**NFA without Epsilon? 🡪 DFA**

**Subset Contrctuion Method**

-For each state NFA determined all reachable state for every input symbol

- The set of reachable states constitutes a single state in this converted DFA.

- Find reachable states for each DFA state ntil no more states can be found.

**Algorithms**

Assume:

M 🡪 NFA

Md 🡪 DFA

1. Create Md with some number of columns as M. Rows will be added according to the following steps.

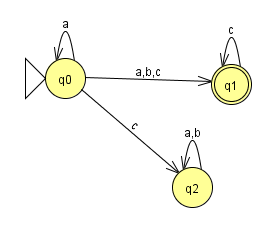
2. Collect all starting states of M and create a new row with this set. This would be the standing state of Md.

3. For ever new row created, compute the transition in Md by evauluating each state in the new row for every input in M.

4. Create new rows as necessary with the names in the intersection of rows and columns not yet present in the table.

5. Repeat this tep until no more new states are generated.

**Example:**



M

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | a | b | c | ф |
| q0 | q0,q1 | q1 | q2,q1 |  |
| q1 |  |  | q1 |  |
| q2 | q2 | q2 |  |  |

Md

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | a | b | c | $ |
| q0,q1 | q0,q1 | q1 | q1,q2 |  |
| q1 |  |  | q1 |  |
| q1,q2 | q2 | q2 | q1 |  |
| q2 | q2 | q2 |  |  |

**RE🡪DFA**

**McNaughton-Yamada-Thompson Algorithm**

1.Convert R into an augmented R (R#)

(a|b)\*abb#

2. Construct T for R#

Repeat transversing the annotated T. Rule 1 and Rule 2 updat ethe followpos until all the traversal ends.

Rule1: If n is a star node and I is a position in lastpos(N then followpos(i) := firstpos(N).

Rule2: if n is a cut-node with left child c1 and right child c2 & I is a position in lastpo(c1) then followpos(i) := firstpos(c2)

**Rule 1 (Star node)**

If 1 ϵ lastpos(n) = {,1} then: Followpos(1):={1,2}

If 2 ϵ lastpos(n)={1,2} then: Followpos(2):={1,2}

**Rule 2 Cut-Node**

If i =1 ϵ lastpos(1) then followpos(1)= firstpos(2) = {3} = {1,2,3}

Followpos(2) = {1,2,3}