

PROGRAMMING ASSIGNMENT-II

ROBOT VISION

Coding Standard and General Requirements

Code for all programming assignments should be **well documented**. A working program with no comments will receive **only partial credit**. Documentation entails writing a description of each function/method, class/structure, as well as comments throughout the code to explain the program flow. Programming language for the assignment is **Python**. You can use standard python built-in IDLE, or other IDLEs such as CANOPY, PyCharm Community Edition, PyScripter, CodeSculptor, Eric Python, Eclipse plus PyDev, etc.

Following libraries can be used when necessary:

- PIL (The Python Imaging Library), Matplotlib, NumPy, SciPy, LibSVM, OpenCV, VLFeat, python-graph.

Submit by **17th March 2021**, 11.59pm. PA2 is 10% of your total grade.

Question 1: Histogram of Oriented Gradients (HOG) [10 pt]

Your tasks:

- 0 pt Use two different images of your choice to perform the following steps for getting HOG features of the input image.
- 0 pt Compute the x and y gradients for the image and then compute the orientation and magnitude as well. (You can use your code from first assignment here.)
- 3 pt Implement the code for computing histogram for each cell. Use 9 bins for histogram (for 0 - 180 degrees) and use voting scheme as discussed during the class. Refer to slide 67 from lecture 10.
- 3 pt Implement the code for computing HOG features with the following parameters; cell size 8x8 pixels, block size 2x2 cells. Normalize your features for each block using euclidean norm.
- 2 pt Visualize the computed HOG features. Use the bin with highest magnitude for each cell and use a color coding for each orientation in the cells for visualizing your HOG features. Show the result as an image. Instead you can also draw a line corresponding to the orientation for each cell. Either way of visualization will be fine.
- 2 pt Repeat the above steps (computing HOG features and visualization) with 18 bins, cell size of 16x16, block size of 4x4 cells. Compare the results with previous set of parameters and discuss the differences if any (what and why?).

What to submit:

- Code: Your code should be well commented.
- A short write-up about your implementation with results and your observations from each results.