Home Work 3

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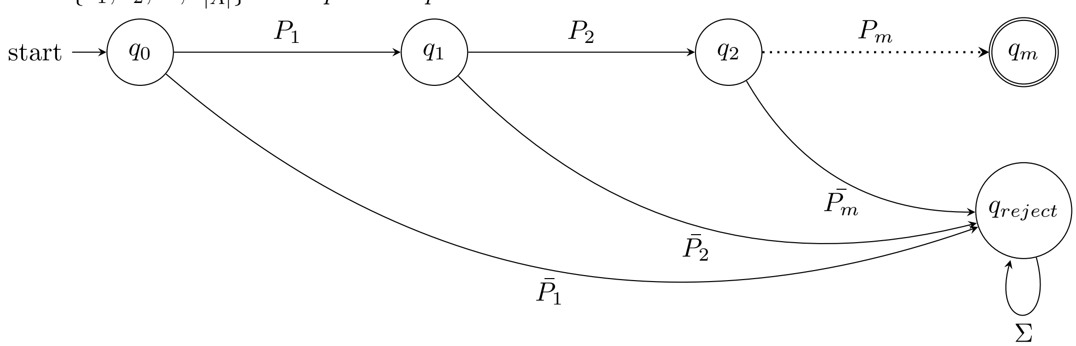
procedure NAIVE(*On input* S[1,..m])
    $n \leftarrow |T|$
    $m \leftarrow |S|$
    for s=0 **to** n-m **do**
        if P[1,..m] = T[s+1...s+m] **then**
            print*("pattern found")*

Question 1

The string matching problem is defined as: "Given a text $T = T_1...T_n$ which is stored as array $T = T[1, ..., n]$, and a pattern $P = P_1...P_m = P[1...m]$ with $m < n$, where both are strings over the same alphabet Σ; decide whether S is a substring of T.

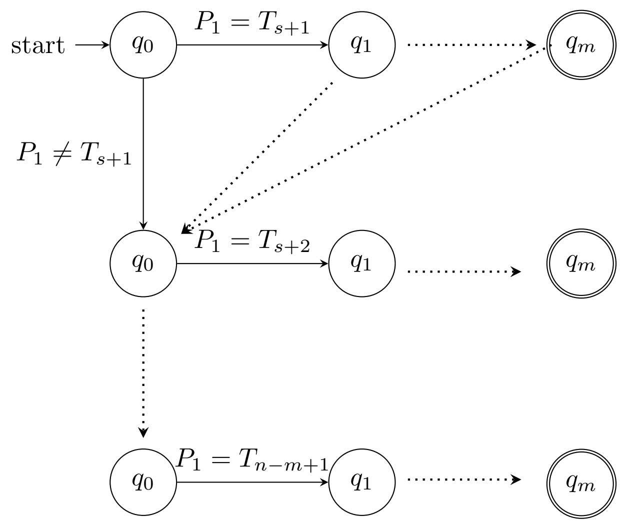
Algorithm 1 is the so-called naive-pattern finding algorithm. Use Algorithm 1 to construct a Finite State. Automata(deterministic or non-deterministic) for solving the matching problem.

Let M $= (Q, \Sigma, \delta, q_0, F)$ be 5-tuple NFSA where:
Q is a finite set of states
Σ is a finite set if input symbols
δ is a state transition function from $Q \times \Sigma \rightarrow Q$
$q_0 \in Q$ is the initial state
$F \subseteq Q$ Q is the set of final states
Let $A = \{s_1, s_2, ..., s_{|A|}\}$ and $\bar{p} = A - p$



Question 2

Algorithm 1 returns a result in the time proportional to $O(|T||S|)$. Discuss the computation time of your automaton.
In the worst case the automata will have $O(|T||S|)$ complexity. We know this because it iterates through the whole text of size $|T|$ and for each of those iterations it compares at $|S|$, which is the size of the string, individual items. Thus the automata has the same time complexity as the algorithm.


start
q_0
$P_1 = T_{s+1}$
q_1
q_m
$P_1 \neq T_{s+1}$
q_0
$P_1 = T_{s+2}$
q_1
q_m
q_0
$P_1 = T_{n-m+1}$
q_1
q_m