university of groningen

Automatic word-sense disambiguation for Dutch using dependency knowledge

› Hessel Haagsma

› Supervision: Gertjan van Noord

Task

"Foolen kondigt de geboorte aan van drie nieuwe tijdschriften."
"Foolen announced the birth of three new journals."

What is the meaning of 'geboorte'?

1. 'het baren van een kind' – childbirth
2. 'afkomst, oorsprong' - origin, descent, ancestry
3. **'ontstaan, oprichting' - foundation, creation**

Intuition

(1) "Two occurrences of the same word have identical meanings if they have similar local contexts."

(2) "Two different words are likely to have similar meanings if they occur in identical local contexts."

Lin, D. (1997). Using syntactic dependency as local context to resolve word sense ambiguity. In Proceedings of the 35th Annual Meeting of the ACL, p.64

Implementation for Dutch

Which resources are needed to implement this for Dutch?

- Local context database, i.e. a large, dependency-parsed corpus
- Semantic database and ontology, for sense selection and similarity measures
- Sense-annotated corpus, for testing and frequency estimation

Local context database

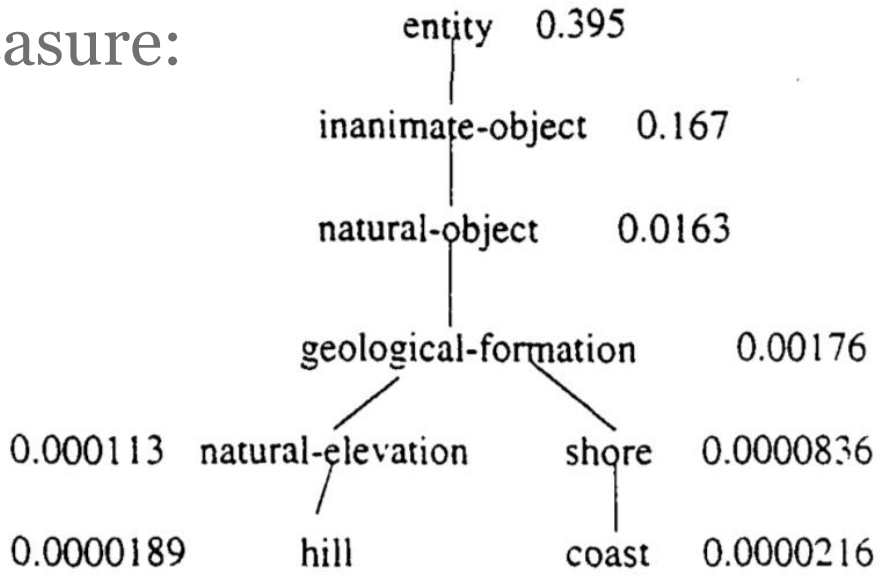
- Dependency-parsed corpus: LassyLarge
- Local context: *van-mod-geboorte-head*

- Version 1: use DFS-script for all triples containing only nouns, adjectives, adverbs, verbs
- Version 2: use Alpino-generated triples: adds prepositions, indirect relations

Semantic database

- Semantic database: Cornetto
- Retrieve possible senses
- Semantic similarity measure:

$$sim(hill, coast) = \frac{2 \times \log(GeoForm)}{\log(hill) + \log(coast)}$$



Sense-annotated corpus

- Sense-annotated corpus: DutchSemCor
- 1M annotations, 250K manually done
- Sense inventory maps to Cornetto
- Minimum number of instances of each sense
- 942 word sample as test set:
  564 nouns, 327 verbs, 51 adjectives

Results (1)

Local context database	Accuracy
First-sense baseline	28.24
Version 1 (script)	31.32
Version 2 (Alpino)	33.76
With manual part of DSC	36.41
40 similar words	**37.15**

Results (2)

- Nouns: 40.58%, verbs: 36.42%, adjectives: 23.40%
- Adjectives do not fit in hierarchy
- Lin (1997): 56.1%, baseline 58.9%. Nouns only
- Corpus-dependent baseline

Problems

- Similar words not sufficient for differentiation
- Frequency-balanced corpus distorts semantic similarity
- No context: *'Zalig!'*
- Uninformative contexts: *van - mod, ben - su*
- Obscure context: *X - internetpretpost - obj1*

Improvement

- Implement named-entity placeholders
- Use sense-annotated corpus with natural sense frequencies
- Exploit other relations in semantic database: (near-)synonym, (near-)antonym
- Make local contexts larger
- Explore alternative similarity measures