Finite state machine

- Finite state machine is used to recognize patterns.
- Finite automata machine takes the string of symbol as input and changes its state accordingly. In the input, when a desired symbol is found then the transition occurs.
- While transition, the automata can either move to the next state or stay in the same state.
- FA has two states: accept state or reject state. When the input string is successfully processed and the automata reached its final state then it will accept.

DFA

- DFA stands for Deterministic Finite Automata. Deterministic refers to the uniqueness of the computation. In DFA, the input character goes to one state only. DFA doesn't accept the null move that means the DFA cannot change state without any input character.
- DFA has five tuples {Q, ∑, q0, F, δ}
- Q: set of all states
  ∑: finite set of input symbol where δ: Q x ∑ →Q
  q0: initial state
  F: final state
  δ: Transition function

NDFA

- NDFA refer to the Non Deterministic Finite Automata. It is used to transit the any number of states for a particular input. NDFA accepts the NULL move that means it can change state without reading the symbols.
- NDFA also has five states same as DFA. But NDFA has different transition function.
- Transition function of NDFA can be defined as:
- δ: Q x ∑ →2Q

Regular expression

- Regular expression is a sequence of pattern that defines a string. It is used to denote regular languages.
- It is also used to match character combinations in strings. String searching algorithm used this pattern to find the operations on string.
- In regular expression, x* means zero or more occurrence of x. It can generate {e, x, xx, xxx, xxxx,.....}
- In regular expression, x+ means one or more occurrence of x. It can generate {x, xx, xxx, xxxx,.....}

Epsilon closure

- Set of states that are reachabel from the current state only by encountering epsilon

Epsilon nfa

- The NFA with epsilon-transition is a finite state machine in which the transition from one state to another state is allowed without any input symbol i.e. empty string ε. Adding the transition for the empty string doesn’t increase the computing power of the finite automata

but adds some flexibility to construct then DFA and NFA. This is very helpful when we study regular expression (RE) and prove the equivalence between the class of language accepted by RE and finite automata.

Mealy Machine –

- A mealy machine is defined as a machine in theory of computation whose output values are determined by both its current state and current inputs. In this machine atmost one transition is possible.

- It has 6 tuples: (Q, q0, ∑, Δ, δ, λ')
  Q is finite set of states
  q0 is the initial state
  ∑ is the input alphabet
  Δ is the output alphabet
  δ is transition function which maps Q×∑ → Q
  'λ' is the output function which maps Q×∑→ Δ

Moore Machine –

- A moore machine is defined as a machine in theory of computation whose output values are determined only by its current state.

- It has also 6 tuples: (Q, q0, ∑, Δ, δ, λ)
  Q is finite set of states
  q0 is the initial state
  ∑ is the input alphabet
  Δ is the output alphabet
  δ is transition function which maps Q×∑ → Q
  λ is the output function which maps Q → Δ