

Context Free Grammars and Parsing

Natural Language Understanding Lab

Evgeny A. Stepanov,
Mahed Mousavi, Gabriel Roccabruna

SISL, DISI, UniTN & VUI, Inc.
`evgeny.stepanov@unitn.it`

Objectives

- Understanding:
 - relation between grammar and syntactic parse tree
 - relation between grammar and syntactic categories
 - relation between grammar and Part-of-Speech tags
 - context free grammars (CFG)
 - probabilistic context free grammars (PCFG)
- Learning how to:
 - define CFG in NLTK
 - parse with CFG
 - learn PCFGs from a treebank
 - parse with PCFG
 - generate sentences using a grammar in NLTK
 - evaluate parser

Outline

- ① Grammars, Production Rules, and Parse Trees
 - Parse Tree representation and methods in NLTK
 - *Exercise*: 10 min
- ② Context Free Grammars
 - Defining CFGs (in NLTK)
 - Parsing with CFGs
 - *Exercise*: 15 min
 - “Real” Grammar Example
 - *Exercise*: 15 min
- ③ Probabilistic Context Free Grammars
 - Learning Grammars from a Treebank
 - PCFG Parsers in NLTK
 - *Exercise*: 15 min

Outline

- ④ Generating Sentences
 - *Exercise*: 5 min
- ⑤ Evaluating Constituency Parsers: PARSEVAL
- ⑥ ***Lab Exercise***: Comparative Evaluation of Parsers: 30 min

Recommended Reading

- Dan Jurafsky and James H. Martin. Speech and Language Processing (3rd ed. draft)
 - Chapter 12: Constituency Grammars
 - Chapter 13: Constituency Parsing
- Steven Bird, Ewan Klein, and Edward Loper. Natural Language Processing with Python
 - Chapter 8: Analyzing Sentence Structure