Lecture 19

Syntactic Parsing – PART III

A typical grammar and an input sentence [Lect. 17]

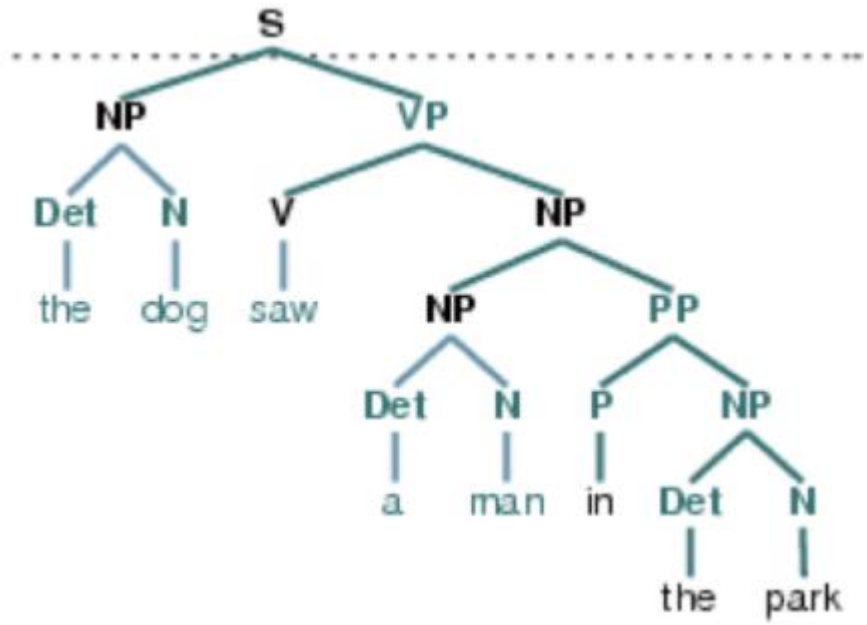
Starts with S

- **S→NP VP**
- **NP→*Noun***
- **NP→*Pronoun***
- **NP→*Det Noun***
- **NP→*Det Adj Noun***
- **VP→*Verb***
- **VP→ *Verb* NP**
- **VP→ *Verb* PP**
- **VP→ *Verb* NP PP**
- **PP→*Preposition* NP**
- **PP→*Preposition* VP**
- ***Noun*→girl|boy|book|table, *Pronoun*→i, *Det*→the|a, *Adj*→small , *Verb*→read|want , *Preposition*→on|under|in|to [lexicon]**

Test sentence: i read a book on the table $ (grammatically correct or not?)------Yes/ACCEPT/Grammatically correct [use parsing]

Aim of parsing

- To construct the “proper” tree for an input sentence given the grammar
- S on the top, entire input sentence is covered



Bottom up parsing – 2nd type of parsing

Given an input grammar and a test sentence, conduct bottom up parsing in the following manner:

- Start from the leftmost leaf node (leftmost word in input sentence)
- Construct the tree up using 1 rule from the grammar at a time
- SUCCESS if you reach the root node S on the top and the entire input sentence is matched else ERROR!
- SUCCESS: the sentence is grammatically or syntactically correct
- ERROR : the sentence is grammatically or syntactically incorrect
- Syntax: relative placement or ordering of words in a sentence

Shift-Reduce parser: An example of bottom up parsing

- Task: match the input string from left to right and simultaneously construct a tree with S on the top
- SHIFT: push the leftmost input word into the stack
- REDUCE: replace RHS by LHS of rule [RHS - top of the stack]
- SUCCESS: ($S , $) else ERROR!

STACK	INPUT	ACTION
$	$\mathbf{id}_1 * \mathbf{id}_2$ $	shift
$ $\mathbf{id}_1$	$* \mathbf{id}_2$ $	reduce by $F \to \mathbf{id}$
$ F	$* \mathbf{id}_2$ $	reduce by $T \to F$
$ T	$* \mathbf{id}_2$ $	shift
$ $T *$	$\mathbf{id}_2$ $	shift
$ $T * \mathbf{id}_2$	$	reduce by $F \to \mathbf{id}$
$ $T * F$	$	reduce by $T \to T * F$
$ T	$	reduce by $E \to T$
$ E	$	accept

Test sentence: **i read a book on the table $**

Class Assignment : Slide 2 example

Test sentence: **i read a book on the table $**