

Distance measures and Video shot boundary detection

Homework 3

Due 10/15/2004

1. Given two normalized histograms \mathbf{h} and \mathbf{g} with $\sum_{i=1}^n h_i = \sum_{i=1}^n g_i = 1$. Show the equivalency between histogram intersection distance and l_1 distance. Specifically, show the following relationship:

$$\sum_{i=1}^n |h_i - g_i| = 2 \left[1 - \sum_{i=1}^n \min(h_i, g_i) \right] \quad (1)$$

2. Various shot boundary detection algorithms have been described in lecture. Several survey papers are available at the class website. Please read at least one of the survey papers and then choose one algorithm that you will use in the following experiments.
 - (a) Download the video `baseball.mpg` (<http://www.vis.uky.edu/~cheung/courses/ee639/data/baseball.mpg>) and take a look at it. You can see that this video is composed of three different shots, which are separated by abrupt changes in the frame content. Write a program “`shot_detect`” to detect the boundaries between the shots for this sequence. You can write the program in the language of your choice.

Note: Decode the `baseball.mpg` video into a sequence of ppm images first using the `mpeg2decoder` which was provided to you in the last assignment. Then apply your algorithm to the sequence of ppm images.
 - (b) Now download the video `commercial.mpg` (<http://www.vis.uky.edu/~cheung/courses/ee639/data/commercial.mpg>). Take a look at the video. What type of transitions do you see in this video? Apply your “`shot_detect`” program to this sequence. Does it work well in detecting the kind of transitions in this video? Modify your algorithms to detect the shot boundaries in the new sequence.