Foundation of Computer Vision
Programming Assignment 4

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1. Histogram of Gradients Implementation

First, the two input images are converted to gray scale images. Two features vectors are initialized to store the results of the two images. We are given key points array for both the images Then the HOG function is called passing three parameters as follows: Image, Key points1(x,y).

Figura 1: Two given aerial view of the same landscape

For HOG, i have first created a sub image of 16*16 size. Using the imgradient function of matlab, computed the gradient values along x-direction and y-direction. Then calculate the magnitude of gradients and the angle value for this sub image.

For the angle value generated, i am traversing the matrix and checking each if its negative. If yes, then adding 360 to the current value.

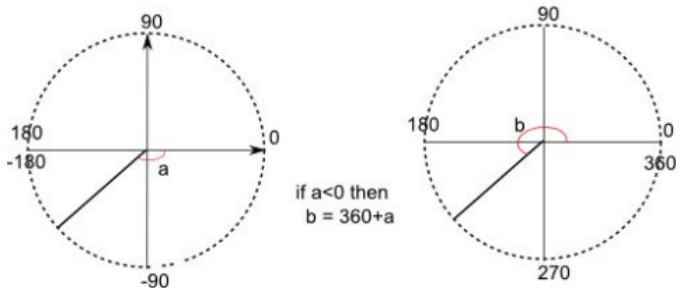

Figura 2: Handling the Negative values

Again the imgAngle matrix is traversed and each individual is checked if they fall in a particular range. If yes, then its initialized with that range value.

After that, i have created initially 8 bins which is initialized with zeros. Then i divide or classify the gradients into these bins and concatenate these bins to final resultsbins.

Figura 3: HOG Match Features

After that we call the match features function to compare these features with threshold value and store the results in out index matrix. Using these result we display the keypoints on the image using inbuilt function of showMatchedFeatures.

2. SURF

For the SURF, we have used the detectSURFFeatures functions and extracted the points for both the images and using that points, extracted the features and showed the results using the showMAtchFeatures function. However i have not compared the results of the HOG and SURF. Below is the result of applying the SURF algorithm.

Figura 4: SURF Match Features