EECS332 Digital Image Analysis, MP#4

This MP is important to the final project. The due date is 10/29/2013 (Tu).

1 Histogram-based Skin Color Detection

The purpose of this MP is to let you to have a clear understanding and a clean implementation of color based segmentation with application to flesh tone (skin color) detection as discussed in class. Due to its efficiency in computation and implementation, such a technique is very likely to be used in our final project. What you need to do in this MP are the following steps:

- *Collecting flesh tone training data.* A couple of images are provided. It is very easy to find on the Web some color images contain skin color (people). You can crawl such images from the Web. Then, you should design a tool to collect skin pixels. Of course, a simple interface will do. E.g., you can use `imcrop` or `ginput` in Matlab. If you are using C++, you have to select pixels or small regions using a mouse.
- *Selecting a good color space.* You'd better try a couple of color spaces, e.g., RGB, N-RGB, HSI, etc, before you make your decision.
- *Training a color histogram-based flesh tone detector.* Basically, you just construct a 2D color histogram based on the color pixels you have collected, i.e., R-G, NR-NG, H-S, etc. Note: pay more attention to normalization.
- *Finding skin regions in test images.* You apply your color detector to segment skin color regions in test images.

Some training and testing images are shown here[1]. You can also create your own test images. Please pay attention that this image is an 24-bit bitmap images. You should test your color detector on all these three images.

2 Gaussian-based Color Segmentation (optional)

Although Gaussian-based color segmentation is compact in terms of color model, it is computationally more intensive than the histogram-based model. Still, you can try this approach and compare with the previous one. The same as above, you need to

- *Collect training data.* The same as above.

[1] you can download these images from our course website

(a) (b) (c)

Figure 1: Training and testing images.

- *Find a good color space.* The same as above.
- *Train a Gaussian color model.* You just need to estimate the mean and covariance of your training data as the parameters of the Gaussian distribution.
- *Find skin tone based on the Gaussian distribution.* It is quite straightforward. Note: you need to set a threshold.

3 What to turn in

Each individual student should turn in his/her own solution. What you need to turn in includes:

- your code;
- a short report ($\leq$ 1 page is fine);
- your results on these testing images.