

Q. What do you mean by closure properties of regular languages? Define some important Closure properties.

Ans. Closure properties: A set is closed under an operation if applying that operation to any members of the set always yields a member of the set.

Closure under Kleene: The set of regular languages is closed under each Kleene operation.

That is, if L_1 and L_2 are regular languages, then

- $L_1 \cup L_2$ is regular
- $L_1 L_2$ is regular
- L_1^* is regular.

Closure under Complementation: The set of regular languages is closed under complementation.

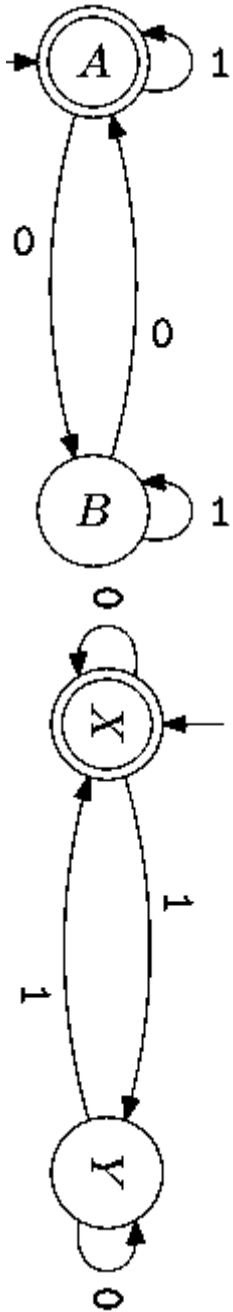
The complement of language L , written L' .

Closure under Intersection: The set of regular languages is closed under intersection.

Closure under Intersection: That is, if L_1 and L_2 are regular languages, then

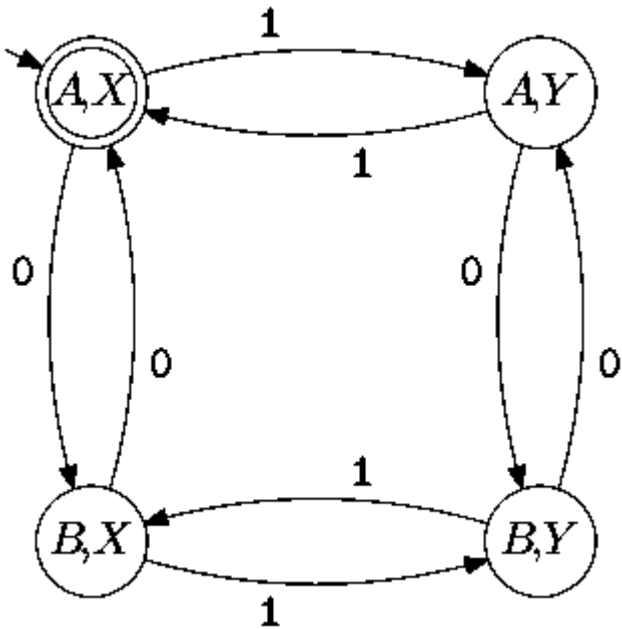
- $L_1 \cap L_2$ is regular

For example: Suppose L_1 is the binary strings with an even number of 0's, and L_2 the binary strings with an even number of 1's. Then the FAs for these languages both have two states:



And so the FA for $L1 \cap L2$ has four states:

Product Construction for Even 0's and 1's



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