Bioinformatics I
WS 15/16
Tutor: Alexander Seitz

1	2	$\sum$ (6+2)

Jonas Ditz
& Benjamin Schroeder

Blatt 8

(Abgabe am 14. December 2015)

Theoretical Assignment - *Suffix tree construction and application*

a - *Suffix tree construction*

i

If one uses the naive approach to construct the suffix tree of "CTAGTAGCAG", the result would look like Figure 1.

ii

b - *Main data table of WOTD*

c - *Suffix tree application*

Theoretical Assignment - *Runtime and space complexity of suffix trees*

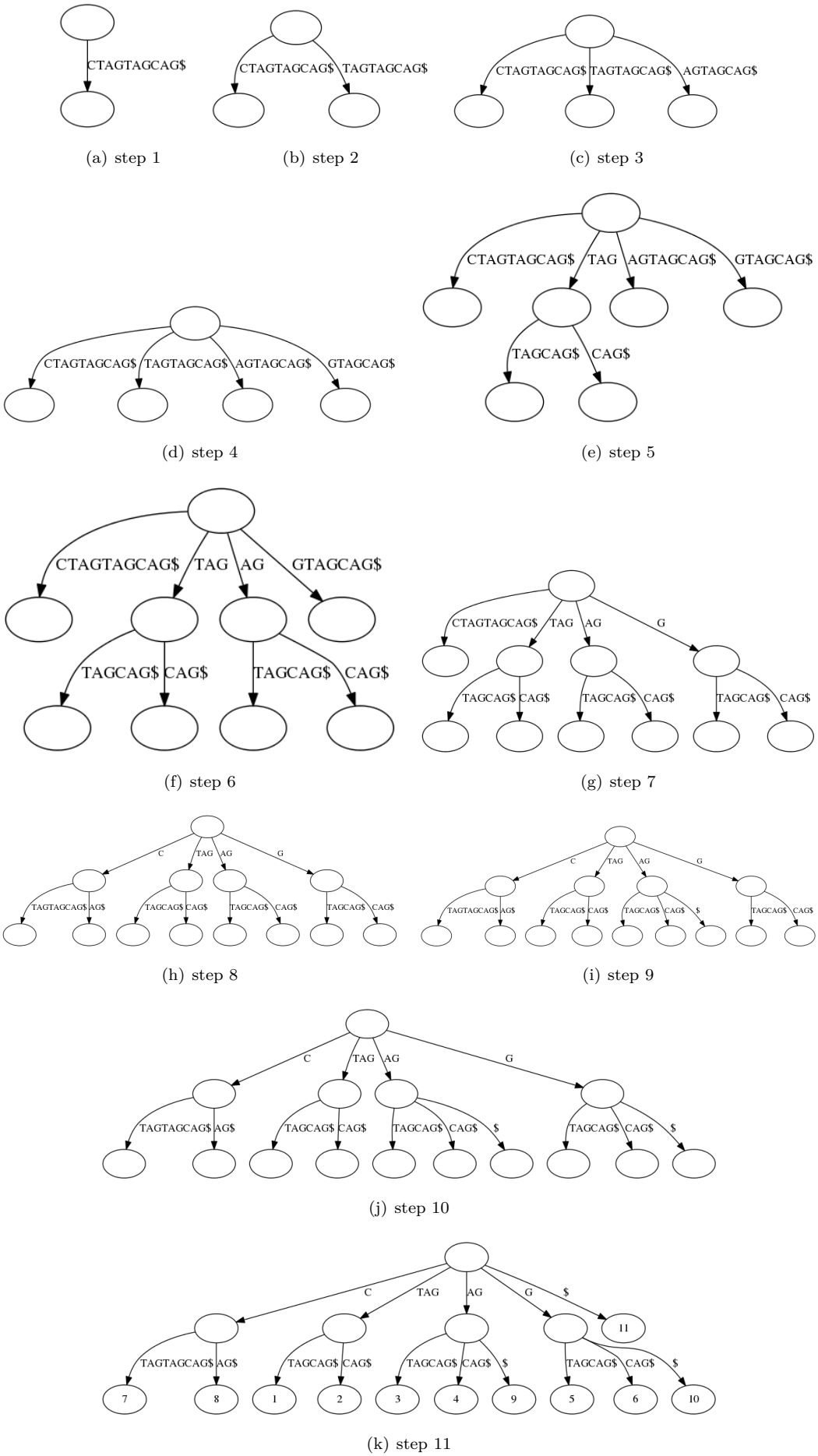
a

Assume a text T of length n with n times the letter "a". If one build a suffix tree for T using WOTD, each node will have just one c-group with all remaining suffixes in it. So evaluating the root node, one has to compute the longest common prefix of n suffixes, of $n-1$ suffixes for the second node and so on. In each c-group the shortest suffix is of length 1, so for each node $\bar{u}$ there are just $|R_a\bar{u}|$ numbers of comparisons.

Since T is of length n this will lead to an overall runtime of $\sum_{i=1}^{n} i = \frac{1}{2}n(n+1)$, which is in $O(n^2)$. $\square$

b

c



(a) step 1 (b) step 2 (c) step 3

(d) step 4 (e) step 5

(f) step 6 (g) step 7

(h) step 8 (i) step 9

(j) step 10

(k) step 11

Figure 1: All steps of the naive implementation of suffix tree construction for the string "CTAGTAGCAG".