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**INDUCING INTERPRETABLE WORD
SENSES FOR WSD AND ENRICHMENT OF
LEXICAL RESOURCES**

Overview

- **Inducing word sense representations:**
 - word sense embeddings via retrofitting [Pelevina et al., 2016, Remus and Biemann, 2018];
 - sparse sense representations [Panchenko et al., 2017c];
 - semantic classes [Panchenko et al., 2018]

Overview

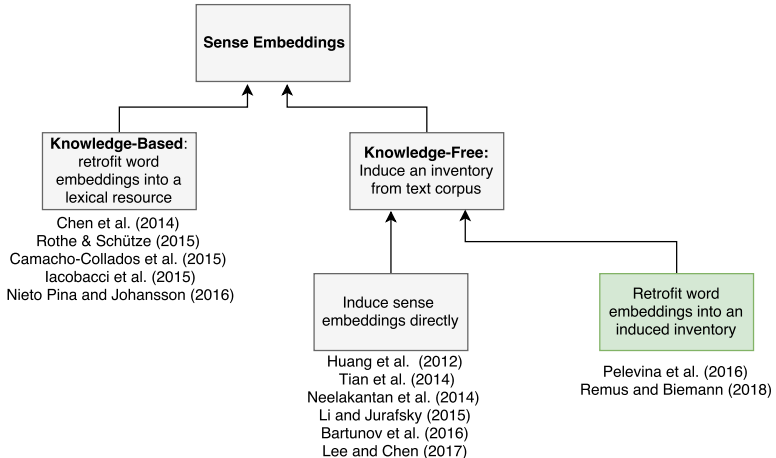
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- **Making the induced senses interpretable**
[Panchenko et al., 2017b, Panchenko et al., 2017c]

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- **Making the induced senses interpretable**
[Panchenko et al., 2017b, Panchenko et al., 2017c]
- **Linking induced word senses to lexical resources** [Faralli et al., 2016, Panchenko et al., 2017a, Biemann et al., 2018]

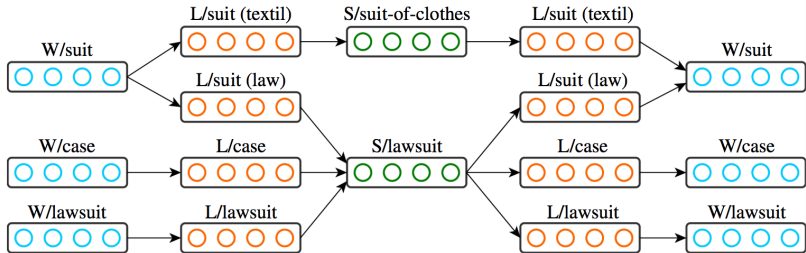
Inducing word sense representations

Related work



Related work: knowledge-based

■ AutoExtend [Rothe and Schütze, 2015]



* image is reproduced from the original paper

Related work: knowledge-free

- Adagram [Bartunov et al., 2016]
- Multiple vector representations θ for each word:

$$p(Y, Z, \beta | X, \alpha, \theta) = \prod_{w=1}^V \prod_{k=1}^{\infty} p(\beta_{wk} | \alpha) \prod_{i=1}^N [p(z_i | x_i, \beta) \prod_{j=1}^C p(y_{ij} | z_i, x_i, \theta)],$$

- α – a meta-parameter controlling number of senses;
- z_i – a hidden variable: a sense index in context;
- $p(\beta_{wk} | \alpha)$ – probability of the k -th sense of the word w ;
- $p(z_i | x_i, \beta)$ – probability of observing word x_i in the sense z_i ;
- $\prod_{j=1}^C p(y_{ij} | z_i, x_i, \theta)$ – probability of the context C .

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- **See also:** [Neelakantan et al., 2014] and [Li and Jurafsky, 2015]

Sense embeddings using retrofitting



Sense embeddings using retrofitting



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Inducing word sense representations

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Sparse sense representations



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Inducing word sense representations

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Sparse sense representations



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Inducing word sense representations

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Sparse sense representations



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Inducing word sense representations

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Watset: synset induction



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Inducing word sense representations

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Induction of sense semantic classes



Induction of sense semantic classes



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Inducing word sense representations

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Induction of sense semantic classes

Conclusion



Summary

- How to **induce word senses** and **semantic classes** from text and synonyms.

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- How to **induce word senses** and **semantic classes** from text and synonyms.
- **Interpretability can be added** on the top of induced word senses in a model agnostic way.
- Hypernymy labels **improve hypernymy extraction**.
- Linking induced word senses to lexical resources:
 - improves **performance of WSD**;
 - can be used to **enrich lexical resources** with new senses.

A New Shared Task on WSI&D

- Participate in an ACL SIGSLAV sponsored shared task on **word sense induction and disambiguation** for Russian!

A lexical sample task evaluated using the ARI measure

- Target word, e.g. “bank” (in Russian).
- Contexts where the word occurs.
- You need to group the contexts by senses.

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- **More details:** <http://russe.nlpub.org/2018/wsi>
 - You can participate by **31.01.2018**.

Thank you!



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