Exercise sheet 7: Suffix-Trees

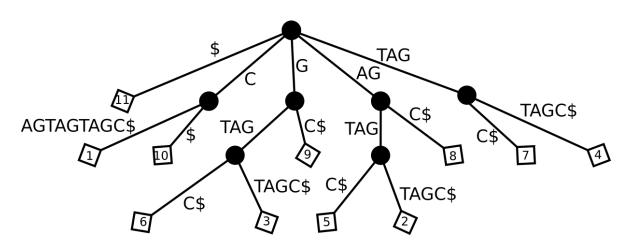
Exercise 1

You are given the text T = CAGTAGTAGC

Question 1A Draw the corresponding suffix tree

Solution

CAGTAGTAGC



Question 1B Describe the steps of a counting query for P = TAG

Solution

- start at root node
- locate outgoing edge that starts with T
- match subsequent characters of the pattern
- in the subtree rooted at \overline{TAG} count the number of leaves $\Rightarrow 2$

Question 1C Describe the steps of a reporting query for P = AG

Solution

- start at root node
- locate outgoing edge that start with A
- match subsequent characters of the pattern
- in the subtree rooted at \overline{AG} report the labels of all leaves $\Rightarrow \{2, 5, 8\}$

Exercise 2

Question 2A Draw a generalized suffix tree for the sequences A = CCATG and B = CATG.

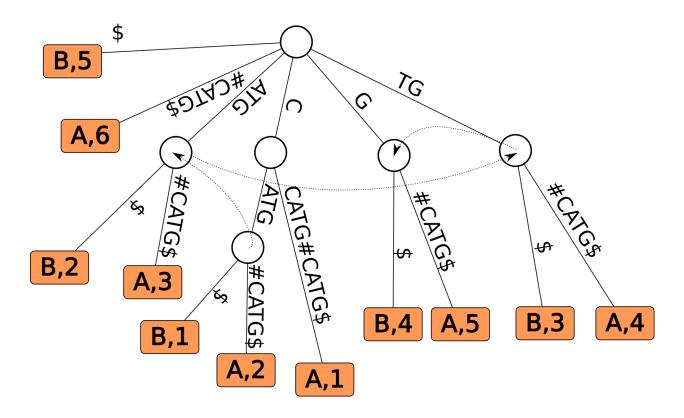
Hint 1 Concatenate the two sequences using a unique character for splitting. e.g. CCATG#CATG\$. Dont forget to include suffix links

Formulae sl(v) = w $v = \overline{cb}$ $w = \overline{b}$ c: character, b: string

remember: over lined strings are a representation for the node at that string

Solution

CCATG#CATG\$



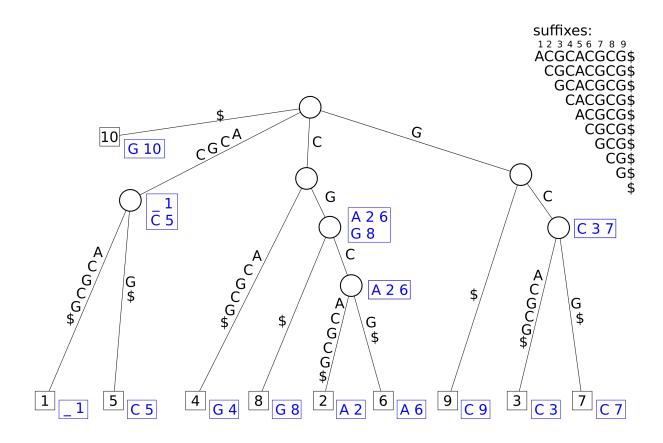
Question 2B Find the Maximal Unique Matches of the sequences A = CCATG and B = CATG using the tree from A)

Solution CATG is the only MUM as $v = \overline{CATG}$ has no suffix links pointing to it

Exercise 3

Question 3A Draw a generalized suffix tree for the sequence A = ACGCACGCG.

Solution



Question 3B Find all maximal pairs of length at least 2

Solution ACGC: (1,5,4)

CG:(2,8,2),(6,8,2)