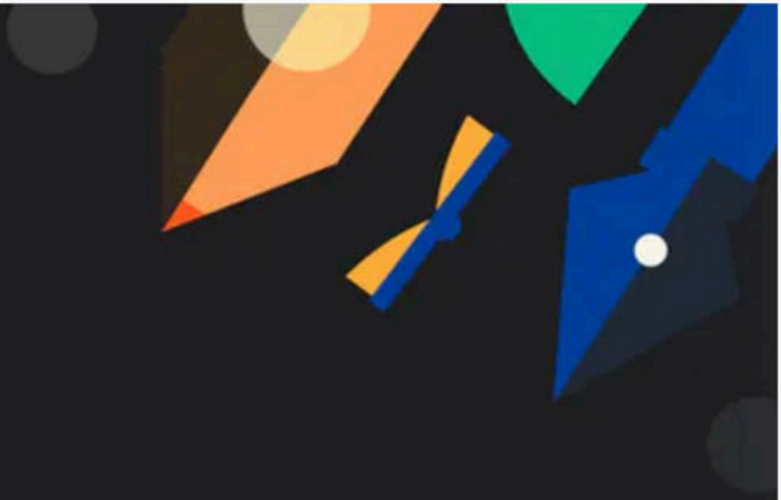

Regular Expression - II

Complete Course on Theory of Computation

Subbarao Lingamgunta • Lesson 14 • Feb 21, 2022

atmost 3-length String

$\Rightarrow 0, 1, 2$

$\Rightarrow \epsilon + (0+1) + (0+1)^2 + (0+1)^3$

$\Rightarrow (0+1+\epsilon)^3$

$\epsilon \cdot \epsilon \cdot \epsilon \Rightarrow \epsilon$

$0 \cdot 0 \cdot \epsilon \Rightarrow 00$

$0 \cdot 0 \cdot 0 \Rightarrow 000$

$1 \cdot 1 \cdot 1 \Rightarrow 111$

$\epsilon \cdot \epsilon \cdot 1 \Rightarrow 1$

Minimal R.E not unique.

but minimal DFA unique.

exactly 3-length strings

$$(0+1)^3$$

GRE L = { set of all even length strings over its alphabet {0,1} }.

$\Rightarrow$ 0, 2, 4, 6, 8, 10, - - - - - -

$$\left[(0+1)^2\right]^*$$

$\Rightarrow$ 0, 2, 4, 6, 8, 10, - - -

odd-length = even length + 1

$\Rightarrow$ 1, 3, 5, 7, 9, 11, ------

$$\left[(a+1)^2\right]^b \cdot (a+1)$$

(or)

$$(a+1) \cdot \left[(a+1)^2\right]^b$$

length of the string divisible by 5

$$\left[(a+b)^5\right]^b$$

GRE $L = \{$ set of all strings of 0's & 1's in which every 2-consecutive 1's are not allowed $\}$.

$\Longrightarrow \in, 00000, \cancel{11111}, 101010, 010101, 0001000, \ldots\ldots$

$(0+10)^{*} \cdot (1+\in)$

1010 . 1

$\in$ 10101

GRE $L = \{$ Set of all strings of 0's & 1's where in every string consecutive 0's & 1's not allowed $\}$.

$\Longrightarrow$ $\epsilon, 0, 1, 01, 10, 0101, 1010, \cancel{1100}, \cancel{110}, \cancel{001}$

$(0+\epsilon)(10)^{\phi}(1+\epsilon)$

$\underbrace{\quad}_{0} \quad | \quad \underbrace{\quad}_{1}$

ϵ

$/ \quad (1+\epsilon)(01)^{\phi}(0+\epsilon)$

GRE $L = \{$ all strings of 0's & 1's where in every 2-consecutive 1's are not allowed & starting with 1 $\}$.

$\Rightarrow$ 1, 10, 1000000, 10000, 1010101010101, 101010

$(10)^* \cdot (1+\epsilon)$

$1 \cdot (0+01)^*$ $\Rightarrow$

$\epsilon^{\star} = \epsilon$, $\epsilon^{+} = \epsilon$

$\varphi^{\star} = \epsilon$, $\varphi^{+} = \varphi$

$a + \epsilon = a, \epsilon$

$a \cdot \epsilon = a$

$\varphi + a = a$ ✓

$\varphi \cdot a = \varphi$ ✓

$L = \varphi$

$|L| = 0$

$L = \{\epsilon\}$

$|L| = 1$ ✓

$|\epsilon| = 0$ ✓

GRE $L = \{$ set of all strings of a's & b's where each string contain exactly 2-a's $\}$.

$$b^b a b^b a b^b$$

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atmost 2- a's

$$b^b (a+\epsilon) b^b (a+\epsilon) b^b$$

at-least 2-a's

$(a+b)^* a\,(a+b)^*\,a\,(a+b)^*$

$b^* a\,(a+b)^*\,a\,b^*$

$(a+b)^*\,a\,b^*\,a\,b^*$

aab ∈ L

$b^* a b^* a (a+b)^*$ ✓

$b^* a^+ b^* a^+ b^*$ ✗