Machine Learning and Computer Vision
Assignment 43

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1 Short answer questions

1. parallel to x direction

2. First, You are approaching (or going away) from the object, so the scale of image is changing. Within a window matching may fail because it's not scale invariant.

   Second, when the light of two views are different, the dense stereo matching may not work because light causes intensity changes.

3. SIFT feature divides a patch into 4 * 4 sub-patches. For each sub-patch, compute a histogram of 8 bins (so every bin covers 45 degrees, these orientations are relative to the keypoint's dominant orientation). Finally normalize this 4 * 4 * 8 = 128 dimension vector into unit length. So in a single dimension, it's a normalized of count of histogram covers 45 degree to relative dominant orientation in a sub-patch.

4. x, y, (location) scale, rotation. Because SIFT is invariant to scale and rotation, we need consider that. The main step for general Hough Transform is: in the query image, choose a point and measure distances of SIFT features in query image to the point. Then we vote for the point in matching image:

   For every possible scale
   For every possible rotation
   get location x, y via distance multiplies scale, rotate by rotation
   vote for H[x, y, scale, roation]

2 Programming

3 Extra Credit