

Computer Vision

Fall 2021

Problem Set #3

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3: Projective Geometry

Report what wrapping technique you have used and comment on what led you to choosing this method.:

I have tried both techniques and I have settled with inverse wrapping. There are couple of disadvantages of using forward wrapping. Forward wrapping takes every pixel in the source image and transform it into the destination image. This can result in holes in the destination image since some pixel might not be fill which is the biggest disadvantage of forward wrapping. Another problem with forward wrapping is when the pixel land between two pixel in the destination image, but this could be solved by nearest neighbor (for example). A better technique is called "inverse wrapping". In this case, you start with each pixel in the destination image to be filled, and find the corresponding pixel value in the source image. In this case, we are making sure that all the pixel inside the markers area will be filled. It must be noted that the inverse wrapping also can suffer from the problem of landing between two pixels. However, this can be solved by many techniques such as interpolation or nearest neighbor.

4: Markers in Video



ps3-4-a-1



ps3-4-a-2

4: Markers in Video (cont.)



ps3-4-a-3

4: Markers in Video (cont.)



4: Markers in Video (cont.)



ps3-4-a-6

4: Markers in Video



ps3-4-b-1



ps3-4-b-2

4: Markers in Video (cont.)



ps3-4-b-3

4: Markers in Video (cont.)



ps3-4-b-4



ps3-4-b-5

4: Markers in Video (cont.)



ps3-4-b-6

5: Markers in Video



ps3-5-b-4



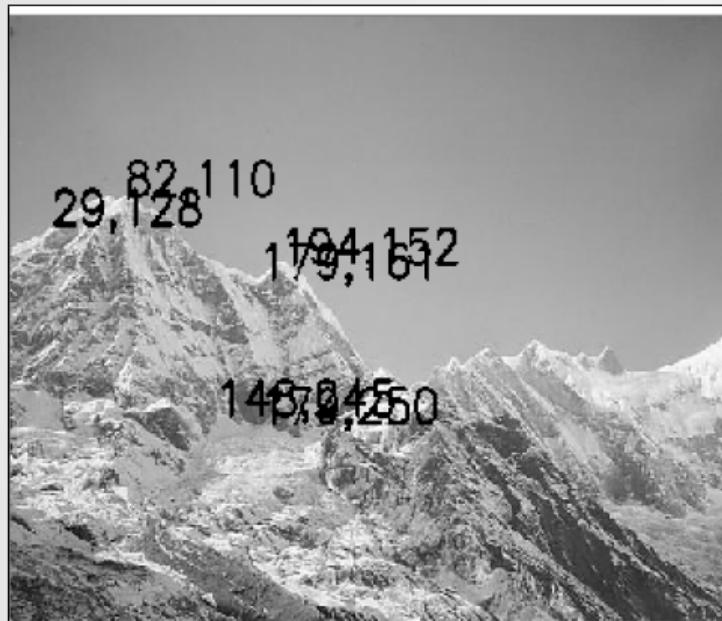
ps3-5-b-5

5: Markers in Video (cont.)



ps3-5-b-6

6: Manual Correspondence points



ps3-6-a-1



ps3-6-a-2

9: Image Stitching



ps3-9-1



ps3-9-2

9: Image Stitching

Comment on the quality difference between the two outputs and how it relates to the importance of choosing the correct correspondence points for the image:

I didn't have the time to implement this in code. However, choosing the right corresponding points in both images [feature matching] is very crucial to estimate the homography correctly. Small mismatch in the selection may result in large error (in case of 4 points). Once the estimation of the Homography is wrong, the stitching quality will not be as good. One way to increase the accuracy is to use as many matches as possible, and then using technique such as least square to estimate the Homography. However, least square is very sensitive to outliers as it uses the squared error as measure, so the outliers can affect the result greatly. For that reason, algorithm like RANSAC would be more useful to use since it can deal well with outliers.

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