CSE 803: Homework Set #4 Fall 2008
Individual work; due Saturday, 25 Oct. 5PM.

Report answers to the following questions.

1. Exercise 9.7 Page 267 of S&S.

2. Exercise 9.8 only part (b) page 267 of S&S.

3. Given below are two points for each of eight time instants. Partition these points into two paths (say squares versus circles) or (A1,A2, ..., A8 versus B1, B2, ..., B8) such that the total smoothness computed by formula 9.6 is maximum. (You can intuitively apply operations of the greedy exchange algorithm without any programming of it.)

<table>
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<th>time</th>
<th>1</th>
<th>2</th>
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<td>73</td>
<td>290</td>
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4. Enhance your programming work from previous homeworks to address the problem of finding the best match of an N x N block of image B in image A, assuming that both images are taken from approximately the same scene at approximately the same time. The exercise is to see if we can compute how some neighborhoods moved from A to B.

   (a) The program[s] should input two (.ppm magic number P3) images, A and B, and a list (array) of centers C = (Cr, Cc) j of some blocks in image B. Images A and B will have approximately the same size. The centers C should be "interesting points" that you may find using your favorite image tool on the test images.

   (b) The program should output image B with the following graphics overlaid in some noticeable colors. (a) For each center in list C, there should be a vector with head at C’ and tail at C. C’ is the center of the best matching block in image A. (b) The blocks from A and B should be outlined in different colors. Figure 9.6 in the text shows similar output, but with too many vectors.

   (c) The student should test on block sizes of, say, 7 x7 or 15 x 15, etc. An odd number is used for symmetry about the center point C.

   (d) You should include at least 8 interesting cases in your report. Consider writing your code to loop over the tasks described above.

   (e) Obtain your own image pair, A and B, from the web or your own collection, etc. and report on your results.

   (f) About a week before the due date, two sets of test images will be given – you should report on your test results with these. They will be named hw4test1A.pgm, hw4test1B.pgm, hw4test2A.pgm, hw4test2B.pgm.

Resources

Test images will be provided. A C++ function dda.cpp is available in stockman/Software/PointsLines/ to generate all pixels on a straight line between two given pixels. A main program to test the function is ddaGo.cpp.