THEORY OF AUTOMATA

COIN-OPERATED COFFEE MACHINE

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Problem Statement

Model a coffee dispenser machine that accepts ₹5 and ₹10 coins; dispense coffee at ₹15. Model as Moore and Mealy machines and compare their efficiency.

What is a Mealy Machine?

A Mealy machine is defined as a 6-tuple:❓$M = (Q, \Sigma, \Delta, \delta, \lambda, q_0)$

Where:

Q = finite set of states

Σ = input alphabet

Δ = output alphabet

$\delta: Q \times \Sigma \rightarrow Q$ is the state transition function

$\lambda: Q \times \Sigma \rightarrow \Delta$ is the output function

q_0 = start state

What is a Moore Machine?

A Mealy machine is defined as a 6-tuple:❓M = (Q, Σ, Δ, δ, λ, q_0)

Where:

Q = finite set of states

Σ = input alphabet

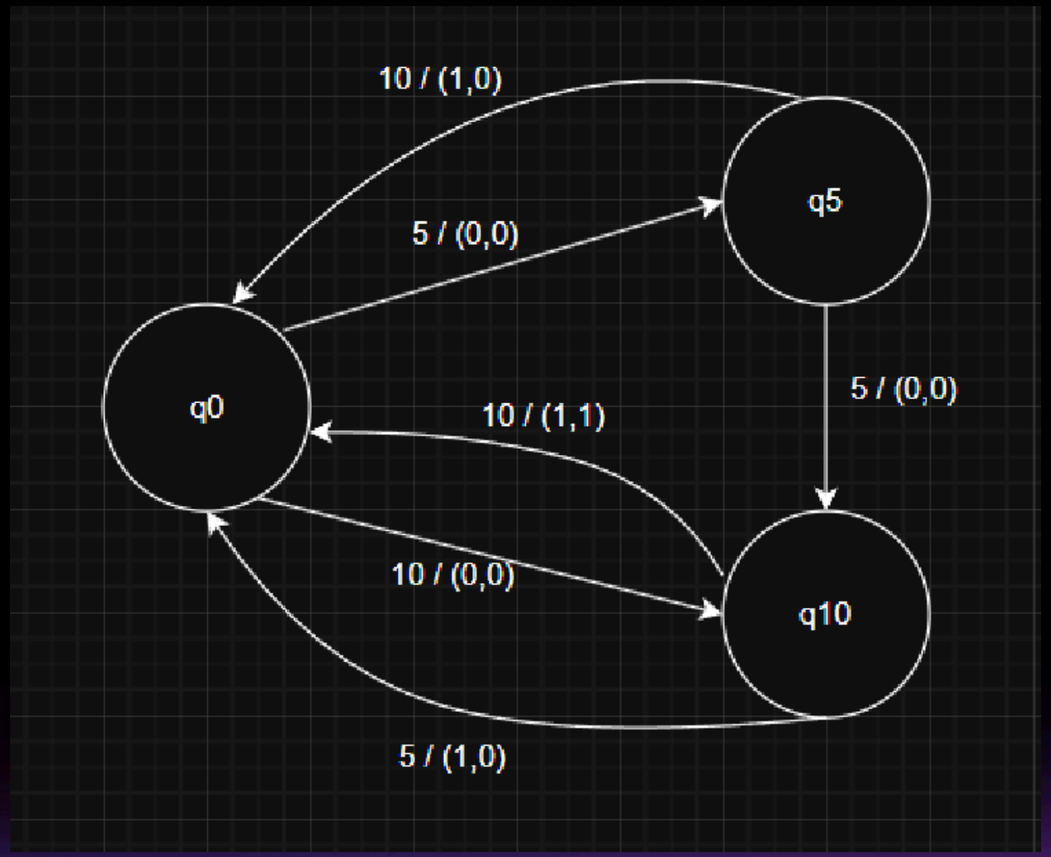
Δ = output alphabet

δ: Q × Σ → Q is the state transition function

λ: Q → Δ is the output function

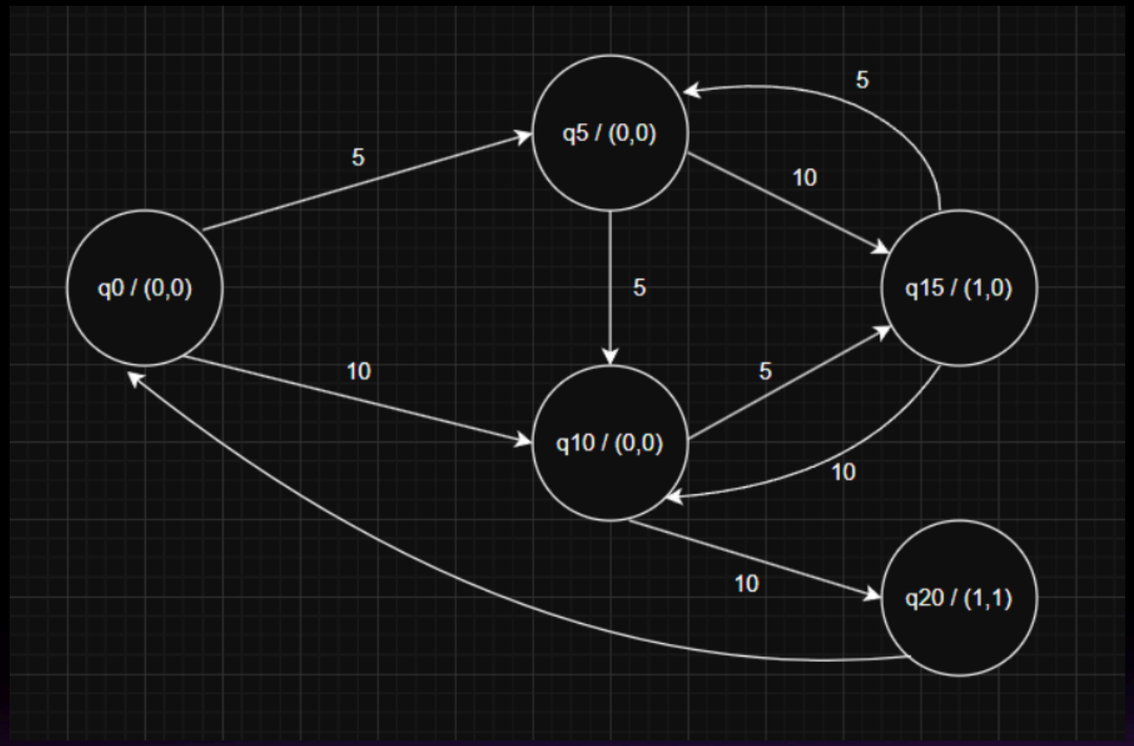
q_0 = start state

Mealy Machine



Current State	Input	Next State	Output(D, R5)
q0	5	q5	(0,0)
q0	10	q10	(0,0)
q5	5	q10	(0,0)
q5	10	q0	(1,0)
q10	5	q0	(1,0)
q10	10	q0	(1,1)

Moore Machine



Current State	5	10	Output
q0	q5	q10	(0,0)
q5	q10	q15	(0,0)
q10	q15	q20	(0,0)
q15	q5	q10	(1,0)
q20	q5	q10	(1,0)

Mealy vs Moore

Mealy

- Q = {q0,q5,q10}
- Σ = {5, 10}
- Δ = {(D, R5) | D ∈ {0,1}, R5 ∈ {0,1}}
- δ (ex. δ(q0, 5) = q5)
- λ (ex. λ(S0, 5) = (0,0))
- q0

Moore

- Q = {q0, q5, q10, q15, q20}
- Σ = {5, 10}
- Δ = {(D, R5) | D ∈ {0,1}, R5 ∈ {0,1}}
- δ (ex. δ(q0, 5) = q5)
- λ (ex. λ(S0) = (0,0))
- q0

THANK YOU!