

IWCS 2019

**Proceedings of the 13th International Conference on
Computational Semantics - Long Papers**

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University of Gothenburg
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CLASP centre for
linguistic theory
and studies in probability



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Introduction

Welcome to the 13th edition of the International Conference on Computational Semantics (IWCS 2019) in Gothenburg. The aim of IWCS is to bring together researchers interested in any aspects of the annotation, representation and computation of meaning in natural language, whether this is from a lexical or structural semantic perspective. It embraces both symbolic and machine learning approaches to computational semantics, and everything in between. This is reflected in the themes of the sessions which take place over full 3 days. The programme starts with formal and grammatical approaches to the representation and computation of meaning, interaction of these approaches with distributional approaches, explore the issues related to entailment, semantic relations and frames, and unsupervised learning of word embeddings and semantic representations, including those that involve information from other modalities such as images. Overall, the papers capture a good overview of different angles from which the computational approach to natural language semantics can be studied.

The talks of our three keynote speakers also reflect these themes. The work of Mehrnoosh Sadrzadeh focuses on combination categorial grammars with word- and sentence embeddings for disambiguation of sentences with VP ellipsis. The work of Ellie Pavlick focuses on the evaluation of the state-of-the-art data-driven models of language for what they “understand” in terms of inference and what is their internal structure. Finally, the work of Raffaella Bernardi focuses on conversational agents that learn grounded language in visual information through interactions with other agents. We are delighted they have accepted our invitation and we are looking forward to their talks. We include the abstract of their talks in this volume.

In total, we accepted 25 long papers (51% of submissions), 10 short papers (44% of submissions) and 7 student papers (54% of submissions) following the recommendations of our peer reviewers. Each paper was reviewed by three experts. We are extremely grateful to the Programme Committee members for their detailed and helpful reviews. The long and student papers will be presented either as talks or posters, while short papers will be presented as posters. Overall, there are 7 sessions of talks and 2 poster sessions (introduced by short lighting talks) which we organised according to the progression of the themes over 3 days, starting each day with a keynote talk. The sessions are organised in a way to allow plenty of time in between to allow participants to initiate discussions over a Swedish *fika*.

To encourage a broader participation of students we organised a student track where the papers have undergone the same quality review as long papers but at the same time the reviewers were instructed to provide comments that are beneficial to their authors to develop their work. To this end we also awarded a Best Student Paper Award.

The conference is preceded by 5 workshops on semantic annotation, meaning relations, types and frames, vector semantics and dialogue, and on interactions between natural language processing and theoretical computer science. In addition to the workshops, this year there is also a shared task on semantic parsing. The workshops and the shared task will take place over the two days preceding the conference.

There will be two social events. A reception which is sponsored by the City of Gothenburg will be opened by the Lord Mayor of Gothenburg and will take place on the evening of the second day of the workshops and before the main conference. A conference dinner will take place in Liseberg Amusement Park where participants will also get a chance to try some of their attractions.

IWCS 2019 has received general financial support (covering over a half of the costs) from the Centre for Linguistics Theory and Studies in Probability (CLASP) which in turn is financed by a grant from the

Swedish Research Council (VR project 2014-39) and University of Gothenburg. CLASP also hosts the event. We are also grateful to the Masters Programme in Language Technology (MLT) at the University of Gothenburg, Talkamatic AB and the City of Gothenburg for their financial support.

We very much hope that you will have an enjoyable and inspiring time!

Simon Dobnik, Stergios Chatzikyriakidis, and Vera Demberg

Gothenburg & Saarbrücken

May 2019

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Invited Speakers:

Mehrnoosh Sadrzadeh, Queen Mary, University of London

Ellie Pavlick, Brown University

Raffaella Bernardi, University of Trento

Invited Talks

Mehrnoosh Sadrzadeh: Ellipsis in Compositional Distributional Semantics

Ellipsis is a natural language phenomenon where part of a sentence is missing and its information must be recovered from its surrounding context, as in “Cats chase dogs and so do foxes.”. Formal semantics offers different methods for resolving ellipsis and recovering the missing information, but the problem has not been considered for distributional semantics, where words have vector embeddings and combinations thereof provide embeddings for sentences. In elliptical sentences these combinations go beyond linear as copying of elided information is necessary. I will talk about recent results in our NAACL 2019 paper, joint with G. Wijnholds, where we develop different models for embedding VP-elliptical sentences using modal sub-exponential categorial grammars. We extend existing verb disambiguation and sentence similarity datasets to ones containing elliptical phrases and evaluate our models on these datasets for a variety of linear and non-linear combinations. Our results show that indeed resolving ellipsis improves the performance of vectors and tensors on these tasks and it also sheds some light on disambiguating their sloppy and strict readings.

Ellie Pavlick: What Should Constitute Natural Language “understanding”?

Natural language processing has become indisputably good over the past few years. We can perform retrieval and question answering with purported super-human accuracy, and can generate full documents of text that seem good enough to pass the Turing test. In light of these successes, it is tempting to attribute the empirical performance to a deeper "understanding" of language that the models have acquired. Measuring natural language "understanding", however, is itself an unsolved research problem. In this talk, I will discuss recent work which attempts to illuminate what it is that state-of-the-art models of language are capturing. I will describe approaches which evaluate the models' inferential behaviour, as well as approaches which rely on inspecting the models' internal structure directly. I will conclude with results on human's linguistic inferences, which highlight the challenges involved with developing prescriptivist language tasks for evaluating computational models.

Raffaella Bernardi: Beyond Task Success: A Closer Look at Jointly Learning to See, Ask, and GuessWhat

The development of conversational agents that ground language into visual information is a challenging problem that requires the integration of dialogue management skills with multimodal understanding. Recently, visual dialogue settings have entered the scene of the Machine Learning and Computer Vision communities thanks to the construction of visually grounded human-human dialogue datasets against which Neural Network models (NNs) have been challenged. I will present our work on GuessWhat?! in which two NN agents interact to each other so that one of the two (the Questioner), by asking questions to the other (the Answerer), can guess which object the Answerer has in mind among all the entities in a given image (GuessWhat?!). I will present our Questioner model: it encodes both visual and textual inputs, produces a multimodal representation, generates natural language questions, understands the Answerers' responses and guesses the object. I will compare our model's dialogues with models that exploit much more complex learning paradigms, like Reinforcement Learning, showing that more complex machine learning methods do not necessarily correspond to better dialogue quality or even better quantitative performance. The talk is based on work available at <https://vista-unitn-uva.github.io/>.

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