CSC236 Worksheet 8 Solution

Hyungmo Gu

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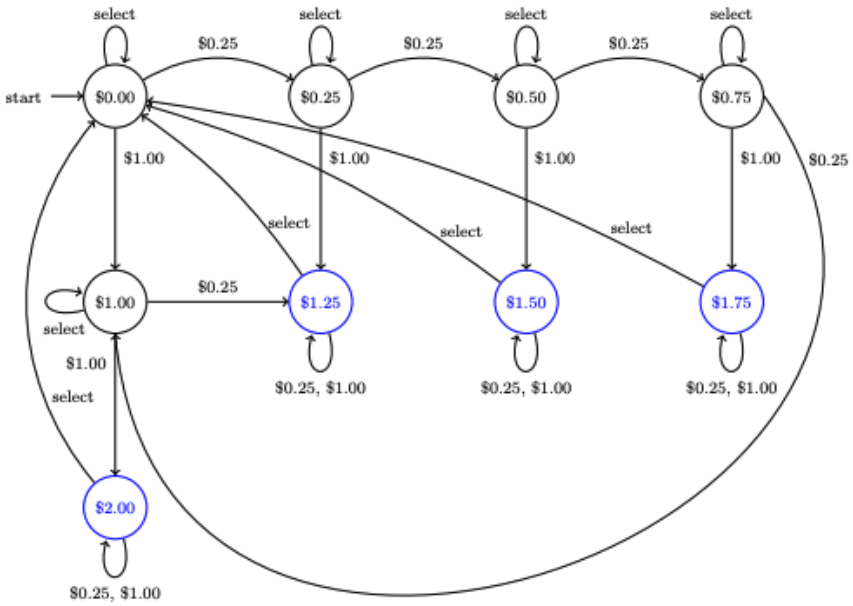
Question 1

Notes:

- **Deterministic Finite State Automaton (DFSA)**: is a mathematical method of machine which, given any input string x, **accepts** or **rejects** x.
- Applications of DFSA
  1. Vending Machine



  2. Protocol analysis
  3. Text parsing
  4. Video game character behavior

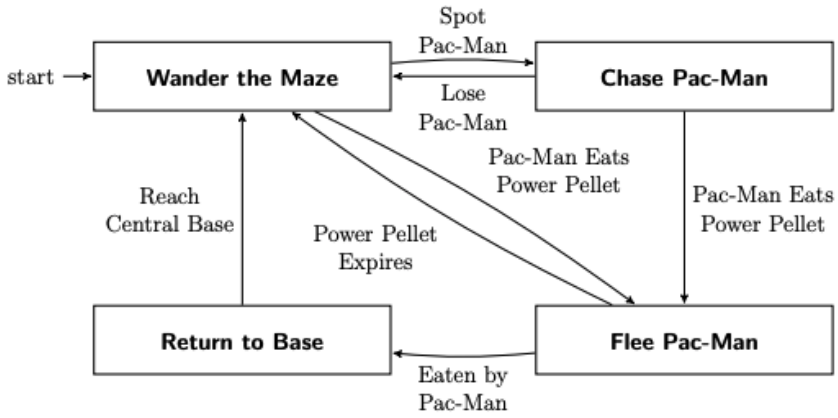
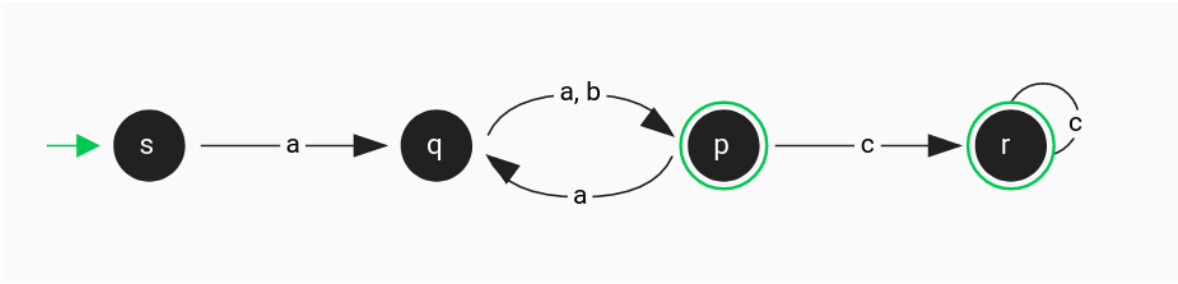


Figure 3: Behavior of a Pac-Man Ghost

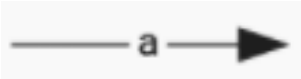
5. Security Analysis
6. CPU control units (**)
7. Natural Language Processing (**)
8. Speech Recognition (**)

- Definitions and Syntax

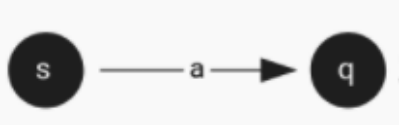


  - *DFSA* M is a quintuple $M = (Q, \Sigma, q_0, F, \delta)$, where
    - Q : a finite set of **states**.
      - Represents status of system
      - Is represented by a black circle, i.e. s,q

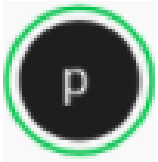
      - i.e. automatic sliding door at walmart has two states: either close or open
      - i.e. traffic light has three states: red, yellow, green
    - Σ : a finite non-empty alphabet
      - is set of symbols in each transition, i.e. a, b, c



* $q_0 \in Q$: the start or initial state
* $\delta : Q \times \sigma \to Q$: a transition function
  - is a connection between two states.
  - is represented by an arrow



* $F \subseteq Q$: the set of accepting or final states
  - Is represented by a double circle



  - Multiple accepting states may exists
  - Purpose: When processing ends, the output is either *accept* or *reject*

- Simple Example