Computer Vision: Final Project

The final project requires that you define a novel algorithm for object recognition and/or detection. You must use the images and bounding-boxes available in Carmen.

1. You have three options: design a computer vision algorithm for object recognition, object detection or both. Object recognition means that the bounding box indicating where the object is located is known and you need to specify the category. Object detection means that the object category is known and you need to find the bounding box where the object is located in a test image (note that there could be zero instances of that object in the images, one, two or several).

2. You can use any number of object categories. The minimum number of categories you need to use is 20.

3. You need to provide a quantitative analysis of your algorithm. For example, how robust is it to different orientations of an object, how does the selection of training images affect the outcome of your testing, how robust is the derived algorithm to occlusions and noise, etc.

4. Report: You need to write a 3-page report with the following information: a formal (mathematical) definition of the problem, the reasons why previous approaches might fail, the key idea of your solution, detail derivations of your algorithm, experimental results with quantitative evaluations. Your report should clearly state how many categories were considered, which images were used for training and which ones for testing and why. Cited references do not count toward the 3-page limit, all other text and images must be in the 3-page max. Use either Arial (11 pt) or Times New Roman (12 pt).

5. Code: You must submit your Matlab code online. Your code must assume that the training and testing images are within the main project folder with the name "finalProjectData/". All folders and loading files should be in the project folder, e.g., ./finalProjectData/, or ./sift/. ***Do not*** use absolute folder addresses e.g. c:\\my documents\my project\. Your code should include a GUI interface (as in homework 2) with two buttons: a. Training, b. Testing. If the user selects option a, the system should learn the object representation using your algorithm and the selected training images. When option b is chosen, the system should test the learned model with the selected testing images and plot the quantitative analyses reported in the paper. The program must be self-contained, meaning that all the libraries must be included in your submission file, i.e. ***do not*** assume that we have any feature extraction library or toolbox in Matlab other than the

standard ones. If you choose to write your code in C++ or Python, you must provide a makefile.

Groups: Groups of 1 or 2 students only.

Submission deadline: Friday, December 4, 3 pm ET.

What to upload in Carmen: You must upload your report (in PDF), Matlab code and any libraries you use using a single ZIP of RAR file.