Finite State Machines

CS114 Lab 2
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Finite State Machines

- Computers with almost no memory
- Useful for morphology (but not syntax)

Finite State Machines

- Automata
  - Output: just accept or reject
- Transducers
  - Output: an output string (or anything you want)

Finite State Machines

- Input: a string (containing symbols from some alphabet)
  - Read one symbol at a time from left to right
- Start in the start (initial) state
- Transition to next state according to current state and read symbol

Finite State Machines

- If you get to the end of the input and you are in:
  - Accept (final) state: return “accept”/output string
  - Other state: return “reject”/do not output string

Finite State Machines

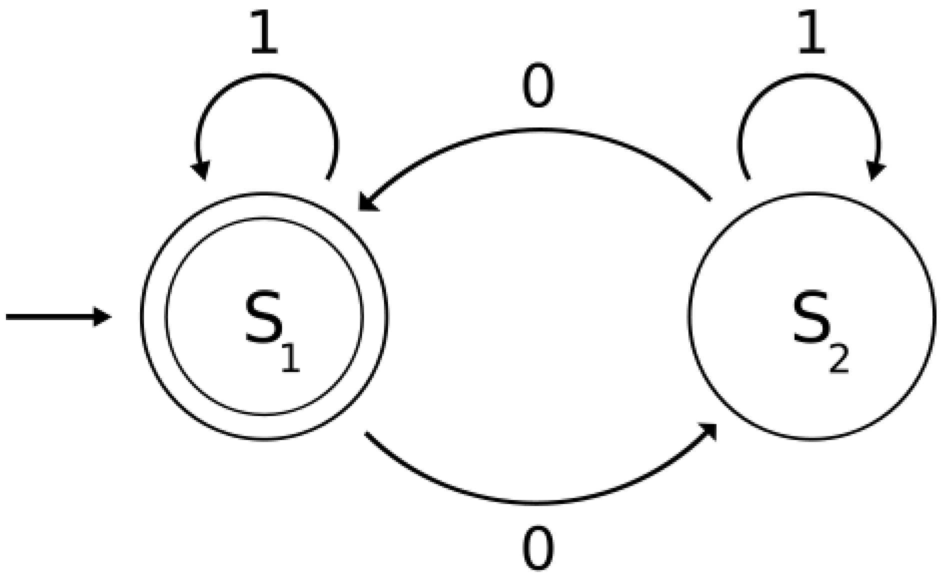
- Determinism—exactly one transition for each combination of state/symbol
- Nondeterminism—zero or more transitions for each combination of state/symbol

Finite State Machines

- For transducers, distinguish between nondeterministic transducers and nondeterministic transductions
  - Transducer—as before
  - Transduction—more than one possible output string for any input string
  - For HW, make sure all transductions are deterministic

Finite State Machines

- State diagram



Finite State Machines

- Language recognized by a finite state machine
  - Set of input strings for which the machine returns “accept”/output string

- A language is regular if and only if it is recognized by a finite state machine