



CSE322

Design of Turing Machines

Lecture #37

Design of Turing Machine

We now give the basic guidelines for designing a Turing machine.

- (i) The fundamental objective in scanning a symbol by the R/W head is to 'know' what to do in the future. The machine must remember the past symbols scanned. The Turing machine can remember this by going to the next unique state.
- (ii) The number of states must be minimized. This can be achieved by changing the states only when there is a change in the written symbol or when there is a change in the movement of the R/W head. We shall explain the design by a simple example.

Variants of Turing Machine

- Multi Tape Turing Machine
- Non Deterministic Turing Machine

The Turing machine we have introduced has a single tape. $\delta(q, a)$ is either a single triple (p, y, D) , where $D = R$ or L , or is not defined. We introduce two new models of TM:

- (i) a TM with more than one tape
- (ii) a TM where $\delta(q, a) = \{(p_1, y_1, D_1), (p_2, y_2, D_2), \dots, (p_r, y_r, D_r)\}$. The first model is called a multitape TM and the second a nondeterministic TM.

Multi-tape Turing Machine

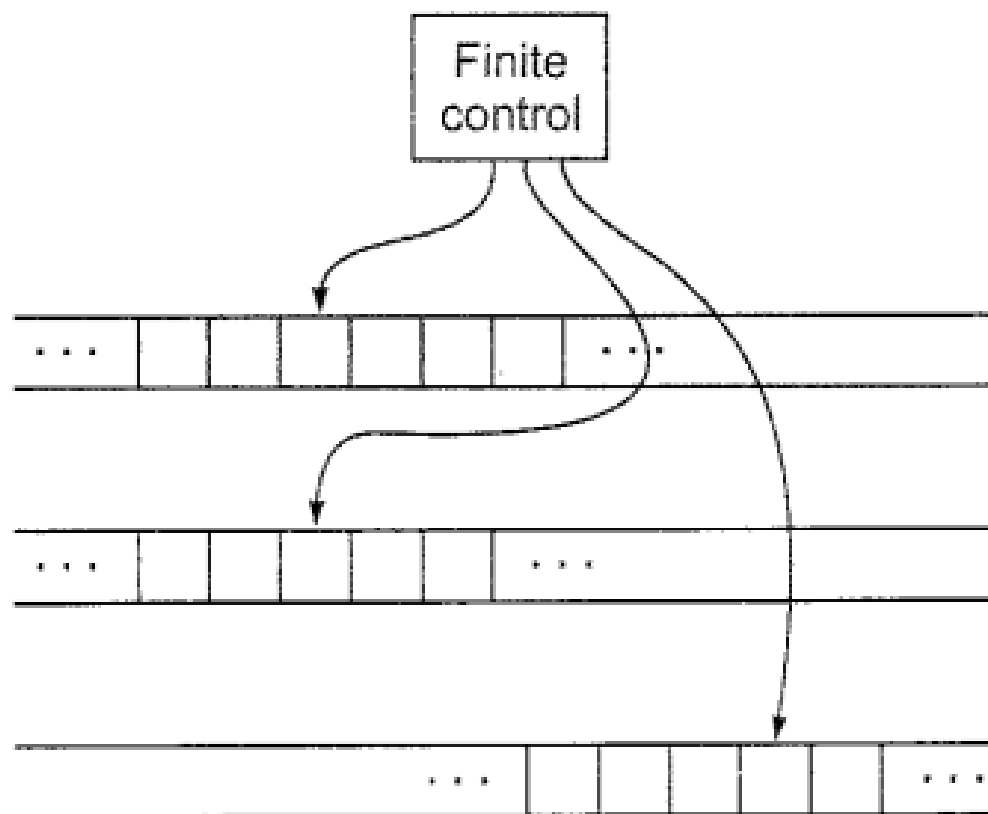


Fig. Multitape Turing machine.

PROBLEM



Design a TM that accepts

$$\{0^n 1^n \mid n \geq 1\}.$$

