Exercises

April 28, 2024

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# Bioinformatics second homework
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1 Questions

Exercises

15.4-1
Determine an LCS of $\langle 1, 0, 0, 1, 0, 1, 0, 1 \rangle$ and $\langle 0, 1, 0, 1, 1, 0, 1, 1, 0 \rangle$.

15.4-2
Give pseudocode to reconstruct an LCS from the completed c table and the original sequences $X = \langle x_1, x_2, \ldots, x_m \rangle$ and $Y = \langle y_1, y_2, \ldots, y_n \rangle$ in $O(m + n)$ time, without using the b table.

15.4-3
Give a memoized version of LCS-LENGTH that runs in $O(mn)$ time.

15.4-4
Show how to compute the length of an LCS using only $2 \cdot \min(m, n)$ entries in the c table plus $O(1)$ additional space. Then show how to do the same thing, but using $\min(m, n)$ entries plus $O(1)$ additional space.

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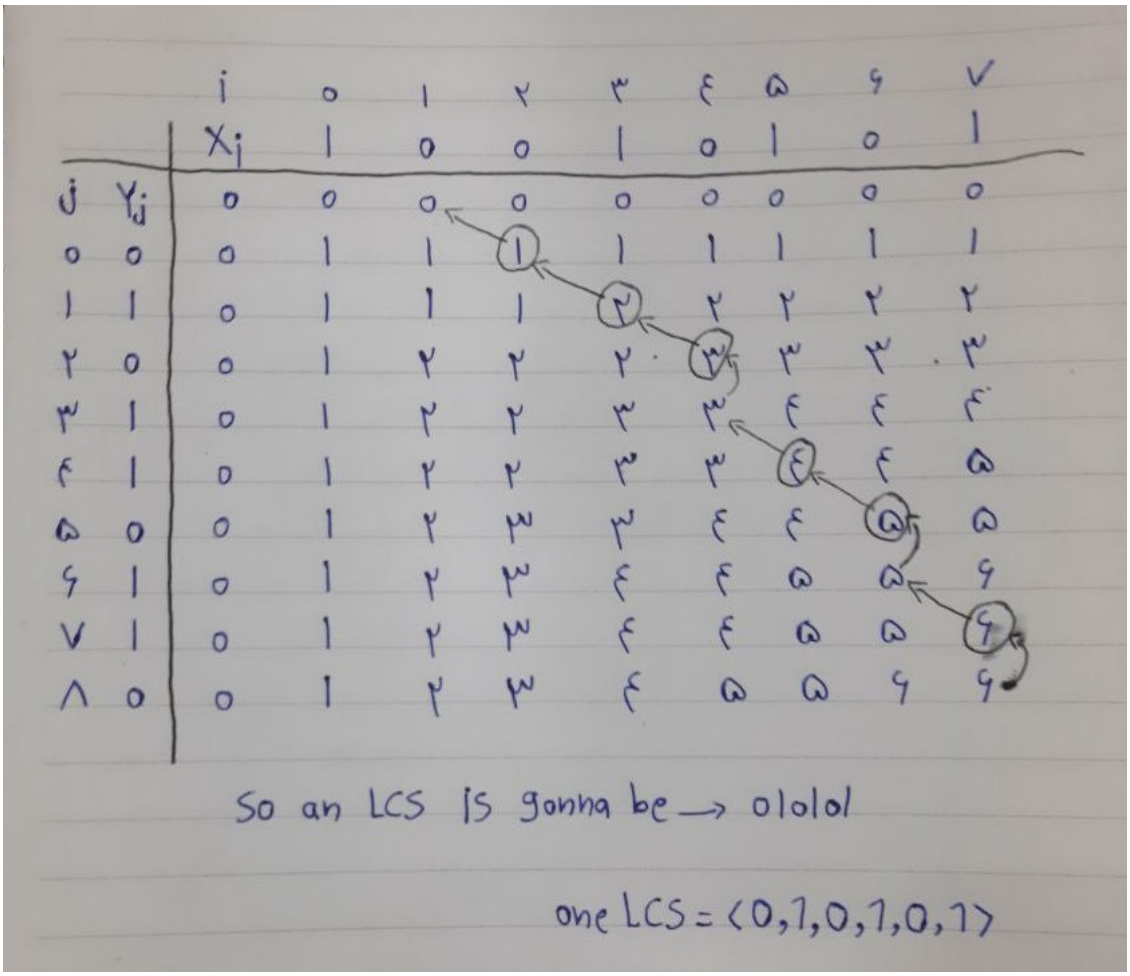
```
#15.4.1
```

2 Answer



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#15.4.2

LCS(c,X,Y){
m = length(X)
n = length(Y)
LCS = []
i = m
j = n

while i>0 and j>0
    if X[i]==Y[j]
        LCS.append(X[i])
        i = i - 1
        j = j - 1
    elif c[i-1][j] > C[i][j-1]
        i = i - 1
    else
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        j = j -1

Reverse = []
for k=len(LCS)-1 to 0
    Reverse.append(LCS[k])
return Reverse
}
```

[ ]:
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#15.4.3

MemorizedLCS(X,Y){

m = length(X)
n = length(Y)
memory = table[m+1][n+1] initialized with 0

for i=1 to m
    for j=1 to n
        if X[i]==Y[j]:
            memory[i][j] = 1 + memory[i-1][j-1]
        else:
            memory[i][j] = max(memory[i-1][j] , memory[i][j-1])

return memory[m][n]
}
```