EECS 542 W17 Programming Assignment 1 (1/13)

Due: 1/27/2017, Friday, 11:59PM

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Instructions – *This problem is a group assignment. For assignment 1, you may form a team of your preference (of size, 3 to 4). You are expected to make progress on the problem every week. We will be discussing the assignment in the last 60 minutes of the class. Please bring your laptop to the class with MATLAB installed. MATLAB is preferred, since some of the rudimentary functions are already implemented. However, if you still prefer to work with any other language, you may have to implement these functions.*

Dataset: Buffy Stickmen[1] V3.01.

The images are from the TV show Buffy the Vampire Slayer. The images are annotated with line segments indicating the size, location and orientation of six body parts (head, torso, upper/lower right/left arms). For this assignment, we will be using the images from S5e2. You may choose to use other episodes while attempting the bonus problems.

Installation Instructions: Download dataset, install MinGW for MATLAB

Refer to README.txt, for details on how to install/ work with the dataset. However, prior to the step 2, you will need to install MinGW through MATLAB add-ons. Refer to the post on piazza, in case you face any installation errors.

Problem Definition:

- **Objective:** Pose estimation of upper body based on the best location of each part[2].
- **Implementation:** Use the model[3] in figure(a) for upper body. In each of the images, you will have to detect the pose, as shown in figure(c). For details of implementation, refer the paper "01-542-felzenzswalb-aux". You will have to implement the deformation cost function. You will be provided with a match cost function. You may use the DrawStickman function to overlay the parts on the image. Annotation data should not be used in any of your implementations[4]
- **Reporting:** Be sure to include the following in your report:
  - Brief description of algorithm. Detail the deformation cost function used and reasoning behind it.
  - A few images with overlays (both good and bad detection) and average computation time per image.
  - If bonus problem attempted, the details of what was additionally implementation and overall difference in performance.

(a) Upper body model (b) Image (c) Estimated pose (d) Part Centers

Additional Implementation/Bonus Problems: You may choose to implement either or both problems for bonus points

#1. Add the implementation of lower right/ left arm in the above model.
Motivation: Now your tree model will have depth of 2.

#2. Create your own match cost function.
Motivation: The match cost function used here is based on ground truth and is never available in real life. You may implement a feature detection[5] based match cost function, which returns how close the given query is the part.

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[1] Source: http://www.robots.ox.ac.uk/ vgg/data/stickmen/. You may download the complete dataset from here
[2] Base problem: 4 parts, Bonus problem#1: 6 parts
[3] for initial problem, ignore the lower right/left hands, i.e., the yellow blocks
[4] Expect in case of Bonus Prob#2 where you will need annotated data for training you classifier
[5] Since, this is a hard data set, you may implement this for a fewer parts of the model(e.g., only head and torso)