

Assignment-8

ELP - 718 Telecom Software Laboratory

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2018JTM2002
2018-2020**

A report presented for the assignment-8



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September 27, 2018**

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1 Objective

To develop our logical skills to solve the given problem with the help of basic python syntax.

2 Problem Statement 1

IIT Delhi, has just got the strongest computer. The professors in charge wants to check the computational capacity of the computer. So, they decided to create the problem which is to be given as an assignment to students. Can you help the professor to check the computation capability of the computer?

A valid cross is defined here as the two regions (horizontal and vertical) of equal lengths crossing over each other. These lengths must be odd, and the middle cell of its horizontal region must cross the middle cell of its vertical region.

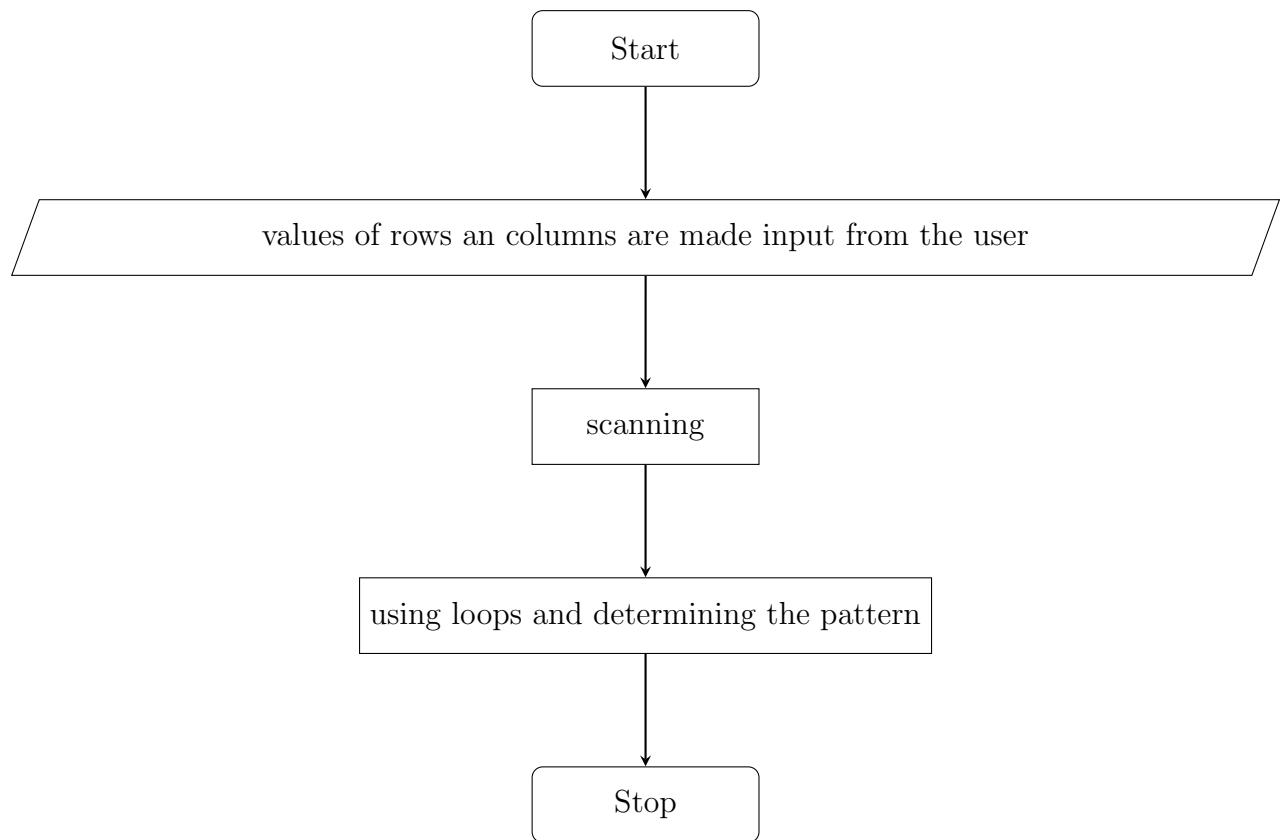
Find the two largest valid crosses that can be drawn on smart cells in the grid, and return two integers denoting the dimension of the each of the two largest valid crosses. In the above diagrams, our largest crosses have dimension of 1, 5 and 9 respectively .

Note: The two crosses cannot overlap, and the dimensions of each of the valid crosses should be maximal.

Constraints

- $2 \leq n \leq 105$
- $2 \leq m \leq 105$

2.1 Program structure



2.2 Input and Output format

- **Input format**

The first line contains two space-separated integers, n and m . Each of the next n lines contains a string of m characters where each character is either S (Smart) or D (Dull). These strings represent the rows of the grid. If the j th character in the i th line is S , then (i,j) is a cell smart. Otherwise it's a dull cell..

- **Output format**

Find two valid crosses that can be drawn on smart cell of the grid, and return the dimension of both the crosses in the reverse sorted order(i.e. First Dimension should be the larger one and other should be smaller one).

2.3 Test Cases

Sample Input1

```
5 6
SSSSSS
SDDSD
SSSSSS
SDDSD
SSSSSS
```

Sample Output0

```
5 1
```

Sample Ouput1

```
6 6
DSDDSD
SSSSSS
DSDDSD
SSSSSS
DSDDSD
DSDDSD
```

Sample Intput2

```
5 9
SSSSDSDDD
DDSDDDDDD
SSSSDDDDD
DDSDSDDDD
DSSSDDDDD
```

Sample Output2

```
9 1
```

2.4 Screenshots

```
shivajitroy@pc15-OptiPlex-9020:~/Documents/assignment-05$ python3 ps1.py
enter the value of rows n :5
enter the value of coloumn m:6
SSSSSS
SDDSD
SSSSSS
SDDSD
SSSSSS
[[ 'S', 'S', 'S', 'S', 'S', 'S'], ['S', 'D', 'D', 'D', 'S', 'D'], ['S', 'S', 'S', 'S', 'S', 'S'], ['S', 'S', 'D', 'D', 'S', 'D'], ['S', 'S', 'S', 'S', 'S', 'S']]
Traceback (most recent call last):
  File "ps1.py", line 22, in <module>
    if patt[i+2][j-2]=='S' and patt[i+2][j+2]=='S' and  patt[i+2][j+1]=='S' and patt[i+2][j-1]=='S'and patt[i+2][j]=='S':
IndexError: list index out of range
```

3 Problem Statement 2

3.1 Problem Statement

After, getting mix results of valid crosses, professors decided to test the computation abilities on one more problem. This time professors wanted to test the decryption capabilities of the computer. Encryption of a message requires three keys, k_1 , k_2 , and k_3 . The 26 letters of English and underscore are divided in three groups, [a-i] form one group, [j-r] a second group, and everything else ([s-z] and underscore) the third group. Within each group the letters are rotated left by k_i positions in the message. Each group is rotated independently of the other two. Decrypting the message means doing a right rotation by k_i positions within each group.

3.2 Input Output Format

- **Input format**

All input strings comprises of only lowercase English alphabets and underscores(_).

- **Output format**

For each encrypted message, the output is a single line containing the decrypted string.

- **Constraints**

- $1 \leq \text{length of string} \leq 150$
- $1 \leq k_i \leq 150 (i = 1, 2, 3)$

3.3 Test Case

Sample Input: 2 3 4

dikhtkor_ey_tec_ocsusrsw_ahas_

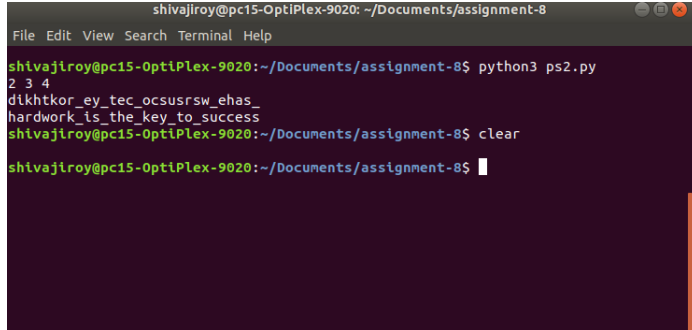
Sample Output: hardworkis_the_key_to_success

3.4 Difficulties/Isseus Faced

- Error in code compiling.

- Error while giving inputs through Terminal.

3.5 Screenshots



4 Appendix

4.1 Appendix-A : code for ps1

```

1 n=int(input("enter the value of rows n :"))
2 m=int(input("enter the value of coloumn m:"))
3 patt = []
4
5 #creating a array to take the inputs
6 for i in range(n):
7     t = list(input())
8     patt = patt + [t]
9 print(patt)
10
11 #running a loop to compare elements
12 for i in range(n):
13     for j in range(m):
14         #print(i,j,patt[i][j])
15
16         if patt[i][j]=='S' and patt[i][j+1]=='S' and patt[i][j
17 -1]=='S': # comparison of characters for finding a pattern of 9 S
18         if patt[i+1][j]=='S' and patt[i+1][j-1]=='D'
19 and patt[i+1][j+1]=='D': #comparision of next column to find the
20 pattern
21         if patt[i+2][j-2]=='S' and patt[i+2][
22 j+2]=='S' and patt[i+2][j+1]=='S' and patt[i+2][j-1]=='S' and patt
23 [i+2][j]=='S': #comparision in the next row and about the same
24 column against its previous and next column
25         if patt[i+3][j]=='S' and patt[
26 i+3][j-1]=='D' and patt[i+3][j+1]=='D':#moving to next row and
27 trying to correlate the pattern

```

```

20                                     if patt[i+4][j]=='S'
and patt[i+4][j+1]=='S' and patt[i+4][j-1]=='S':
21                                     print("9")
22
23         elif patt[i][j]=='S' and patt[i][j-1]=='D' and patt[i
][j+1]=='D' and i<=n-1 : #similarly trying to correlate the
pattern regarding 5 S
24                                     if patt[i+1][j]=='S' and patt[i+1][j+1]=='S'
and patt[i+1][j-1]=='S':
25                                     if patt[i+2][j]=='S' and patt[i][j
-1]=='D' and patt[i][j+1]=='D':
26                                     print("5")
27         elif patt[i][j]=='S' and patt[i][j-1]=='D' and patt[i
][j+1]=='D' and i<=n-1 :# similarly trying tyo correlate the
pattern regarding 1 S
28                                     if patt[i+1][j]=='D' and patt[i+1][j-1]=='D'
and patt[i+1][j+1]=='D':
29                                     if patt[i+2][j]=='D' and patt[i+2][j
-1]=='D' and patt[i+2][j+1]=='D':
30                                     print("1")

```


4.2 Appendix-B : code for ps2

```
1 ##### this is the second .py file #####
2
3 ##### write your code here #####
4 #rotate function
5 def rotate(lst,x):
6     copy = list(lst)
7     for i in range(len(lst)):
8         if x<0:
9             lst[i+x] = copy[i]
10        else:
11            lst[i] = copy[i-x]
12
13
14 #Create 3 groups
15 a1="abcdefghi"
16 a2="jklmnopqr"
17 a3="stuvwxyz_"
18
19 b1 =[]
20 b2 =[]
21 b3 =[]
22 i1=[]
23 i2=[]
24 i3=[]
25
26 #get key vakue from user
27 k1,k2,k3 = list(map(int,input().split()))
28
29 #get string
30 msg = input()
31 msg_list = list(msg)
32 #print(msg_list)
33
34 #now compair g1 in string and copy similaar char into s1
35 for i in range(0,len(msg)):
36     if msg_list[i] in a1:
37         b1.append(msg_list[i])
38         i1.append(i)
39
40     elif msg_list[i] in a2:
41         b2.append(msg_list[i])
42         i2.append(i)
43     elif msg_list[i] in a3:
44         b3.append(msg_list[i])
45         i3.append(i)
46
47
```

```

48
49 #rotate b1,b2,b3
50 rotate(b1,k1)
51 rotate(b2,k2)
52 rotate(b3,k3)
53
54
55
56 #get decrypted msg
57 p=q=r=0
58 for i in range(0,len(msg)+1):
59     if i in i1:
60         msg_list[i]=b1[p]
61         p+=1
62     elif i in index2:
63         msg_list[i]=b2[q]
64         q+=1
65     elif i in index3:
66         msg_list[i]=b3[r]
67         r+=1
68
69 #print(msg_list)
70
71 for i in msg_list[:]:
72     print(i, end = ' ')
73
74 print("")

```