

Fundamental Algorithms

WS 2017

Exercise Sheet 13

Exercise 1:

Consider the KMP algorithm of Chapter 7.

- a) Compute the set of d_i -values for the search string $s = ababacabababacba$ using the KMP-Preprocessing algorithm on Slide 27.
- b) Compute the set of d'_i -values for the same search string using the KMP-Preprocessing2 algorithm on Slide 32.

Exercise 2:

Execute the KMP algorithm on Slide 29 for the search string $s = aababaab$ and the text $t = aabababaabaababaabaa$. Use the following d_i -values for s .

i	0	1	2	3	4	5	6	7	8
s_i		a	a	b	a	b	a	a	b
d_i	2	2	2	4	4	6	6	6	6

Illustrate the state of the algorithm after each increment of j (i.e., after each *shift* of s).

Exercise 3:

Consider the Boyer-Moore algorithm.

- a) Give an example for which the Naive Boyer-Moore algorithm on Slide 35 takes time $O(n \cdot m)$.
- b) What is the runtime of the Boyer-Moore algorithm with occurrence shift on Slide 36 for your example?
- c) What is the runtime of the Boyer-Moore algorithm with D_j -shifts as shown on Slide 40 for your example?

Exercise 4:

Consider the Boyer-Moore algorithm. Compute the values d_1 and d_2 for all $0 \leq j \leq m$ as described on Slide 39 for the search string $s = aababaababaabab$.