

Computer and Biological Vision
ECSE-529

Assignment #3

Due date: October 17, 2016

FEATURE DETECTION

1. This assignment presents a small number of currently popular practical methods for detecting and coding features:

DENSE: sample on every point.

- DENSE SIFT
- HOG
- LBP

Histogram and gradient: magnitude and direction

- Some of the above algorithms are available in the OpenCV library and the MATLAB computer vision toolbox. Otherwise, use Google Search to find programs for each of the above algorithms. There are many versions of these approaches on the Internet.
- Use the three features listed above to process at least 38 images (at least one image from each subject) taken from the "Extended Yale Face Database B" (use the cropped images). You can download this from myCourses.
- Make sure to use the same local window size for each face for each of the three methods so that the results can be compared.

2. For each feature type, use **all** of the extracted features from all images to create a **single** codebook using a "Bag of Words" approach. (See: [Tutorial on Bag of Words Method](#)).

- Order the codewords in the codebook according to the frequency of their occurrence (from highest to lowest).
- Arbitrarily limit the codewords in the Bag of Words to 256.
- Assign a color to each one of the 256 code words. Also assign any old texture pattern or image to **all the words** that are not included in the first 256.

The report should respond to these points:

- a) **Display** any 5 original faces using the codebook of 256+1 codewords that are associated with the Bag of Words referred to above. Do this by assigning the appropriate codeword color (1 out of 257) to each pixel in each image.
- b) Given the results in a), contrast and compare the three feature detectors in light of them being used as potential data inputs for a face detector. Which features would you use and why? Are 256 codes adequate for this task?

NOTE

1. The submitted answer to the assignment should be a maximum of four pages plus the pertinent figures.
2. Attempt all parts of this assignment listed above. The total mark for this assignment will be based on your response to each part.