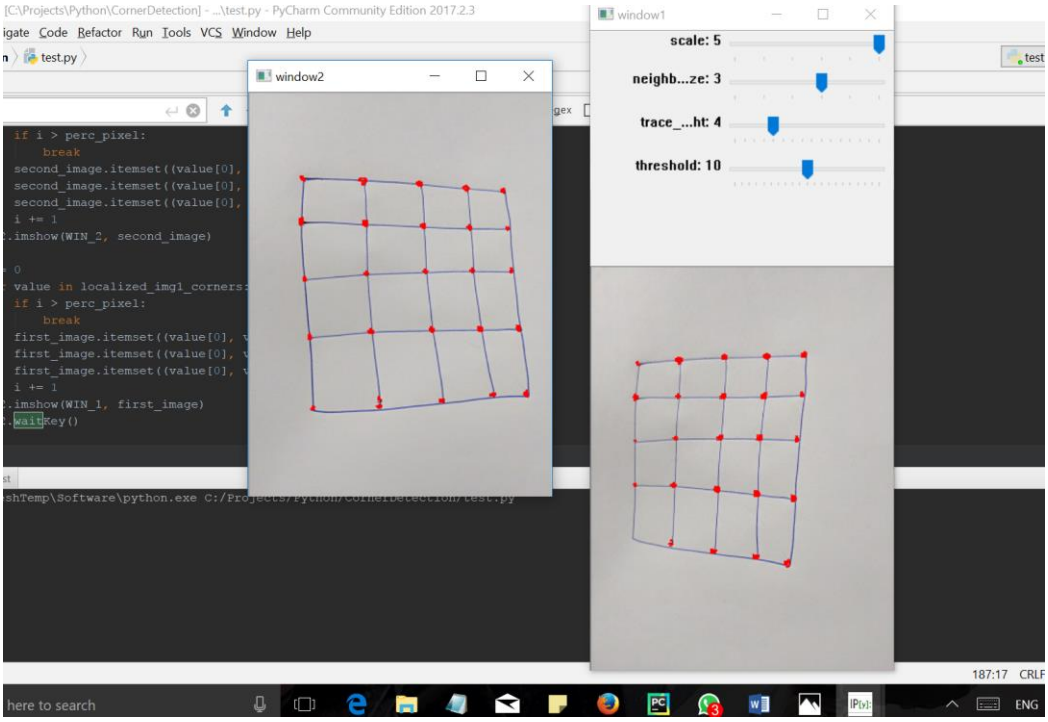
Run command – python test.py

Results and discussion

- On startup of the script
  Original images are displayed



- Enter any letter, corner detection will be performed and resulting corners are displayed on the same windows



References

- https://docs.python.org/3/tutorial/
- https://docs.opencv.org/3.1.0/index.html