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Algorithms and Datastructures
Winter Term 2021/2022
Exercise Sheet 12

Exercise 1: Knuth-Morris-Pratt Algorithm

Consider the pattern $P = BBABAB$ and the text $T = ABBABBABABBABABBA$.

(a) Compute the array S of the Knuth-Morris-Pratt algorithm.

(b) Use the Knuth-Morris-Pratt algorithm to find all appearances of P in T. Document the steps analogously to the lecture.

Exercise 2: Rabin-Karp Algorithm

Let T be a given text of length n and let $P_1, \ldots, P_k$ be k patterns, each of length exactly m. The goal is to know if there is at least one pattern in the text, that is, we want to answer *True* if there exists at least one index $i \in \{1, \ldots, k\}$ such that $P_i \in T$, and answer *False* if for any $i \in \{1, \ldots, k\}$, $P_i \notin T$. It is easy to solve this problem in $O(k(n+m))$ by running the Rabin-Karp algorithm once for each pattern. Give an algorithm (based on Rabin-Karp) that requires only $O(n+km)$.