KI - Künstliche Intelligenz
German Journal of Artificial Intelligence
Special Issue on NLP & Semantics

Daniel Hershcovich · Lucia Donatelli

Passing the Turing test, or exhibiting intelligent behavior indistinguishable from that of a human, is often cited as one of the major goals of Artificial Intelligence. However, demonstrating such behavior by means of interacting with natural language—the test's passing criterion—is sometimes considered too modest of a goal given current research. As powerful Natural Language Processing (NLP) technology continues to achieve human-like and often superhuman performance based on standard benchmarks, many questions regarding what we assumed our computers to be capable of are surfacing. Innovative techniques and models introduced at a staggering pace are shaking the scientific community in academia and industry alike.

As astonishment by our rapid progress grows, awareness of the limitations of current methods is entering the consciousness of more and more researchers and practitioners. A central difficulty much NLP research faces is how to generalise from controlled data sets to real-world environments that require a wider range of language and linguistic phenomena than data-specific and often superficial heuristics can account for. In addition to asking what our computers are capable of, NLP researchers are also asking questions about the fundamental relationship between language and intelligence and what makes either decidedly 'human'.

This special issue introduces diverse perspectives on current questions in NLP research. In the opening technical contribution of this special issue, we review the current state of semantics in NLP. We focus on the dichotomy between *semantics*, as formally defined in linguistics, and *meaning*, an extended understanding of semantics employed in much NLP research that integrates theoretical foundations of linguistic competence with usage-based performance effects resulting from contextual factors. This survey article sets the stage for the issue's articles, which answer the question of how to represent meaning from distinct perspectives.

In the article *Ideal words: a vector-based formalisation of semantic competence*, Aurelie Herbelot and Ann Copestake bridge theories of semantic competence with semantic performance with a formal distributional account based on corpus data, arguing that the representation of meaning is in principle learnable from performance data and can be leveraged for teaching artificial agents meaning.

In their article *Draw mir a sheep: A Supersense-based Analysis of German Case and Adposition Semantics*, Jakob Prange and Nathan Schneider investigate the complex relationship between form and meaning, focusing on the German language, and specifically the little words (or parts of words) called prepositions and case markers, which nevertheless play a heavy role in sentence semantics.

In *Embodied Human Computer Interaction*, James Pustejovsky and Nikhil Krishnaswamy describe a simulation platform for building Embodied Human Computer Interaction (EHCI). The authors present a semantic formalism for multiomodal interaction and highlight the importance of incorporating modalities apart from language such as gesture, action, gaze, and facial expression into the common ground for enhanced interaction from both formal and computational perspectives.

In the paper *Stance Detection Benchmark: How Robust Is Your Stance Detection?*, Benjamin Schiller, Johannes Daxenberger and Iryna Gurevych analyze the

Daniel Hershcovich
University of Copenhagen, Copenhagen, Denmark
E-mail: dh@di.ku.dk

Lucia Donatelli
Saarland University, Saarbrücken, Germany
E-mail: donatelli@coli.uni-saarland.de

robustness of models designed to detect the stance of a proposition toward a topic across diverse domains, an important task for fake news detection and argumentation.

The paper *Designing a Uniform Meaning Representation for Natural Language Processing* by Jens E. L. Van Gysel et al. presents a sentence-level and document-level symbolic meaning representation for many languages, developed in a large international project aiming at supporting lexical and logical inference at scale.

In addition, Alexander Koller from Saarland University shared his expert opinions with us in an interview on the utility of semantic representations, the fast-pace growth of the field of computational linguistics, and the challenges and joys of being a computational semanticist figuring out which hill to climb in NLU.

In their project report *Do it Yourself but not Alone: Companion-Technology for Home Improvement – Bringing a Planning-Based Interactive DIY Assistant to Life*, Pascal Bercher et al. describe an interactive assistant, ROBERT, that utilizes hierarchical planning and ontological reasoning to adapt to users and guide them through domestic projects.

Finally, the special issue includes abstracts of two recent PhD dissertations: in *Learning High Precision Lexical Inferences*, Vered Shwartz presents algorithms for recognizing semantic relations between words, and in *The syntax, semantics, and pragmatics of Japanese addressee-honorific markers*, Akitaka Yamada develops a discourse model in which the dimension regarding politeness-oriented expressions in Japanese is modeled as a Bayesian inference process.

Guest editors,
Daniel Hershcovich and Lucia Donatelli

1 Content

1.1 Technical Contributions

- It's the Meaning that Counts: The State of the Art in NLP and Semantics—Daniel Hershcovich and Lucia Donatelli
- Ideal words: a vector-based formalisation of semantic competence—Aurelie Herbelot and Ann Copestake
- Draw mir a sheep: A Supersense-based Analysis of German Case and Adposition Semantics—Jakob Prange and Nathan Schneider
- Embodied Human Computer Interaction—James Pustejovsky and Nikhil Krishnaswamy

- Stance Detection Benchmark: How Robust Is Your Stance Detection?—Benjamin Schiller, Johannes Daxenberger and Iryna Gurevych
- Designing a Uniform Meaning Representation for Natural Language Processing—Jens E. L. Van Gysel, Meagan Vigus, Jayeol Chun, Kenneth Lai, Sarah Moeller, Jiarui Yao, Tim O'Gorman, Andrew Cowell, William Croft, Chu-Ren Huang, Jan Hajic, James H. Martin, Stephan Oepen, Martha Palmer, James Pustejovsky, Rosa Vallejos and Nianwen Xue

1.2 Interviews

- Climbing the Hill of Computational Semantics—Interview with Alexander Koller, Saarland University

1.3 Project Reports

- Do it Yourself but not Alone: Companion-Technology for Home Improvement – Bringing a Planning-Based Interactive DIY Assistant to Life—Pascal Bercher, Gregor Behnke, Matthias Kraus, Marvin Schiller, Dietrich Manstetten, Michael Dambier, Michael Dorna, Wolfgang Minker, Birte Glimm and Susanne Biundo

1.4 Doctoral Dissertations

- Learning High Precision Lexical Inferences—Vered Shwartz
- The syntax, semantics, and pragmatics of Japanese addressee-honorific markers—Akitaka Yamada