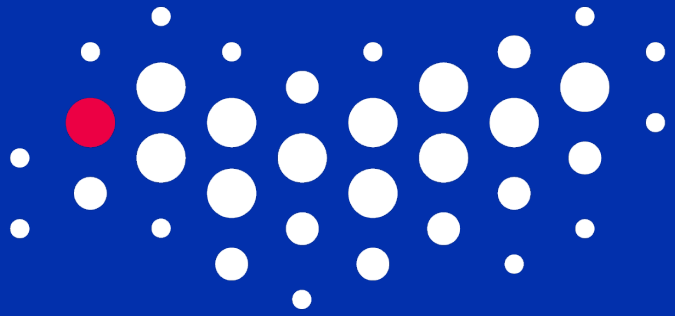

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NLP – Dependency Parsing

Quick Introduction

Feb 1st, 2019

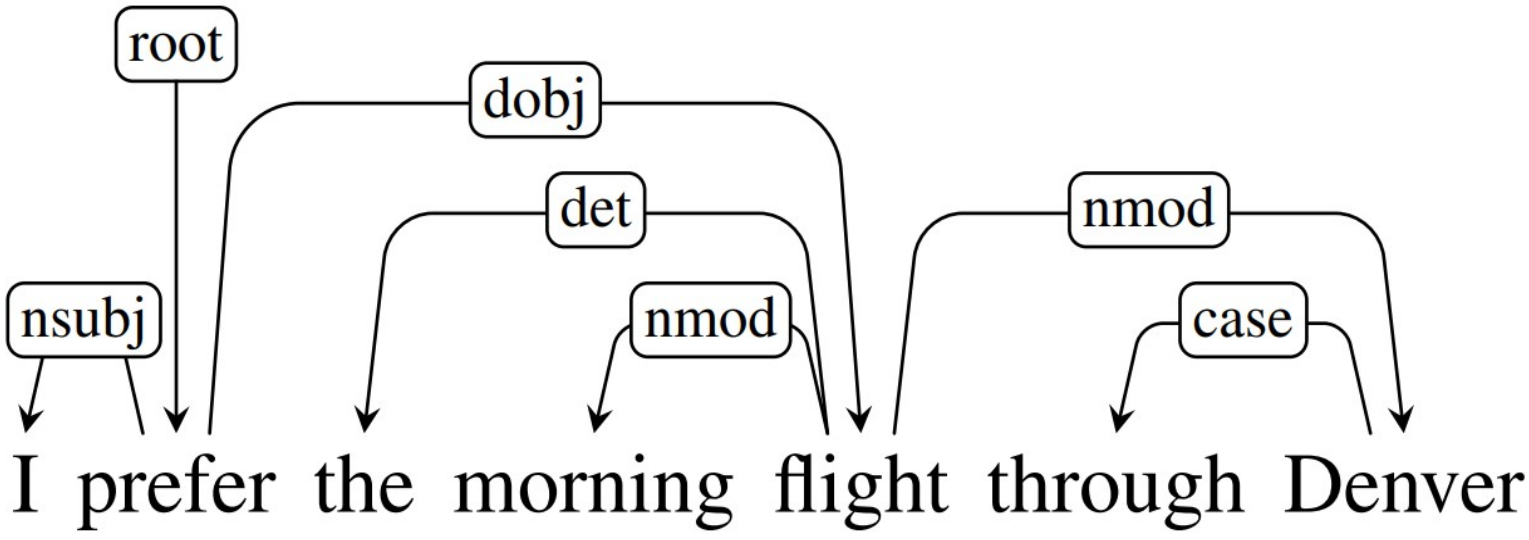
References

- https://web.stanford.edu/~jurafsky/slp3/15.pdf
- State-of-the-art methods: http://nlpprogress.com/english/dependency_parsing.html

Classical vs deep learning-based NLP

- **Goal:** we want to understand the grammatical structure of a sentence, similar to context-free constituent parsing
- In contrast to constituent parsing, not based on rules for the structure of the sentence, but more flexible, well-suited for example for languages like Russian, which have a flexible word order. DPs abstracts over word order ...

Example



(15.1)

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Basics

- We look at binary relationships between words.
- The relations are always between a **head** and a **dependant**
- The relationships are **directed** and **labelled**
- The label show the type of grammatical relationships
- There is always one root node (the predicate of the sentence)

Motivation – Why DP?

- Question answering: Who invented the light bulb? → If we understand the structure of the sentence, we can more easily answer the query. When was the light bulb invented → modifier.
- Information extraction
- Co-reference resolution

- → this information is very helpful / necessary for many NLP problems

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Relation types

- There is a fix number of relation types

Clausal Argument Relations	Description
NSUBJ	Nominal subject
DOBJ	Direct object
IOBJ	Indirect object
CCOMP	Clausal complement
XCOMP	Open clausal complement
Nominal Modifier Relations	**Description**
NMOD	Nominal modifier
AMOD	Adjectival modifier
NUMMOD	Numeric modifier
APPOS	Appositional modifier
DET	Determiner
CASE	Prepositions, postpositions and other case markers
Other Notable Relations	**Description**
CONJ	Conjunct
CC	Coordinating conjunction

Figure 15.2 Selected dependency relations from the Universal Dependency set. (de Marneffe et al., 2014)

Universal dependency set (UD) / Treebanks

- Standardized set of labels
- linguistically motivated, computationally useful, cross-linguistically applicable
- See example on previous slide
- Treebanks are basically datasets with manually or semi-automatically labelled examples
- They can be used for training and evaluation of algorithms

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Another Example