

Seminar

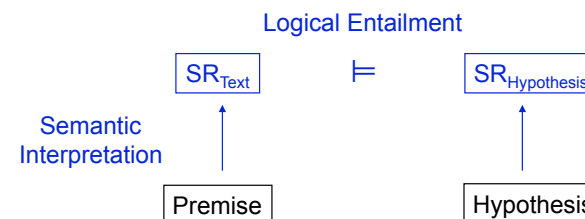
Recent Developments in Computational Semantics

Introduction 1

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The Logical Paradigm



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Statistical Semantics



- Word-Sense Disambiguation
- Semantic Similarity
- Acquisition of Semantic Resources
 - Paraphrases
 - Inference Patterns
 - Script Information
- Semantic Role Labeling
- Statistical Models and Compositionality

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Word-Sense Disambiguation



- Word-Sense Disambiguation
 - Selectional Constraints vs. Selectional Preferences
 - Supervised/ Semi-supervised/Unsupervised
- Topics for Seminar Talks:
 - Semi-supervised WSD: Yarowsky 1995
 - Using Selectional Preferences for WSD: McCarthy&Carroll 2003
 - Unsupervised word-sense discrimination: Schütze 1998

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Semantic Similarity

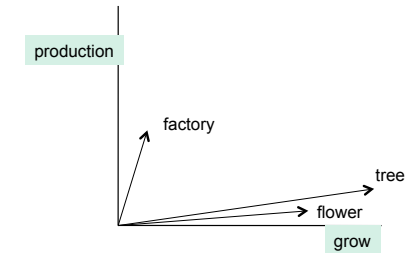


P: Several *airlines* *polled* *saw* costs *grow* more than expected, even after adjusting for inflation
 H: Some *companies* *reported* cost *increases*

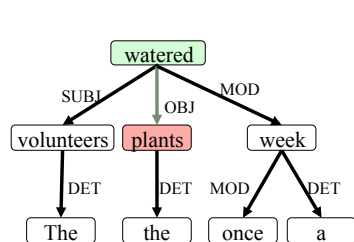
Semantic Similarity



	factory	flower	tree	water	fork
...
grow	15	147	330	106	3
use	120	149	175	946	48
garden	5	200	198	118	17
worker	279	0	5	18	0
production	102	6	9	28	0
wild	3	216	35	30	0
...

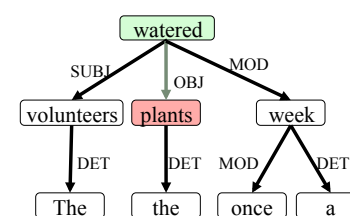


Semantic Similarity: Integrating Syntactic Information



	plant	factory	flower	water	fork
...
(grow, -SUBJ)	114	1	17	4	0
(close, -OBJ)	36	30	1	2	0
(car, MOD)	71	38	0	0	0
(fresh, MOD)	5	0	65	224	0
(deep, MOD)	1	0	9	166	4
(company, -MOD)	3	1	0	216	0
(worker, -MOD)	2	128	0	6	0
(wild, MOD)	45	0	167	11	0
(like, -OBJ)	42	13	107	128	8
(water, -OBJ)	23	0	5	0	0
...

Semantic Similarity in Context



	plant	factory	flower	tree	water	fork
...
grow	517	15	147	212	106	3
use	403	120	149	130	946	48
garden	316	5	200	119	118	17
worker	84	279	0	4	18	0
production	130	102	6	15	28	0
wild	96	3	216	63	30	0
...



Table 3. The top-20 most similar paths to “X solves Y”.

Y is solved by X	Y is resolved in X
X resolves Y	Y is solved through X
X finds a solution to Y	X rectifies Y
X tries to solve Y	X copes with Y
X deals with Y	X overcomes Y
Y is resolved by X	X ceases Y
X addresses Y	X tackles Y
X seeks a solution to Y	X alleviates Y
X do something about Y	X corrects Y
X solution to Y	X is a solution to Y



- Semantic structure need not co-incide with syntactic structure:

Man pleases dog - Dog likes man

*The window broke - The rock broke the window -
John broke the window with the rock*

- Thematic/Semantic roles



- Airbus sells five A380 planes to China Southern for 220 million Euro
- China Southern buys five A380 planes from Airbus for 220 million Euro
- Airbus arranged with China Southern for the sale of five A380 planes at a price of 220 million Euro
- Five A380 planes will go for 220 million Euro to China Southern

Common frame-semantic Analysis:

Frame: COMMERCIAL_TRANSACTION

SELLER: Airbus

BUYER: China Southern

GOODS: five A380 planes

PRICE: 220 million Euro

PropBank example: *give*



Roles:

Arg0: giver

Arg1: thing given

Arg2: entity given to

Example: double object

The executives gave the chefs a standing ovation.

Arg0: *The executives*

REL: *gave*

Arg2: *the chefs*

Arg1: *a standing ovation*

Acquisition of Paraphrases and Inference Patterns



- Automatic Acquisition of Paraphrase patterns: Lin&Pantel 2001, Szpektor et al. 2004
- Inference as Directional Similarity: Bhagat et al. 2007, Pantel et al. 2007, Geffet&Dagan 2005, Geffet&Dagan 2004
- *Paraphrase acquisition for textual entailment*

Semantic Role Labelling



- Target annotations:
 - FrameNet style
 - PropBank style
- Methods:
 - Supervised
 - Unsupervised

Acquiring Script Information



- Acquiring script information from texts: Chambers&Jurafsky 2008, Chambers&Jurafsky 2009, Chklovski&Pantel 2004
- *Acquiring script information from web experiments*

The logical context



P: *John bought a new convertible.*
H: *John bought a new car.*

P: *John didn't buy a new convertible.*
H: *John didn't buy a new car.*

Natural Logic for Inference



- Natural logic and entailment relations: B. MacCartney 2009, Nairn et al. 2006