

Lab Exercise 8

Problem 1: Edit Distance (Sequence Alignment)

a) Given two strings $x[1..n]$ and $y[1..m]$ calculate the edit distance (the cost of the optimal alignment) of x and y . As discussed in class, you are allowed three operations: insert a character, delete a character & replace a character, each operation having cost 1. For e.g. for input strings

$x = \text{"TYPES"} \quad \& \quad y = \text{"STYLE"}$

your program should output '3', since an optimal alignment is

_	T	Y	P	E	S
S	T	Y	L	E	_

whose cost (edit distance) = 3. Your algorithm should be recursive (a top-down algorithm), that uses memoization.

b) Write an iterative (non-recursive) version of the previous algorithm.

c) Print the optimal alignment of the two strings along with the cost of each matching. For the above input strings your program should print:

_	S	1
T	T	0
Y	Y	0
P	L	1
E	E	0
S	_	1

Problem 2: Stock Trading.

An oracle – or a very clever prediction algorithm – is able to tell you the future share prices of a company Transparent Inc. Assuming the share price is fixed on any given day, you will thus have as input the share prices for the next ‘n’ days.

On each day you are allowed to do any one of the following operations: buy one share of Transparent Inc or sell any number of its shares that you have already purchased. You may also choose to not do any transaction at all.

a) For a given list of share prices for the next ‘n’ days, what is the maximum profit that can be obtained under the above constraints ? For e.g. if the share prices for the next 3 days are [2, 4, 50], the maximum profit obtainable would be 94 (buy a share on day 1 and day 2, sell them both on day 3). If the share prices are [25, 12, 10], the maximum profit obtainable would be 0.

b) Print the list of daily transactions that give you the maximum profit.

Problem 3: Spelling Corrector.

Read through <http://norvig.com/spell-correct.html> to implement a simple spelling corrector.