**Computer Vision (CSE/ECE 578)**
**Spring-2020**
**Assignment-2 (Image Mosaicing and Stereo Correspondence)**
**Posted on: 12 February 2020**
**Due on: 28 February 2020**

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# Instructions:

- The assignment aims to familiarize you with the concept of homography estimation and stereo calibration.
- **Make sure that the assignment that you submit is your own work. Any breach of this rule could result in serious actions including an F grade in the course.**
- **This is a fairly large assignment. The experiments and report writing will take time. Start your work early and do not wait till the deadline.**
- Make sure your files can be opened. Corrupted files will not be entertained.
- You can use C/C++, Python or Matlab for this. However, you are expected to implement it yourselves and not use an existing implementation.

# Tasks:

## Image Mosaicing

1. Use any feature detector and descriptor (e.g. SIFT) to find matches between two partially overlapping images. You can use inbuilt functions for this.
2. Estimate the homography matrix between the two images robustly.
3. Transform one of the images to the others reference frame using the homography matrix.
4. Stitch the two images together.
5. Repeat this for multiple images to produce a singly mosaic/panorama.

## Bonus

1. Think of an algorithm which can stitch images given in any order without human intervention? If yes, modify your exisitng code accordingly.
2. Is it possible to stitch a panorama without human intervention, given noisy images which do not belong to the same scene? If yes, how?

## Instructions

- Write modular code, with comments clearly outlining the function of each module.
- The code must be robust and scalable, i.e, it should work for any number of images of any size and generate a reasonable output.
- There are some sample images included in the assignment, these images are NOT the exhaustive test set. Your code may be tested on a different set.
- **Show results on additional images captured with your camera.**
- You are allowed to use in-built functions for feature detection and matching but are required to write the code to build the homography matrix by yourself
- Submit a pdf report with procedure, code, results of intermediate steps and additional images from your cameras.

## Stereo Correspondences

1. Perform Intensity Window-based correlation on the given pair of images.
2. Rectify the pairs of images and with these new images, repeat step 1.
3. Compare with Greedy Matching and Dynamic programming solution for Stereo Correspondence on the rectified images.

## Bonus

1. Perform dense SIFT-based matching on the given pair of Images and give the comparison with that of Intensity window-based correlation.

## Instructions

- Write modular code, with comments clearly outlining the function of each module.
- The code must be robust and scalable i.e, it should work for any number of images of any size and generate a reasonable output.
- There are some sample images included in the assignment, these images are NOT the exhaustive test set. Your code may be tested on a different set.
- Add the procedure and the images of intermediate steps in the report. Add the code to the report as well and explain it wherever necessary.
- Demonstrate the results on the given images and additional images from your camera.
- Make sure you provide the code separately also and not just in the report.
- Please ensure that the report contains your roll number. Zip the code and report for submission. The zip file should be named RollNumber_Assignment2.zip .