COSC 2123/1285 Algorithms and Analysis
Tutorial 10
Dynamic Programming

Objective

Students who complete this tutorial should:

- Be familiar with the concept of dynamic programming.

Questions

8.1.1 What does dynamic programming have in common with divide-and-conquer? What is a principal difference between the two techniques?

New 1 This question appeared in a previous exam.

Consider the two strings "perturb" and "superb". Compute the edit distance between the two strings, assume an edit cost of 1 for any character differences. Show the dynamic programming table and the traceback. Circle the elements in the table when showing the traceback. If there is more than one possible traceback, just show one of them.

8.2.1

a) Apply the bottom-up dynamic programming algorithm to the following instance of the knapsack problem:
Knapsack capacity $W = 6$.

item	weight	value
1	3	$25
2	2	$20
3	1	$15
4	4	$40
5	5	$50

b) How many different optimal subsets does the instance of part (a) have?

c) In general, how can we use the table generated by the dynamic programming algorithm to tell whether there is more than one optimal subset for the knapsack problem's instance?

8.1.7 *Shortest path counting* (Time permitting) A chess rook can move horizontally or vertically to any square in the same row or in the same column of a chessboard. Find the number of shortest paths by which a rook can move from one corner of a chessboard to the diagonally opposite corner using a dynamic programming algorithm.

