Automata Formal Languages & Logic

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Unit 3

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Example 1:

Parse the string abba using CYK algorithm ,

Grammar:

S -> aSb | bSa | SS | λ

Solution :

Conversion to CNF

S -> AB | BA | AC | BD | SS | λ

A -> a

B -> b

C -> SB

D -> SA

Example 1:

Parse the string abba using CYK algorithm

,

Grammar:

S -> aSb | bSa | SS | λ

Solution :

1) **Strings of the length 1 can be generated by**

   A -> a

   B -> b

2) **Strings of the length 2 can be generated by**

   For AB

   S -> AB

   For BA

   S -> BA

   For BB it is ∅

3) **Strings of the length 3 can be generated by**

   a) **A . ∅ ∪ S . B = ∅ . SB (SB is generated by C)**

      C -> SB

   b) **B .S ∪ ∅ . A**

      BS is not generated by any rule

   4) **Strings of the length 4 can be generated by**

   A . ∅ ∪ SS ∪ CA

   S -> SS

The given string belongs to the grammar

Example 1:

Parse the string aabba using CYK algorithm ,

Grammar:

S -> AB

A -> BB | a

B -> AB | b

Solution :

Length 3:

1) A (S, B) ∪ ∅.B (S -> AB, B -> AB)

   AS, AB , ∅

2) **AA** ∪ (S ,B) (B)   (A -> BB)

   AA ∪ SB,BB

3) A.∅

   ∅

Length 4:

1) **AA** ∪ ∅. **A** ∪ (S,B) (B)

   AA ∪ ∅ ∪ SB ∪ BB

   (A -> BB)

2) A.∅ ∪ (S,B) ∅ ∪ AA

   ∅ ∪ ∅ ∪ AA

   =∅

Length 5:

A ∅ ∪ ∅.∅ ∪ (S,B) ∅ ∪ AA

= ∅

The string does not belong to grammar

Example 1:

Parse the string baaa using CYK algorithm ,

Grammar:

S $\rightarrow$ AA | BC

A $\rightarrow$ BA | a

B $\rightarrow$ CC | b

C $\rightarrow$ AB | a

Solution :

Length 3:

1) BB $\cup$ {A, S }{A,C}

   BB $\cup$ AA $\cup$ AC $\cup$ SA $\cup$ SC

   =∅

2) **(A,C) (B)** $\cup$ B(A,C)

   AB $\cup$ CB $\cup$ BA $\cup$ BC

   S $\rightarrow$ AB | BC   A $\rightarrow$ BA

   C $\rightarrow$ AB

Length 4:

   B(S,A,C) $\cup$ (A,S) B $\cup$ ∅ **(A,C)**

   = BS $\cup$ BA $\cup$ BC $\cup$ AB,SB

   A $\rightarrow$ BA

   S $\rightarrow$ BC

   S $\rightarrow$ AB

   C $\rightarrow$ AB

The string baaa belongs to the grammar

THANK YOU

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