Simulating Lexical Semantic Change from Sense-Annotated Data

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Motivation

- obtain **evaluation data** for evaluation of Lexical Semantic Change (LSC) detection models

Existing Work

- small test sets **annotated** by humans (e.g. Schlechtweg et al., 2018)
- **synthetic** data sets (pseudo-change) (e.g. Rosenfeld & Erk, 2018)

Lexical Semantic Change

- new and old senses are semantically related (Blank, 1997)
- polysemy is the synchronic result of LSC (Blank, 1997; Bybee, 2015)

→ **synchronic** word senses are a good basis to simulate **diachronic** LSC

Corpus

- **SemCor** is a sense-tagged corpus of English
- consists of a subset of the Brown Corpus
- 700,000 words, with more than 200,000 sense-annotated
- is lemmatized and POS-tagged
- there exist similar corpora in different languages

Sense Frequency Distributions

- a Sense Frequency Distribution (SFD) encodes how often a word *w* occurs in each of its senses
  - **sense 1**: plant, works, industrial plant (buildings for carrying on industrial labor); "they built a large plant to manufacture automobiles"[1]
  - **sense 2**: plant, flora, plant life (botany: a living organism lacking the power of locomotion)

[1] `https://wordnet.princeton.edu/`

Sense-Annotated Corpus

This reduces the number of expensive **plant** shutdowns and startups.	**(s1)**
The pilot **plant** was equipped with a 3-hp. turbine aerator (Figure 2).	**(s1)**
Remove about half the branches from each **plant**, leaving only the strongest with the largest buds.	**(s2)**
"On the side toward the horizon – the southern hemisphere – it is spring; **plants** are being taught to grow".	**(s2)**
Can you share medical facilities and staff with neighboring **plants**??	**(s1)**

Table 1: Corpus sample for the noun *plant*. SFD: $T = (3, 2)$

Split Corpus

t_1	t_2
0000 remove about half the branch from each **plant** leave only the strong with the largest bud **(s2)**	1111 the pilot **plant** was equip with a 3 hp turbine aerator figure 2 **(s1)**
0000 on the side toward the horizon the southern_hemisphere it be spring **plant** are being teach to grow **(s2)**	1111 this reduce the number of expensive **plant** shutdown and startup **(s1)**
0000 can you share medical facility and staff with neighboring **plant** **(s1)**	

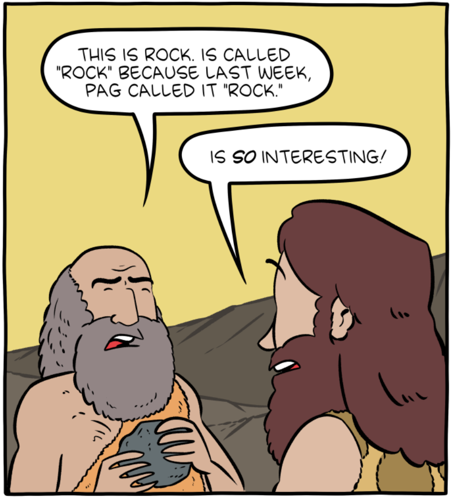
Table 2: $T_1 = (1, 2)$, $T_2 = (2, 0)$. Condition 3.

Experiments

Dataset	Representation	best
SemCor	SGNS	**0.444**
	CNT	0.385
	SVD	0.367
	RI	0.277
	PPMI	0.268

Table 3: Best ρ score across parameter settings for cosine distance in different semantic vector space types. See Schlechtweg et al. (2019) for more information. SemCor was split weakly (condition 3), we tested only on verbs above frequency of 100.

Last Slide


THIS IS ROCK. IS CALLED "ROCK" BECAUSE LAST WEEK, PAG CALLED IT "ROCK."
IS *SO* INTERESTING!

In the early days, etymology was much easier.

Figure 1: Found on `http://languagelog.ldc.upenn.edu`.

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