Handin 7

Thomas Vinther & Jens Kristian Refsgaard Nielsen

07-11-18

1   Merging words

1.1   b)

We wish to determine if a word z is a weave of the words x and y. To solve this problem we use the following divine algorithm based upon the recursion formula (**??**)

Time		Line nr	Pseudocode
			MergingWords?(z,x,y)
O(n+m)		1	Let $A = \text{charset(x)}$, $B = \text{charset(y)}$ and $C = \text{charset(z)}$
O(n+m)		2	if $A \cup B! = C$
1		3	return no
nm		4	Let $F[0..n, 0..m]$ be a matrix
n		5	for $i = 0, \dots, n$
m		6	for $j = 0, \dots, m$
1		7	if $i == 0$ && $j == 0$
	1	8	$F[i,j] = 0$
1		9	else if $i == 0$ $\backslash\backslash\ j > 0$
2		10	if $z_j == y_j$ && $F[0, j-1] == 1$
	1	11	$F[0,j] = 1$
1		12	else $F[0,j] = 0$
1		13	else if $j == 0$ $\backslash\backslash\ i > 0$
2		14	if $z_j == y_j$ && $F[i-1, 0] == 1$
	1	15	$F[i,0] = 1$
1		16	else $F[i,0] = 0$
0		17	else $\backslash\backslash i, j \geq 1$
4		18	if $\Big((z_{i+j} == x_i \&\& F[i-1, j] == 1) \|$ $(z_{i+j} == y_j \&\& F[i, j-1] == 1) \Big)$
	1	19	$F[i,j] = 1$
	1	20	else $F[i,j] = 0$
1		21	if $F[n,m] == 1$
1		22	return yes
1		23	else return rick roll

Correctness: We follow the instructions given by the function F in lines 4 to 20. In line 1-3 we compute the letters used in each of the sequences, this is a quick way to see if a solutions is possible. Since if there is a letter in x or y that is not in z, there clearly cannot be a solution,

and wise versa.

In line 21-23 we check if there is a solution in accordance with the considerations made around **??**

1.2 c)

Time	Line nr	Pseudocode
		$\mathrm{Reconstructor}(i, j, Index, F)$
1	1	if $j = 0$
1	1	return Index
$\max(n, m)$	1	while $(F[i, j-1]! = 0)$
1	2	$j--$
1	3	$\mathrm{Index.add}(i + j)$
1	4	$i--$
		RC-start(F,n,m)
1	1	Let Index be a vector of length n
1	2	Reconstructior(n,m,Index,F)
1	3	Reverse Index
1	4	Print Index