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CS 130b HW#3 README.PDF

1. We find an optimal base case: the starting connection of two points. When we have created optimal solutions for n triangles, the optimal solution for n+1 triangles is the best solution of the optimal solutions for n triangles plus one new triangle. Because the smaller subproblems are optimal, the bigger subproblems are too. Eventually, we will be able to reach an optimal solution this way.

2. Let f(x,y) = the optimal solution for using x points on the first contour and y points on the second contour, making triangles in some way.

As a base case, the starting point=f(1,1)=0

Then, f(x,y) = min(f(x-1,y)+area of triangle(x-1,x,y), f(x,y-1)+area of triangle(x,y-1,y)).

3. Table of partial solutions is an n by m grid, to construct such a table, we proceed by filling the table in diagonal by diagonal (upper left corner is (1,1), lower right corner is (n,m), such that a point (x1,y1) is in the same diagonal as (x2,y2) if and only if x1+y1=x2+y2. We start from the diagonal with the smallest x+y sum, take all the points from it, and see if going downwards or rightwards leads to a new optimal solution. We then take the diagonal with the next smallest sum, etc., eventually filling out a take. Whenever we find a more optimal solution for any old subproblem, we replace the old one. The values at point (n,m) will be the minimum area needed to include x points from the first contour and y points from the second. (1,1) is the base case and is just a straight line, so its area is always zero. At each point (n,m) in the grid, we can add either a point in the first contour or the second contour, setting (n+1,m) and (n,m+1) to a new value if necessary.