Devang Chhajed

Longest Common String using Dynamic Programming

Code:

```python
str1 = input("Enter 1st string : ")
str2 = input("Enter 2nd string : ")

matrix = []
for i in range(len(str2)+1):
    tt=[]
    for j in range(len(str1)+1):
        t=[]
        if i==0 or j==0:
            t.append(0)
            t.append([0,0,0])
        else:
            t.append(-1)
            t.append([0,0,0])
        tt.append(t)
    matrix.append(tt)


def populatematrix(s1, s2):
    for i in range(1,len(s2)+1):
        for j in range(1,len(s1)+1):

            back = matrix[i][j-1][0]
            diag = matrix[i-1][j-1][0]
            up = matrix[i-1][j][0]
            if s2[i-1]==s1[j-1]:
                diag=diag+1

            pos=[back,diag,up]
            maxval = max(pos)
            for mi in range(3):
                if maxval==pos[mi]:
                    matrix[i][j][1][mi]=1
            matrix[i][j][0]=maxval


path=[]
def nbconesol():
    i=len(str2)
    print("")
```

```python
    print("BackTrack Coordinates : ")
    for j in range(len(str1),0,-1):
        if matrix[i][j][1][1]==1:
            print(i,",",j)
            path.append(str1[j-1])
            i-=1
        if matrix[i][j][1][2]==1:
            i-=1
            j+=1

    print("")
    print("LCS : ",end="")
    path.reverse()
    for i in path:
        print(i, end="")



def printm():
    print("Table : ")
    print("", end ="\t")
    for i in range(len(str1)+1):
        if i==0:
            print(i, end ="\t")
        else:
            print(i,"-",str1[i-1], end ="\t")
    print("")
    for i in range(len(str1)+2):
        print("-------", end ="\t")
    print("")
    for i in range(len(str2)+1):
        if i==0:
            print(i, end ="\t|")
        else:
            print(i,"-",str2[i-1], end ="\t|")
        for j in range(len(str1)+1):
            print(matrix[i][j][0], end ="\t")
        print("")



populatematrix(str1, str2)
printm()
```

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nbconesol()

Output:

```
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: C:\Users\Devang Chhajed\Desktop\LCS_OnePath.py ==========
Enter 1st string : ABCBCADAC
Enter 2nd string : ABABDC
Table :
        0       1 - A   2 - B   3 - C   4 - B   5 - C   6 - A   7 - D   8 - A   9 - C
    ------- ------- ------- ------- ------- ------- ------- ------- ------- -------
0       |0      0       0       0       0       0       0       0       0       0
1 - A   |0      1       1       1       1       1       1       1       1       1
2 - B   |0      1       2       2       2       2       2       2       2       2
3 - A   |0      1       2       2       2       2       3       3       3       3
4 - B   |0      1       2       2       3       3       3       3       3       3
5 - D   |0      1       2       2       3       3       3       4       4       4
6 - C   |0      1       2       3       3       4       4       4       4       5

BackTrack Coordinates :
6 , 9
5 , 7
3 , 6
2 , 4
1 , 1

LCS : ABADC
>>> |
```