CS5670 – Computer Vision
Assignment #3

Submission details

- This assignment can be done individually or in pairs (though we strongly encourage you to work in pairs).
- Programs should be in Python. You can use either Python 2 or Python 3.
- We recommend using the SciPy library (http://www.scipy.org), which provides Matlab-like arrays with similar functionality. It also has some handy functions for plotting graphs of signals, which the Python standard library lacks. These operations tend to make signal and image processing algorithms much easier to code. You are not required to use this library, but it could make your life easier.
- To install (email TA if you run into trouble)
    - Ubuntu Linux:
      sudo apt-get install python-numpy python-scipy python-matplotlib ipython ipython-notebook python-pandas python-sympy python-nose
    - On Windows or Mac, you may have to install a Python distribution containing SciPy. We recommend the Anaconda distribution, but other distributions are also possible.
- For submission, package up your code as a zip file. Include your written answers as a pdf or word file named writeup.[pdf|docx]. Include graphs and images in your writeup, and please label them so we know which figures go with which sub-problem.
- Send the final zip file to the TA (see next bullet). Add the course name to the subject of the mail.
- If you have any questions about this assignment, please contact the TA (stinger@tx.technion.ac.il).

Task: Object detection

In this task you will build a system for specific object detection. We're providing you with 3 datasets and it's ok to have a solution that's good only for this data. If you'd rather make it broader that's also fine. Creativity is a key factor in this assignment. Thinking out-of-the-box could lead to better performance. A possible idea is to search for relevant papers and follow the footsteps of one that you like.

1. Propose a method for finding a given template image in a set of query images. Any method you propose is fine, as long as you explain and motivate it clearly. Before you code it and test it, please write the following:
    a. The motivation to the method you propose.
    b. The guiding principles of your approach.
    c. In what cases do you expect it to succeed or fail?
    d. What are the advantages and disadvantages of your approach?
2. Implement the method and apply it to the 3 provided datasets. To evaluate the quality of the results draw on each query image bounding-boxes of detected templates.
3. Based on your experimental results, revisit item 1 and assess your predictions. Associate examples from your results with items on your list of pros & cons. Explain the success/failure cases you got.
4. Suggest a modification to your method that will improve at least one of the failure modes, and implement it. Did it work? Explain why.