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Analysis and Design of Algorithms Assignment 2
Dynamic Programming

Approach:

-The algorithm accepts three parameters, namely x (first string), y (second string), and a scoring Matrix. It uses a 2d Array (results matrix) to keep track of the previous calculated results (calculated as follows).
-In each Iteration there are three options.

1. Keep both letters from x and y
2. Keep letter from x and match it with “-”
3. Keep letter from y and match it with “-”
4. Store the maximum value achieved from these three options

-Lastly, the algorithm constructs newX and newY (the outputs) by going from the bottom right of the results matrix and following the path that has the highest score. Depending on the path with the highest score, it chooses whether to add the character or a “-” to the new string.

Time Complexity:

-The time complexity is represented in terms of the length (n) of the first string and the length (m) of the second string. The first loop iterates through the entire length of the first string so its O(n), and it has a nested loop that iterates through the entire length of the second string so its O(n*m). The constructing loop has O(n+m) time complexity.
-Therefore, the total time complexity of the algorithm is O(n*m).