

Alexander Panchenko

FROM UNSUPERVISED INDUCTION OF LINGUISTIC STRUCTURES FROM TEXT TOWARDS APPLICATIONS IN DEEP LEARNING



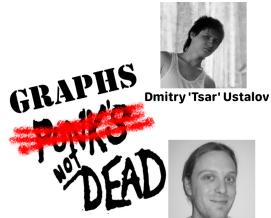
In close collaboration with ...



Chris Biemann



Stefano Faralli



Simone P. Ponzetto



In collaboration with ...

- Andrei Kutuzov
- Eugen Ruppert
- Fide Marten
- Nikolay Arefyev
- Steffen Remus
- Martin Riedl
- Hubert Naets
- Maria Pelevina
- Anastasiya Lopukhina
- Konstantin Lopukhin







Inducing word sense representations:

- word sense embeddings via retrofitting [Pelevina et al., 2016, Remus & Biemann, 2018];
- inducing synsets [Ustalov et al., 2017b, Ustalov et al., 2017a, Ustalov et al., 2018b]
- inducing semantic classes [Panchenko et al., 2018b]





Overview

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 - inducing synsets [Ustalov et al., 2017b, Ustalov et al., 2017a, Ustalov et al., 2018b]
 - inducing semantic classes [Panchenko et al., 2018b]
- Making induced senses interpretable [Panchenko et al., 2017b, Panchenko et al., 2017c]





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





A shared task on word sense induction [Panchenko et al., 2018a, Arefyev et al., 2018]



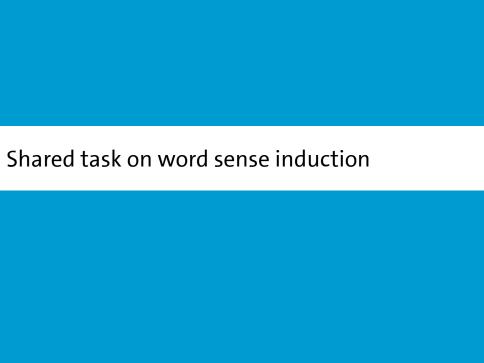


- A shared task on word sense induction
 [Panchenko et al., 2018a, Arefyev et al., 2018]
- Inducing semantic frames [Ustalov et al., 2018a]
 - Inducing FrameNet-like structures;
 - ...using multi-way clustering.





- A shared task on word sense induction
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- Inducing semantic frames [Ustalov et al., 2018a]
 - Inducing FrameNet-like structures;
 - ...using multi-way clustering.
- Learning graph/network embeddings [ongoing joint work with Andrei Kutuzov]
 - How to represent induced networks/graphs?
 - ... so that they can be used in deep learning architectures.
 - ...effectively and efficiently.



A shared task on WSI

- An ACL SIGSLAV sponsored shared task on word sense induction (WSI) for the Russian language.
- More details: http://russe.nlpub.org/2018/wsi

















Shared task on word sense induction

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■ Target word, e.g. "bank".

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 - "river bank is a slope beside a body of water"
 - "bank is a financial institution that accepts deposits"
 - "Oh, the bank was robbed. They took about a million dollars."
 - "bank of Elbe is a good and popular hangout spot complete with good food and fun"

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- You need to group the contexts by senses:
 - "river bank is a slope beside a body of water"
 - "bank of Elbe is a good and popular hangout spot complete with good food and fun"
 - "bank is a financial institution that accepts deposits"
 - "Oh, the bank was robbed. They took about a million dollars."

Extra slides





Sense embeddings using retrofitting

Evaluation on SemEval 2013 Task 13 WSI&D:

Model	Jacc.	Tau	WNDCG	F.NMI	F.B-Cubed
AI-KU (add1000)	0.176	0.609	0.205	0.033	0.317
AI-KU	0.176	0.619	0.393	0.066	0.382
AI-KU (remove5-add1000)	0.228	0.654	0.330	0.040	0.463
Unimelb (5p)	0.198	0.623	0.374	0.056	0.475
Unimelb (50k)	0.198	0.633	0.384	0.060	0.494
UoS (#WN senses)	0.171	0.600	0.298	0.046	0.186
UoS (top-3)	0.220	0.637	0.370	0.044	0.451
La Sapienza (1)	0.131	0.544	0.332	_	_
La Sapienza (2)	0.131	0.535	0.394	_	-
AdaGram, α = 0.05, 100 dim	0.274	0.644	0.318	0.058	0.470
w2v	0.197	0.615	0.291	0.011	0.615
w2v (nouns)	0.179	0.626	0.304	0.011	0.623
JBT	0.205	0.624	0.291	0.017	0.598
JBT (nouns)	0.198	0.643	0.310	0.031	0.595
TWSI (nouns)	0.215	0.651	0.318	0.030	0.573

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