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Regular Expression

- The language accepted by finite automata can be easily described by simple expressions called Regular Expressions. It is the most effective way to represent any language.
- o The languages accepted by some regular expression are referred to as Regular languages.
- o A regular expression can also be described as a sequence of pattern that defines a string.
- Regular expressions are used to match character combinations in strings. String searching algorithm used this
 pattern to find the operations on a string.

For instance:

In a regular expression, x* means zero or more occurrence of x. It can generate {e, x, xx, xxxx, xxxx, xxxx,}

In a regular expression, x⁺ means one or more occurrence of x. It can generate {x, xx, xxx, xxxx,}

Operations on Regular Language

The various operations on regular language are:

Union: If L and M are two regular languages then their union L U M is also a union.

1. $LUM = \{s \mid s \text{ is in } L \text{ or } s \text{ is in } M\}$

Intersection: If L and M are two regular languages then their intersection is also an intersection.

1. $L \cap M = \{st \mid s \text{ is in } L \text{ and } t \text{ is in } M\}$

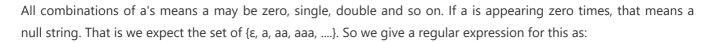
Kleen closure: If L is a regular language then its Kleen closure L1* will also be a regular language.

1. L^* = Zero or more occurrence of language L.

Example 1:

Write the regular expression for the language accepting all combinations of a's, over the set $\Sigma = \{a\}$

Solution:



 $R = a^*$

That is Kleen closure of a.

Example 2:

Write the regular expression for the language accepting all combinations of a's except the null string, over the set $\Sigma = \{a\}$

Solution:

The regular expression has to be built for the language

L = {a, aa, aaa,}

This set indicates that there is no null string. So we can denote regular expression as:

 $R = a^{+}$

Example 3:

Write the regular expression for the language accepting all the string containing any number of a's and b's.

Solution:

r.e. = $(a + b)^*$

This will give the set as $L = \{\epsilon, a, aa, b, bb, ab, ba, aba, bab,\}$, any combination of a and b.

The $(a + b)^*$ shows any combination with a and b even a null string.



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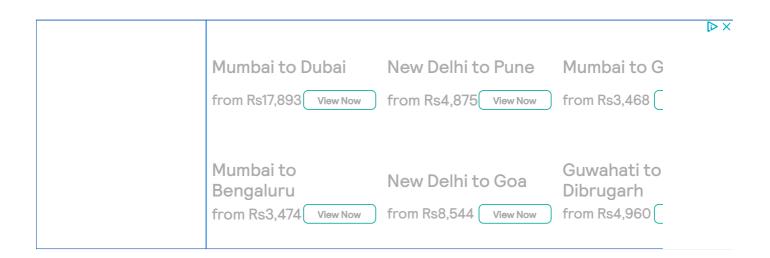
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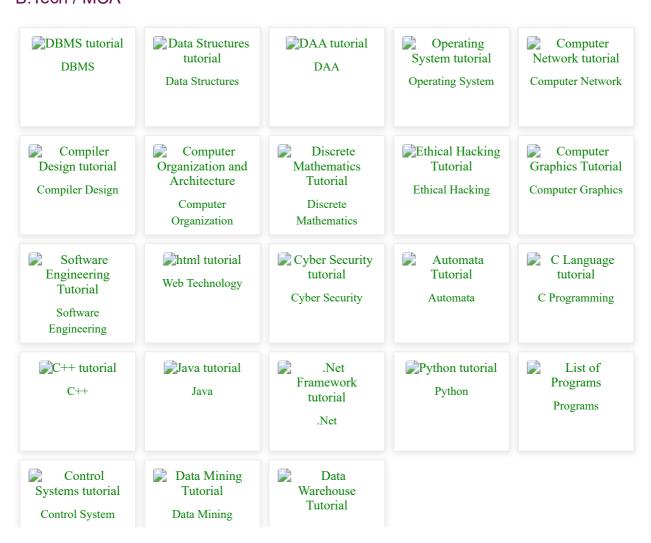


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