

L2.1 Simplification of CFG (Reduction of CFG)

Simplification of Context Free Grammar

Reduction of CFG

In CFG, sometimes all the production rules and symbols are not needed for the derivation of strings. Besides this, there may also be some NULL Productions and UNIT Productions. Elimination of these productions and symbols is called Simplification of CFG.

Simplification consists of the following steps:

1) Reduction of CFG

2) Removal of Unit Productions

3) Removal of Null Productions

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REDUCTION OF CFG

CFG are reduced in two phases

Phase 1: Derivation of an equivalent grammar G' , from the CFG, G , such that each variable derives some terminal string

Derivation Procedure:

- Step 1: Include all Symbols W_1 , that derives some terminal and initialize $i = 1$
- Step 2: Include symbols W_{i+1} , that derives W_i
- Step 3: Increment i and repeat Step 2, until $W_{i+1} = W_i$
- Step 4: Include all production rules that have W_i in it

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Phase 2: Derivation of an equivalent grammar G'' , from the CFG, G' , such that each symbol appears in a sentential form

Derivation Procedure:

Step 1: Include the Start Symbol in Y_1 and initialize $i = 1$

Step 2: Include all symbols Y_{i+1} , that can be derived from Y_i and include all production rules that have been applied

Step 3: Increment i and repeat Step 2, until $Y_{i+1} = Y_i$

Example: Find a reduced grammar equivalent to the grammar G , having production rules
 $P: S \rightarrow AC|B, A \rightarrow a, C \rightarrow c|BC, E \rightarrow aA|e$

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Phase 2 : 

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Questions???