Colour-Based Tracking using Mean Shift

CMPT 412 Assignment 3 Fall 2017
Due 11:59pm Monday, October 23, 2017

Part I

Use Swain and Ballard's colour histogram back projection method to identify the location of a given model object in an image. Write your own colour histogramming and back-projection code. It's ok to use conv2.

You can find Swain's original database along with a collage image I made for testing on canvass in CMPT412_SwainDatabase.zip

The collage is of images from the swain_test folder. The swain_database contains the model images. Note that all the model images are against a very black background so that it is easy to separate out the model pixels from those of the background (i.e., more or less non-zero versus zero). Use the relevant swain_database images as models and locate them in SwainCollageForBackProjectionTesting.bmp.

Part II

Specify a region from one of the first few frames of a video as an object to track. If you like you can specify it by manually entering the coordinates of a window surrounding the object to track. However, Matlab's ginput does provide a simple interface if you prefer to select the region using a mouse. Use the specified region as the model object and then track it by simply using the method of Part I to find the object in each successive frame.

Part III

Use back-projection as in Part II but then use the mean shift method to search for the object in frame starting from its location in the previous frame.

I recommend that you not look too hard on the Internet for posts/code on tracking. Lots of code is posted, but you need to understand the method and write your own. Searching for resources so that you better understand mean shift is fine of course.

You will find two sample videos for testing in Matlab mat format available on canvas: CMPT412_blackcup.mat and CMPT412_bluecup.mat. You can view them using implay.

If you want, you can capture some more videos yourself. I used the webcam on my Mac to create those two. On my Matlab toolbar there's a button "Apps" and under it I made use of "Image Acquisition" and "Video Viewer".