HW10

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HW10

Find the most similar keyword!

- Implement the LCS algorithm for keywords
- Add each keyword into an array/linked list
- Given a string *s*, output the keyword *k*, such that *k*'s value and *s* have the longest common sequence among all the added keywords.

Requirements

- Maintain a keyword list, and implement the LCS algorithm
- For the list structure, you can
  - Use java.util.ArrayList
  - Or develop it by yourself

Operations

operations	description
add(Keyword k)	Insert a keyword k to an array
find(String s)	Find and output the most similar keyword by using the LCS algorithm

Keyword

- A keyword is a tuple of [String *name*, Integer *count*]
  - For example:

    {

        name: “Fang”,

        count: 3

    }
- A keyword should output in format **[name,count]** :
  - [Fang,3]

I/O Example: add

- To do: Insert a keyword [k,c] to the list
- Input:
  - Token1 : a constant “add”
  - Token2 : keyword name **k**
  - Token3 : keyword count **c**
  - EX: add Fang 3

I/O Example: find

- To do: Find and output the most similar keyword by using the LCS algorithm
- Input:
  - Token1 : a constant “find”
  - Token2 : a string **s**
  - EX: find NTU
- Output:
  - If list is empty, then output “InvalidOperation”:

    InvalidOperation
  - If it is legal:

    NTU: [NCCU, 2]

Input file

- You need to read the sequence of operations from a txt file
- The format is firm
- Raise an exception if the input does not match the format

```
add Fang 3
add Yu 5
add NCCU 2
add UCSB 1
add Management 4
add Information 5
find NTU
find Manager
```

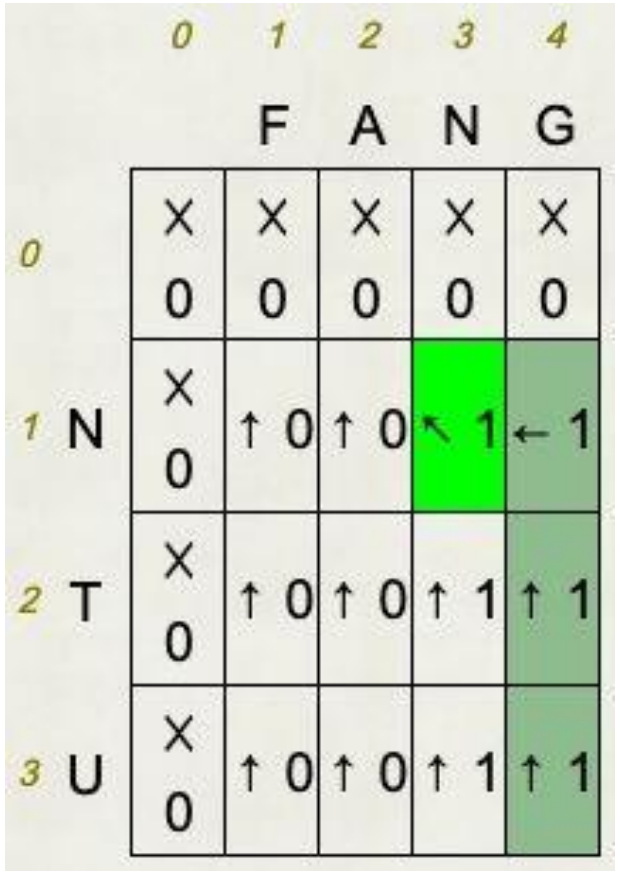
LCS

An LCS Algorithm

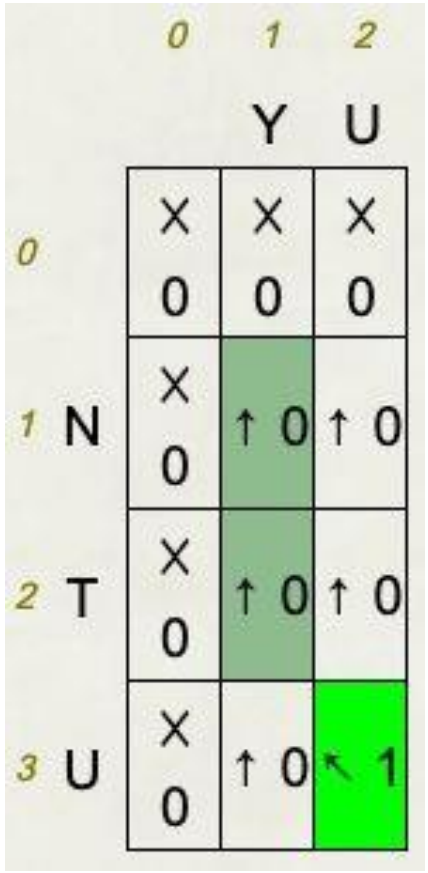
Algorithm LCS(X,Y):
Input: Strings X and Y with n and m elements, respectively
Output: For i = 0,…,n-1, j = 0,...,m-1, the length L[i, j] of a longest string that is a subsequence of both the string X[0..i] = $x_0x_1x_2\ldots x_i$ and the string Y [0.. j] = $y_0y_1y_2\ldots y_j$

```
for i =0 to n-1 do
    L[i,-1] = 0
for j =0 to m-1 do
    L[-1,j] = 0
for i =0 to n-1 do
    for j =0 to m-1 do
        if x_i = y_j then
            L[i, j] = L[i-1, j-1] + 1
        else
            L[i, j] = max{L[i-1, j] , L[i, j-1]}
return array L
```

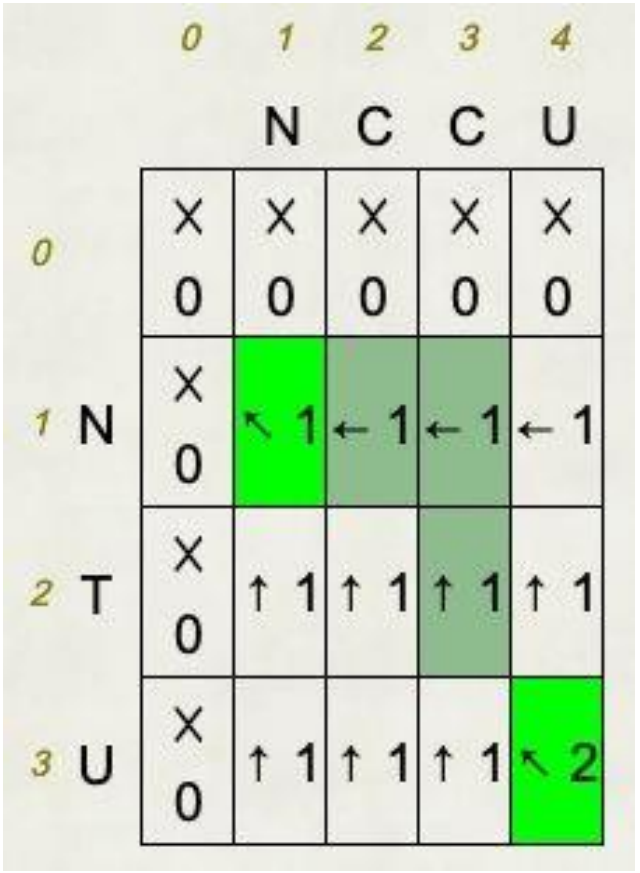
LCS



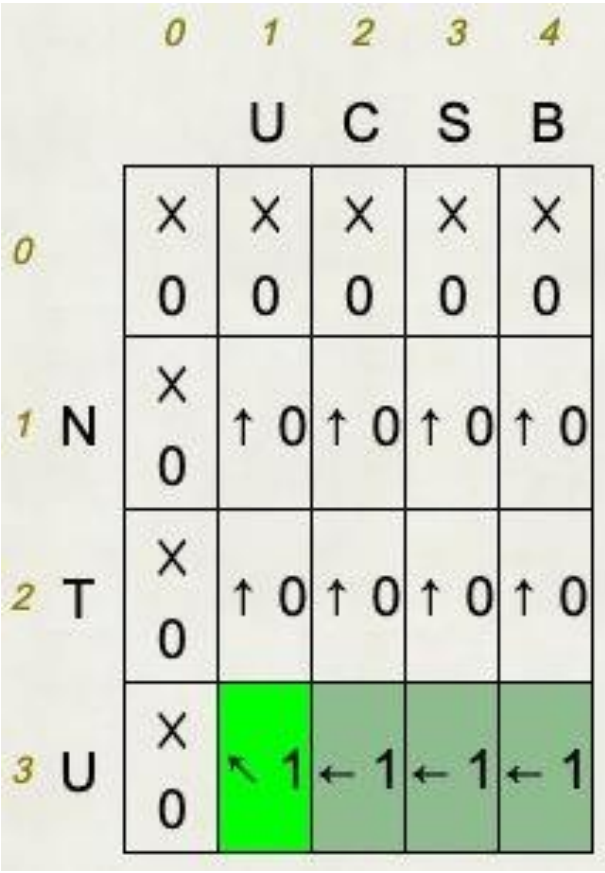
		0	1 F	2 A	3 N	4 G
0		X 0	X 0	X 0	X 0	X 0
1	N	X 0	↑ 0	↑ 0	↖ 1	← 1
2	T	X 0	↑ 0	↑ 0	↑ 1	↑ 1
3	U	X 0	↑ 0	↑ 0	↑ 1	↑ 1



		0	1 Y	2 U
0		X 0	X 0	X 0
1	N	X 0	↑ 0	↑ 0
2	T	X 0	↑ 0	↑ 0
3	U	X 0	↑ 0	↖ 1



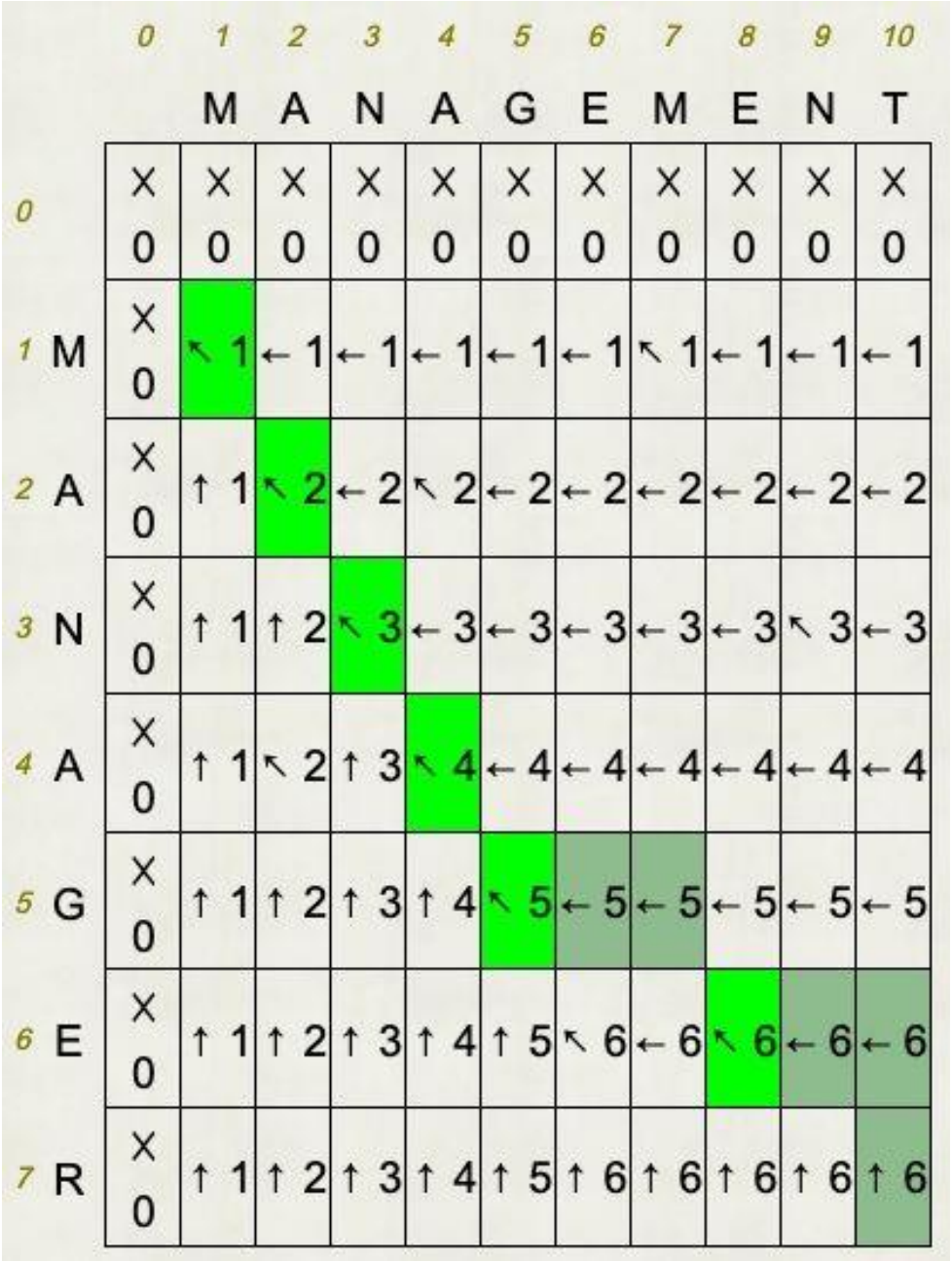
		0	1 N	2 C	3 C	4 U
0		X 0	X 0	X 0	X 0	X 0
1	N	X 0	↖ 1	← 1	← 1	← 1
2	T	X 0	↑ 1	↑ 1	↑ 1	↑ 1
3	U	X 0	↑ 1	↑ 1	↑ 1	↖ 2



		0	1 U	2 C	3 S	4 B
0		X 0	X 0	X 0	X 0	X 0
1	N	X 0	↑ 0	↑ 0	↑ 0	↑ 0
2	T	X 0	↑ 0	↑ 0	↑ 0	↑ 0
3	U	X 0	↖ 1	← 1	← 1	← 1

From https://web.ntnu.edu.tw/~algo/Subsequence2.html

LCS



		0	1	2	3	4	5	6	7	8	9	10
			M	A	N	A	G	E	M	E	N	T
0		X 0	X 0	X 0	X 0	X 0	X 0	X 0	X 0	X 0	X 0	X 0
1	M	X 0	↖ 1	← 1	← 1	← 1	← 1	← 1	↖ 1	← 1	← 1	← 1
2	A	X 0	↑ 1	↖ 2	← 2	↖ 2	← 2	← 2	← 2	← 2	← 2	← 2
3	N	X 0	↑ 1	↑ 2	↖ 3	← 3	← 3	← 3	← 3	← 3	↖ 3	← 3
4	A	X 0	↑ 1	↖ 2	↑ 3	↖ 4	← 4	← 4	← 4	← 4	← 4	← 4
5	G	X 0	↑ 1	↑ 2	↑ 3	↑ 4	↖ 5	← 5	← 5	← 5	← 5	← 5
6	E	X 0	↑ 1	↑ 2	↑ 3	↑ 4	↑ 5	↖ 6	← 6	↖ 6	← 6	← 6
7	R	X 0	↑ 1	↑ 2	↑ 3	↑ 4	↑ 5	↑ 6	↑ 6	↑ 6	↑ 6	↑ 6

Output

```
NTU: [NCCU,2]
Manager: [Management,4]
```

Bonus HW

- Write the reflection on 12/11 資管專題發表會
- File Name: HW{date_IDnumber}.pdf

  ex:HWBonus_111306XXX.pdf

Notice

- Remind to send your GitHub link and contact information via Google form

  https://forms.gle/p8g6rXU7NmDTGKLi6

- Keep maintaining your GitHub!
- The make-up section in WM5 will open soon, only can get 4 out of 5 for late homework. The group that didn't upload the proposal to WM5 should also hand-in in the make-up section.