Statistical Parsing of Morphologically Rich Languages How, Where and Whither

SPMRL'10 – A Gentle Introduction

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Statistical Parsing

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“This is easy”

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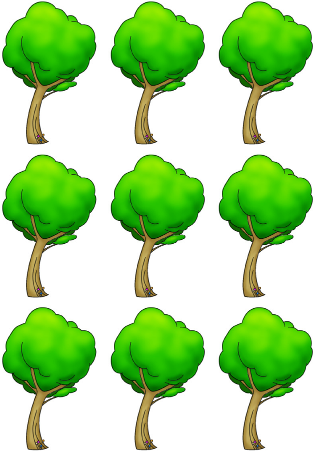
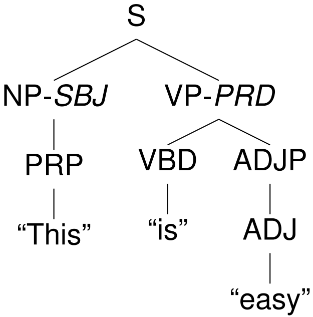
“This is easy”



Statistical Parsing


S

NP-*SBJ*

VP-*PRD*

PRP

VBD

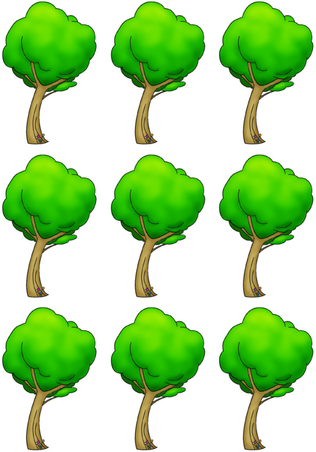
ADJP

“This”

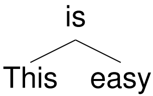
“is”

ADJ

“easy”

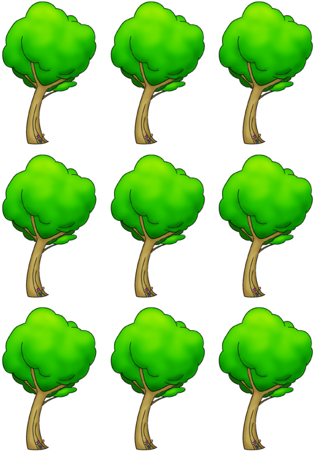


Statistical Parsing



is

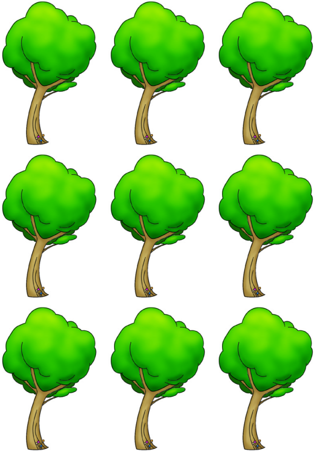
This easy



Statistical Parsing

[This [is [easy]]]

Supervised Statistical Parsing



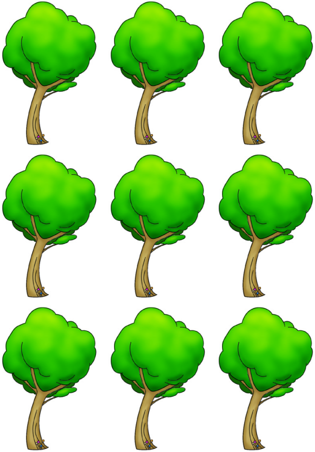
Supervised Statistical Parsing

Constituency-Based:

Accuracy results for German, French, Korean, Arabic, Hebrew and others lag behind those for English.

Dependency-Based:

CoNLL Shared Task: Arabic, Basque and Greek show the lowest performance regardless of the parser used.



So What Is Going On?

Often Considered..

- Corpora Size
  E.g., For *Chinese* (Bikel & Chiang 2000)
- Annotation Idiosyncrasies
  E.g., For *Arabic* (Maamouri, Bies & Kulick 2008, 2009)
- Evaluation Matters
  E.g., For *German* (Rehiben & van Genabith 2007, Kübler 2008)

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A Recurring Trend

English, Chinese $>$ German, French $>$ Hebrew, Arabic

Defining Morphologically Rich languages (MRLs)

Morphology

High Synthesis (high morpheme/words ratio)

High Fusion (non-concatenative morphology)

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Discontinuous Constituents

Null Elements

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Morphosyntax

Case/government

Agreement

Clitics

Parsing with MRLs: Shared Challenges

Architectural Aspects

Modeling Aspects

Learning Aspects

Parsing with MRLs: Shared Challenges

Architectural Aspects

- What is the input? Words? Morphemes?
- If Words – Which abstract representation?
- If Morphemes – When to morphologically analyze?

Modeling Aspects

Learning Aspects

Parsing with MRLs: Shared Challenges

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Modeling Aspects

- What morphological information?
- What morphosyntactic representation?
- How to deal with nonconfigurational structures?

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Learning Aspects

- How to deal with lexical sparsity?
- How to deal with syntactic sparsity?
- How to deal with bi-lexical dependencies?

Today:

Session: Dependency Parsing of MRLs

- Arabic Dependency Parsing with Lexical/Morphological Features
- Local Morphosyntactic Features in Hindi Dependency Parsing
- Different Techniques for Dependency Parsing of Basque

Session: Constituency Parsing of MRLs

- Modeling Agreement for Modern Hebrew Parsing
- Factors Affecting the Accuracy of Korean Parsing
- Direct Parsing of Discontinuous Constituents

Session: Estimation and Lemmatization

- Unknown words in LA parsing for English, Arabic, French
- Parsing Word Clusters (for French)
- Lemmatization and Lexicalized Parsing for French

Today (cont.):

Session: Dependency Parsing of MRLs

- Morphosyntactic Features in Hindi Dependency Parsing
- Easy-First Hebrew Depedency Parsing

Invited Talk by Kevin Knight

- Morphology in Statistical Machine Translation

Panel Discussion

- Dan Bikel
- Julia Hockenmaier
- Slav Petrov
- Owen Rambow

Today (cont.):

From a Bird's Eye View

	Constituency-Based	Dependency-Based
Arabic	X	X
Basque	-	X
English	X	-
French	XXX	-
German	X	-
Hebrew	X	X
Hindi	-	XX
Korean	X	-

Table: An overview of SPMRL contributions.

Overarching Questions

- Evaluation
  - Across Languages
  - Across Treebanks
  - Across Frameworks

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  - Universality
  - Diversity
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  - Universality
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  - Interpretability
- Applications
  - Statistical Machine Translation

Workshop Goals

- To increase visibility
- To identify recurring problems
- To discuss shared solutions

(See also: overview paper in the proceedings)

So, Sit Back and Relax...

Enjoy The Ride!!