Assignment 3

1. Panorama Stitching [1] (4 marks)
(a) Detect, extract and match features (0 marks, inbuilt functions allowed)
(b) Estimate homography matrix between two images using RANSAC. (0.5 marks, inbuilt functions are allowed except those functions which directly estimate homography)
(c) Stitch at least 4 color images of a scene using the homography matrix estimated in (b) to create a panorama (2 marks, inbuilt functions allowed except for warping and blending)
(d) Stitch the images used as input in (c) using the inbuilt command for homography estimation and Compare it with the panorama obtained in (c). (1.5 marks if both the results look the same)
Note: If results obtained in (c) are seamless (refer to the results obtained in [1]), then full marks will be awarded. Otherwise, marks will be awarded based on how all the students in the course have performed and relative grading will be done. 0.5 out of 2 marks if you stitch only 2 images in step (c).

2. Image warping in RGB-D images (for a pair of images). RGB-D image is a combination of an RGB image and its corresponding depth image. (4 marks)
(a) Detect, extract and match features between a pair of RGB-D images. (0 marks, inbuilt functions allowed)
(b) Let the pair of RGB-D images comprise of a source image and a reference image along with their depth images.
(c) Quantize the depth image corresponding to the reference image into $m>10$ levels. (For eg: if depth image has values from 0 to 100, then the image quantized to 5 depth levels will only have values 0,20,40,60,80,100) (0 marks, inbuilt functions allowed)
(d) Estimate homography matrix for each depth level of the quantized reference depth image. (2 marks, inbuilt functions allowed except those functions which directly estimate homography)
(e) Warp each portion of the reference RGB image corresponding to each depth

level using the corresponding homography matrix to obtain an image similar to the source image. (1.5 marks, inbuilt functions allowed except for warping directly)
(f) Estimate a single homography matrix for the image pair and warp reference image to obtain an image similar to the source image. Compare the warped image with the result obtained in (e). (0.5 marks, inbuilt functions allowed except for warping directly)

Note: We will provide the datasets soon for both problem statements on which you need to run your code and submit the results.

Reference:
1. Brown, Matthew, and David G. Lowe. "Automatic panoramic image stitching using invariant features." International journal of computer vision 74.1 (2007): 59-73.
2. Hartley, Richard, and Andrew Zisserman. Multiple view geometry in computer vision. Cambridge university press, 2003.
3. Szeliski, R. (2007). Image alignment and stitching A tutorial in Foundations and Trends® in Computer Graphics and Vision, 2(1), 1-104. https://www.microsoft.com/en-us/research/publication/image-alignment-and-stitching-a-tutorial/