

583. Delete Operation For Two Strings

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Given two words *word1* and *word2*, find the minimum number of steps required to make *word1* and *word2* the same, where in each step you can delete one character in either string.

Example 1:

Input: "sea", "eat"

Output: 2

Explanation: You need one step to make "sea" to "ea" and another step to make "eat" to "ea".

Note:

- The length of given words won't exceed 500.
- Characters in given words can only be lower-case letters.

Solution

Approach #1 Using Longest Common Subsequence [Time Limit Exceeded]

Algorithm

In order to determine the minimum number of delete operations needed, we can make use of the length of the longest common sequence among the two given strings *s1* and *s2*, say given by *lcs*. If we can find this *lcs* value, we can easily determine the required result as $m + n - 2 * lcs$. Here, *m* and *n* refer to the length of the two given strings *s1* and *s2*.

The above equation works because in case of complete mismatch (i.e. if the two strings can't be equalized at all), the total number of delete operations required will be $m + n$. Now, if there is a common sequence among the two strings of length *lcs*, we need to do *lcs* lesser deletions in both the strings leading to a total of $2lcs$ lesser deletions, which then leads to the above equation.

In order to find the length of the longest common sequence, we make use of a recursive function `lcs(s1,s2,i,j)`, which returns the length of the longest common sequence among the strings *s1* and *s2* considering their lengths upto *i* and *j* respectively. For evaluating the function, we check if the characters *s1*[*m* - 1] and *s2*[*n* - 1] for equality. If they match, we can consider the corresponding strings upto 1 lesser lengths since the last characters have already been considered and add 1 to the result to be returned for strings of 1 lesser lengths. Thus, we make the function call `lcs(s1, s2, i-1, j-1)`.

If the last characters don't match, we have two options, either we can consider the second last character of *s1* and the last character of *s2*, or we can consider the second last character of *s2* and the last character of *s1*. We need to consider the larger result obtained out of the two considerations for getting the required length.

Thus, the function call `lcs(s1,s2,m,n)` returns the required *lcs* value.

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