Sept 28

COMPSCI 3331

Fall 2022

What's next?

- Assignment 1: out now, due Oct 11.

Quiz: Wed.

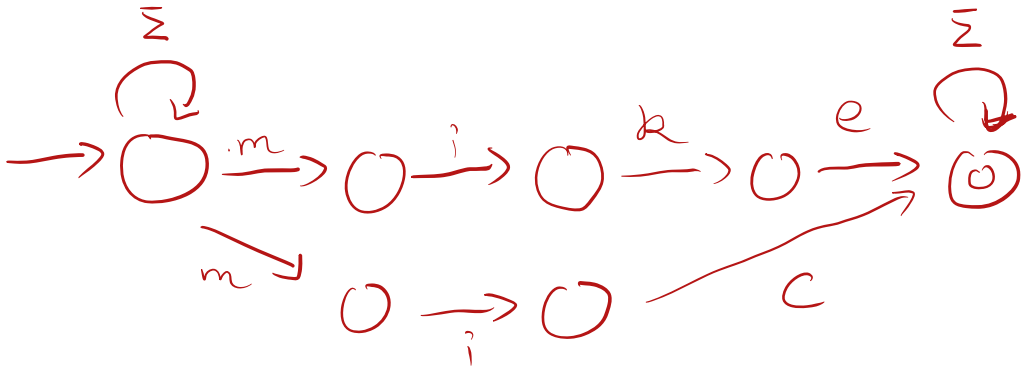
DFA, NFA.

Lecture 2, pt 4.

NFA construction

Pattern Matching: all words over $\Sigma = \{a, b, c, ..., z\}$ that contain the subword “mike” somewhere..

$$L = \{w \in \Sigma^* \ : \ \exists u, v \in \Sigma^* \text{ such that } w = umikev\}$$



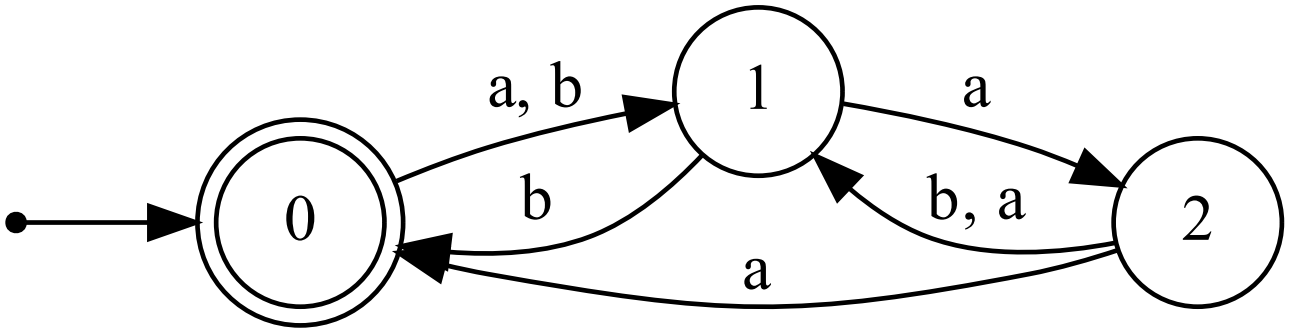
NFA for either mike or mic

example for pattern matching

Subset Construction

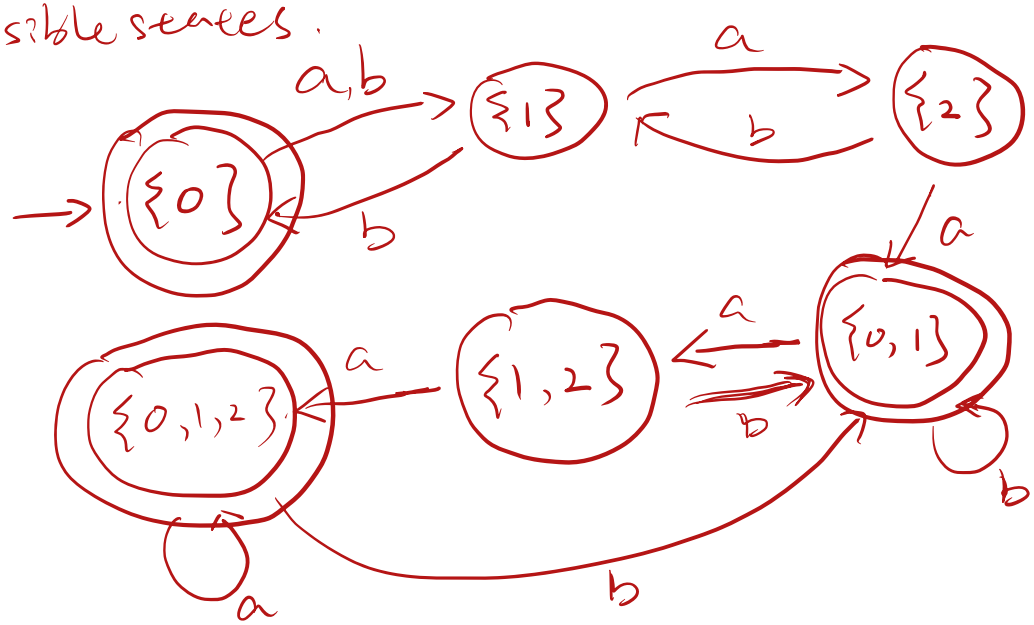
- $M = (Q, \Sigma, \delta, q_0, F)$ be an NFA. $\delta : Q \times \Sigma \to 2^Q$.
- Define a DFA $M_D = (2^Q, \Sigma, \delta_D, q_D, F_D)$.
- $\delta_D(P, a) = \bigcup_{q \in P} \delta(q, a)$, $\forall P \subseteq Q \ \forall a \in \Sigma$
- $q_D = \{q_0\}$ ← transition function for m.
- $F_D = \{P \subseteq Q : P \cap F \neq \phi\}$

Subset Construction Example



n = 3

2^n = 8 possible states.



* two subsets {ε, {0,2}} are not included since they does not connect to any set in this graph - i.e. unreachable.

{0}, {0,1,2}, {0,1} are final states in DFA since 0 is the final state in NFA.

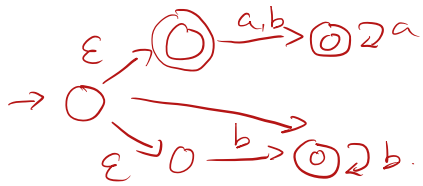
Final state in DFA are all states that contain final state in NFA.

Transition function: $\delta_D(P, a) = \bigcup_{q \in P} \delta($

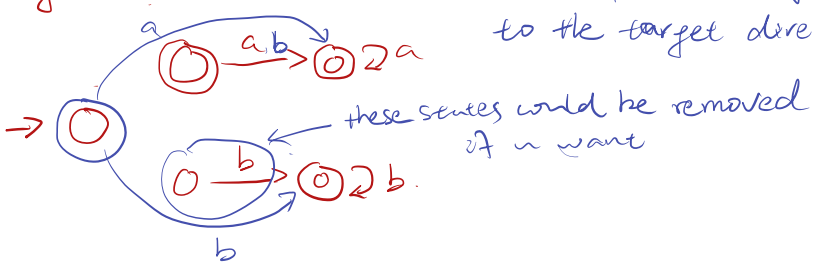
↑ union of all possible states.

Start at the start state.
build it outwards, grow new states.
when no more new state could be reached, you're done.

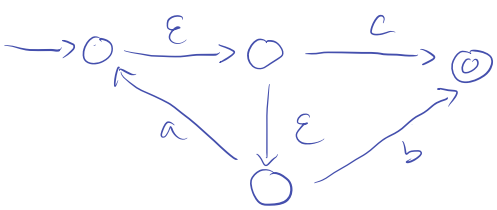
ε-NFA removal.

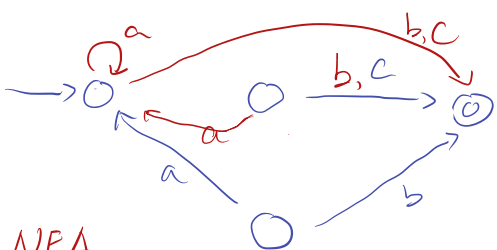


get out of ε transition: skip ε path and get to the target directly



*Remember to make sure the final state matches.





NFA