

(FA) Finite Automata

Different states, Input signal that determines a transition to the next state. There is a start state, and at least one final state. (Halts the input signal)

Types of Finite Automata

* Deterministic Finite Automata (DFA)

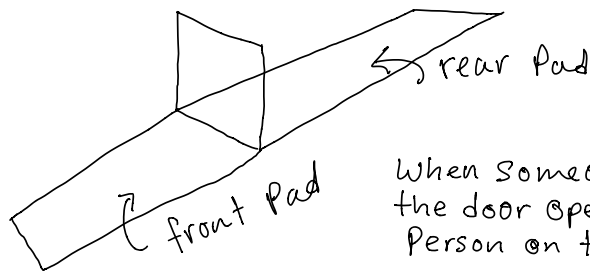
For each state and each possible input there is a rule for what state you transition

* Nondeterministic Finite Automata (NFA)

You don't always have a unique rule for a given input

Ex

Automatic door in a Supermarket



When someone is on the front pad the door opens unless there is a person on the rear pad

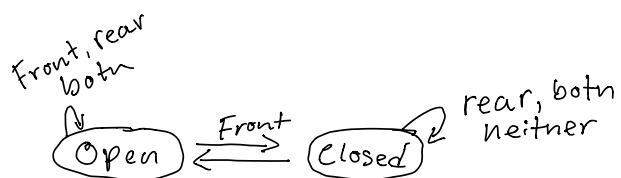
States: Door Open Door closed

Input Signals: Person on front pad, rear, both, neither

Transitions:

Closed Front → Open
Closed Rear → closed
Closed Both → closed
Closed Neither → closed

Open Front → Open
Open Rear → Open
Open Both → Open
Open Neither → closed



Ex

States q_1, q_2

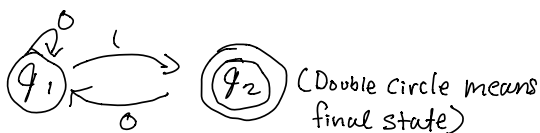
q_1 is the start state

q_2 is the final state

Input values: 0 or 1 (AKA Alphabet $\{0,1\}$)

Transition:

	0	1
q_1	q_1	q_2
q_2	q_1	q_2



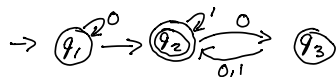
What input strings are accepted (recognized) by this DFA

01 } End at
10111 } q_2

010 } Not recognized
11110 }

The set of all recognized input strings is called the language recognized by the FA

All strings ending in a 1



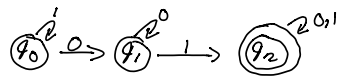
State: q_1, q_2, q_3 Alphabet $\{0,1\}$

Start state: q_1 Final: q_2

Transition:

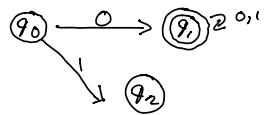
	0	1
q_1	q_1	q_2
q_2	q_3	q_2
q_3	q_2	q_2

Strings that end in a 1
or end in 1 followed by
an even number of 0's



What is the language of this machine?

All string having 01 as a substring



What is the language of the machine?

Any string that starts with a 0