PES UNIVERSITY ONLINE

Automata Formal Languages & Logic

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Automata Formal Languages & Logic

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:

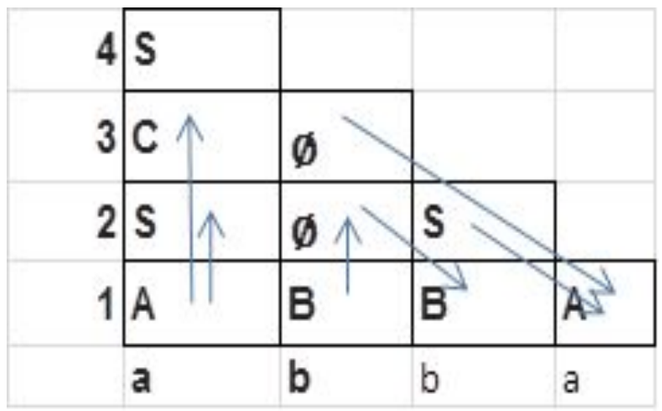
Parse the string abba using CYK algorithm

,

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 ,

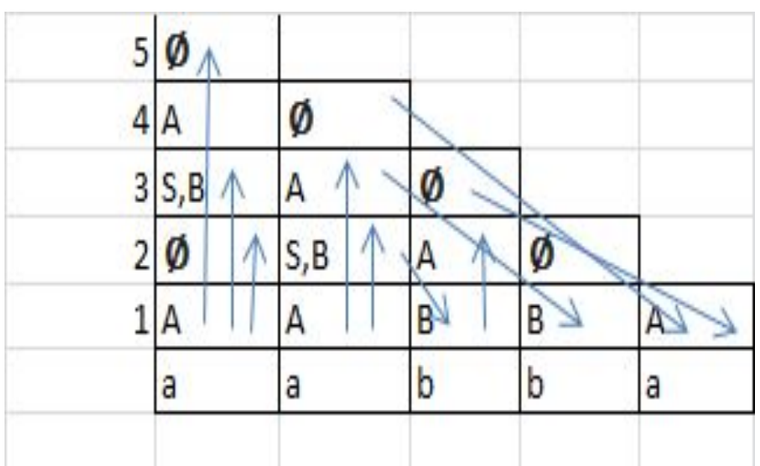
Grammar:

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 → AA | BC

A → BA | a

B→ CC | b

C → AB | a

Solution :

4	S,A,C			
3	Ø	S,A,C		
2	A,S	B	B	
1	B	A,C	A,C	A,C
	b	a	a	a

Length 3:

1) BB ∪ {A, S }{A,C}
   BB ∪ AA ∪ AC ∪ SA ∪ SC
   =⌀
2) **(A,C) (B)** ∪ B(A,C)
   AB ∪ CB ∪ BA ∪BC
   S → AB | BC A → BA
   C → AB

Length 4:

B(S,A,C) ∪ (A,S) B ∪ ⌀ **(A,C)**
= BS ∪ BA ∪ BC ∪ AB,SB
A → BA
S → BC
S → AB
C → AB

The string baaa belongs to the grammar

THANK YOU

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