COL352 HOMEWORK 1

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3)To show that:-

Show that regular languages are closed under the repeat operation, where repeat operation
on a language L is given by
repeat(L) = {l1l1l1l2…l_k) **s**∈ L }

Sol:
Let A1 => (Q1,Σ,q_0^1,F1, δ 1) be the automata accepting 1.

Let A be a finite state automata then (Q, Σ,q_0,F, δ) such that

Q => Q1

q_0 => q_0^1

F => F1

δ (q,a) => { q, δ,(q,a)} where a ∈ W.

4) Design an algorithm that takes as input the descriptions of two DFAs, D1 and D2, and
determines whether they recognize the same language.

Sol: L1 => L(D1) ,L2 => L(D2)

Lets say L3 => L2 dash => L(D2 dash)

L4 => L1 $\cap$ L3.

If L4 => { ∅ } then D1 and D2 recognize the same language .

L4 => L(D) => { ∅ }

if D has no path from starting state to final state

5)To prove that :-

Show that if A is regular, then so is A^R. In other

words, regular languages are closed under the reverse operation

sol: Let B => $(Q_1,\Sigma,q_0^1,F1,\delta 1)$ be the automata accepting A .

Let B^R => $(Q_2,\Sigma,q_0^1,F1,\delta 2)$ Such that

$Q_2 \Rightarrow Q_1$

$Q_0^2 \Rightarrow q \mid q \in \mathbf{F}_1$

$F_2 \Rightarrow q_0^1$

$\delta_2(q,a) \Rightarrow \delta_1^{-1}(q,a)$

correctness of proof:

$w \in \Sigma^*$,w is accepted by B^R if w^R is accepted by B.

2)To prove:

All NFAs recognize the class of regular languages

Sol: All NFA M (Q, Σ,q_0,F, δ) that accepts x belongs to sigma* ,and every possible state M could be taking input x is a state from F.

There are 2 steps to prove that –NFAs recognize of regular languages.

1)every regular language is recognized by some /all NFA

2) every all/NFA recognizes a regular language

Step1)

Let L be the any regular language and M be the DFA that recognizes L .for every input string there is exactly one possible state q belong Q that M could be after reading x.

So, if M is shown as all NFA then it accept x iff(if and only if) q belongs F ,which happens iff x belongs to L. from the above every regular language is recognized by some/all NFA

Step2)

Let A be the language recognized by N,then proof is accordingly given below to prove A is regular.

- Constructing a DFA that recognizes M =(Q, Σ,q_0,F, δ) that recognizes A.

For any subset S(Q,E(S) is the set of all states q belongs Q that can reach from S .

There fore every all NFA recognizes a regular language from step1 and step2 all NFA recognizes the class of regular language

1)construct an NFA that accepts strings that don't have all the characters from | .Below I have explained the NFA and drawn the construction of NFA of l_1,l_2……………………l_k

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