Problem

We define the ***avoids*** operation for languages A and B to be

A *avoids* B = {wl w ? A and w doesn't contain any string in B as a substring}.

Prove that the class of regular languages is closed under the *avoids* operation.

Step-by-step solution

Step 1 of 3

Regular Language:

• Regular language is the language which is generated or expressed with the help of regular expression and is recognizable by the finite automata.

• It is possible to get different types of regular languages from different types of regular grammar.

• By the definition of regular language it is known that if a finite automata recognizes a language then only it is said to be regular.

• Thus, in this case of **"avoids"** operation over two regular languages A and B

• If a finite automata accepting the language of **"avoids"** can be constructed

• Then it can be said that the set of regular languages is closed under the operation **"avoids".**

Comment

Step 2 of 3

As per given details there are two languages as *A* and *B* for which the avoid operations is defines as follows:

$\text{A avoids B}=\left\{\text{w}\,|\,\text{w} \in \text{A and w does not contain any string in B as a substring}\right\}$.

Here, it is required to prove that class of regular languages is closed under avoids operation.

Comment

Step 3 of 3

Proof:

• In the above:

(A avoids B) can be written as follows:

$\left(\text{A} - \left(\text{A has B}\right)\right)$

Where (A has B) are string of A which contain strings of B as substrings.

• After that $\left(\text{A avoids B}\right)$ will be strings of A that means strings of B will not contain B as substring.

• (A has B) can be written as follows:

$\left(\text{A has B}\right) \text{ as } \text{A} \cap \left(\Sigma^{*}\text{B}\Sigma^{*}\right)$

• After that $\left(\text{A has B}\right)$ that means these are the strings of A that contains the strings of B as substring.

• Similarly, (A avoids B) can be written as follows:

$\left(\text{A} - \left(\text{A} \cap \left(\Sigma^{*}\text{B}\Sigma^{*}\right)\right)\right)$

Hence, the regular languages are closed under the concatenation, intersection, and subtraction and even closed under operation avoid.

Comments (1)