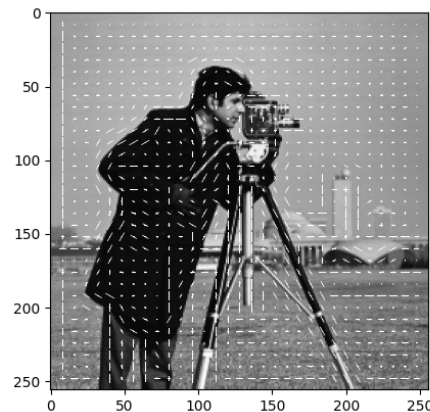


Hog Visualization of cameraman,

For extracting HOG, we first need to use differential filters on the grayscale image along both x and y coordinate. Gradient magnitude and angle is then computed with the formulas and based on two gradient matrices, we can then build the histogram of oriented gradients for total of 6 bins (Bins are based on gradient angles and values are based on the sum of gradient magnitudes belong to that bin). Histograms need to be concatenated and normalized using L2 normalization to finally find hog and return `ori_histo_normalized`. Here is the hog visualization of the cameraman with arrows that are perpendicular to gradient:



Face Recognition Visualization of target

Purpose of this section is to detect faces using a template image.

Here we can use the hog descriptor from previous section and extract both images' hog. We then need to make a set of bounding boxes and run 2 suppressions on that set. First suppression is by using correlation score (I chose 0.49 as my threshold since the face I detected with lowest score was 0.49) between template and the bounding boxes and second suppression is by using Non-Maximum Suppression with IoU which calculates the intersection between max score and a box over total area. By repeating this process until the set is empty, we end up with boxes with maximum score which will be our faces. First two images are hog visualization of my template and target and finally my face recognition visualization at the bottom:

