Breadth-First Top-Down Parsing Algorithm

Input: context-free grammar $G = (N, T, P, S)$

string $p \in T^*$

queue Q

1. initialize Tree with root S.

   INSERT(S, Q)

2. repeat

   2.1. q := *REMOVE*(Q)

   2.2. $i := 0$

   2.3. done := false

   Let $q = uAv$ where A is the leftmost variable in q.

   2.4. repeat

   2.4.1. if there is no A rule numbered greater than i then done := true

   2.4.2. if not done then

   Let $A \rightarrow w$ be the first A rule with number greater than i and let j be the number of this rule

   2.4.2.1. if $uwv \notin T^*$ and the terminal prefix of uwv matches a prefix of p then

   2.4.2.1.1. *INSERT*(uwv, Q)

   2.4.2.1.2. Add node uwv to Tree. Set a pointer from uwv to q.

   2.4.3. $i := j$

   until done **or** $p = uwv$

   until *EMPTY*(Q) or $p = uwv$

3. if $p = uwv$ then accept else reject

Ref: Sudkamp, Thomas A., *Languages and Machines*. 2 ed. Addison-Wesley, 1997