13/10/11

✗ Pushdown Automata ✗

Component of Pushdown Automata :→

(i) Read only Input tape.
(ii) Input alphabet
(iii) Finite state control
(iv) Set of final state
(v) Initial state

} As finite Automata

Operation of push down Automata (PDA) :→

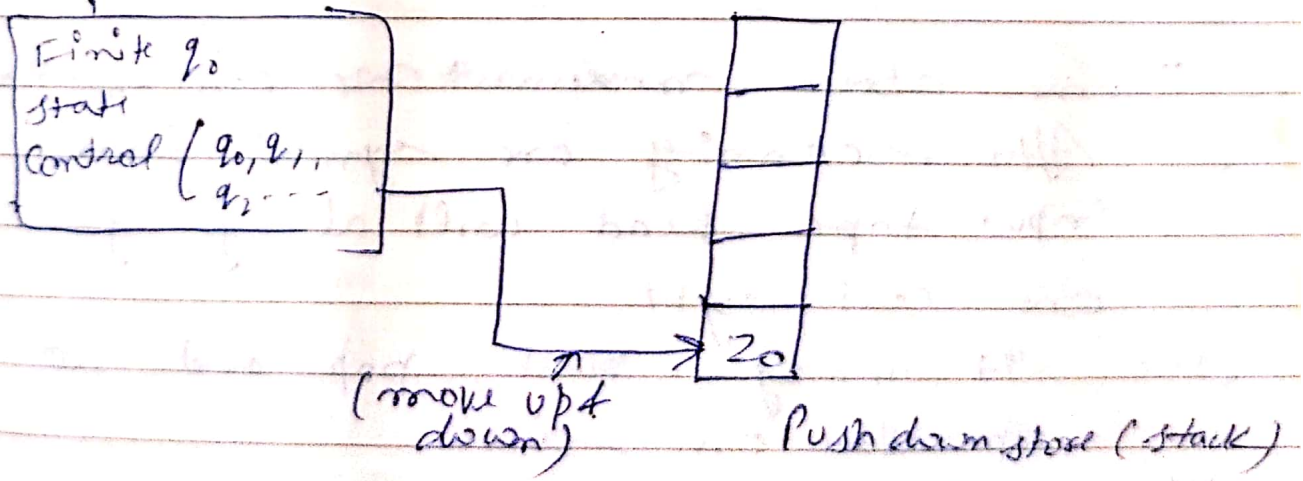
other part of tape will be filled ∧ (null)

| $ | a | a | a | b | b | b | ∧ | ∧ | ∧ |

(Input tape)

start marker.

(head moving towards left to right only one cell at a time).



In above fig we take input tape in which aaabbb or a^3b^3 is given. Suppose initial state of finite state control is q_0 and initially Z_0 symbol is stored in PDA.

$\delta(q_0, a, z_0) = (q_1, az_0)$

Present state — input symbol pointed by head of stack — Top element — Next state — a will be added upon top of stack

$\delta(q_1, a, a) = (q_2, aa)$

$\delta(q_2, a, a) = (q_3, aaa)$

$\delta(q_3, b, a) = (q_4, aa)$

$\delta(q_4, b, a) = (q_5, a)$

$\delta(q_5, b, a) = (q_6, z_0)$

$\delta(q_6, \wedge, z_0) = (q_f, \wedge)$

From above movement we can see that.

(i) After scanning one symbol from input tape head will always go one cell right.

(ii) It may push, pop and no operation on stack

(iii) It may change the state or no change in state (from (ii))

Some Languages accepted by Pushdown atomata :

(i) when state is final state
(ii) Stack is empty or special symbol on to stack (Z_0)
(iii) String has been scanned completely.

Difinition :

A push down atomata consist of seven tuples $(Q, \Sigma, \Gamma, \delta, q_0, Z_0, F)$.

(i) Q is a finite non-empty set of states
(ii) Σ is a finite non-empty set of input
(iii) Γ " " " " " Push down symbol
(iv) q_0 is initial state
(v) F is final state
(vi) Z_0 Push down initial symbol stored
(vii) δ Transition function from $Q \times (\Sigma \cup \{\eta\}) \times \Gamma$

Suppose

$$A = \{Q, \Sigma, \Gamma, \delta, q_0, Z_0, F\}$$

Where

$$Q = \{q_0, q_1, q_f\}, \quad \Sigma = \{a, b\}, \quad \Gamma = \{a, Z_0\}, \quad F = \{q_f\}$$

then

δ is given by

$$\delta(q_0, a, Z_0) = (q_0, aZ_0) \quad \text{---(i)}$$

$$\delta(q_1, b, a) = (q_1, \Lambda) \quad \text{---(ii)}$$

$\delta(q_0, a, a) = \{(q_0, aa)\}$ — (3)

$\delta(q_1, \wedge, z_0) = \{(q_f, \wedge)\}$ — (4)

$\delta(q_0, b, a) = \{(q_1, \wedge)\}$ — (5)

Rule-I : If present state is q_0, stack top symbol is z_0 and a is scanned then no change in state and a is push onto stack.

Rule-(II) : If present state is q_1, stack top symbol is a and b is scanned then no change in state and pop the top element a from stack.

Rule (III) : If present state is q_0, stack top symbol is a and a scanned then no change in state and push a onto stack.

Rule (IV) : If present state is q_1, stack top symbol is z_0 and $\wedge$ (null) is scanned then machine goes to final state q_f and pop z_0 from stack.

Rule (V) : If present state is q_0, stack top symbol is a and b is scanned then next state is q_1 and top element a is popped from stack.