Problem

Read the informal definition of the finite state transducer given in Exercise 1.24. Give a formal definition of this model, following the pattern in Definition 1.5 (page 35). Assume that an FST has an input alphabet Σ and an output alphabet Γ but not a set of accept states. Include a formal definition of the computation of an FST.

(Hint: An FST is a 5-tuple. Its transition function is of the form $\delta :\ Q \times \Sigma \longrightarrow Q \times \Gamma$.)

Step-by-step solution

Step 1 of 2

Finite State Transducer:

• A finite state transducer is a kind of deterministic finite state automaton which consists of both the input string and the output string.

• It converts the input string into an output string.

Comment

Step 2 of 2

The formal definition of Finite State Transducer (FST) is as follows:

A Finite State Transducer is a 6-tuple machine and is represented as $M = (Q, \Sigma, \Gamma, \delta, q_0)$ where

- Q is a finite set of states.
- Σ is a finite set of input alphabets.
- Γ is a finite set of output alphabets.
- $\delta : Q \times \Sigma \rightarrow Q \times \Gamma$ is the transition function that defines rules.
- $q_0 \in Q$, is the start state.

The formal definition of the computation of Finite State Transducer (FST) is as follows:

• The computation of the finite state machine is carried out by translating the input string into output string.

• Assume that *w* is an input string over the input alphabet Σ and *x* is an output string consisting of alphabet of Γ.

• The transition is carried out over a sequence of states $q_0', q_1', \ldots q_n'$ in Q' such that

- $q_0' = q_0$

• The transition of $\delta(q_{i+1}', w_{i+1}) = (q_{i+1}', x_{i+1})$ for $0 \le i < n$.

Comments (1)