Hayden Yu
ID#66185399
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Homework 4

For this homework, the program takes two strings, string x has size ‘m’ and string y with size ‘n,’ and finds the edit distance to edit string z, which has the same components of string x initially and the program used a doubly-linked list for it, to string y. Using dynamic programming with memoization, the program calculates the minimal operations to obtain the edit distance. Once the program obtained the edit distance, it will backtrack the costs of each operation that add up to the edit distance. The minimal costs of each operation are inserted in the front of a vector as it backtracks. Using the resulted vector, the program edits list z with transformation operations; right, delete, insert, and replace, implemented in O(1) time. However, the running time of this program is Θ(mn) because that’s the time to find the edit distance. The figure below shows the edit distance and operations to transform “electrical engineering” to “computer science.”

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Edit distance is 54

Operation              z                          Cost            Total

inital string   electrical engineering          0               0
delete          lectrical engineering           2               2
delete          ectrical engineering            2               4
delete          ctrical engineering             2               6
right           ctrical engineering             0               6
insert          cotrical engineering            3               9
insert          comtrical engineering           3               12
insert          comptrical engineering          3               15
insert          computrical engineering         3               18
right           computrical engineering         0               18
insert          computerical engineering                3               21
right           computerical engineering                0               21
replaced by     computer cal engineering                4               25
insert          computer scal engineering               3               28
right           computer scal engineering               0               28
replaced by i   computer scil engineering               4               32
delete          computer sci engineering                2               34
delete          computer sciengineering         2               36
right           computer sciengineering         0               36
right           computer sciengineering         0               36
replaced by c   computer sciencineering          4               40
delete          computer sciencneering          2               42
delete          computer scienceering           2               44
delete          computer sciencering            2               46
right           computer sciencering            0               46
delete          computer scienceing             2               48
delete          computer scienceng              2               50
delete          computer scienceg               2               52
delete          computer science                2               54
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