Editorial

Philipp Cimiano, Matthias Hagen*, and Benno Stein

Argumentation technology

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Individuals, organizations and governments are faced with an increasing number of options when taking decisions. At an individual level, decisions to take are for example: Should I get vaccinated? Which insurance should I choose? Which products should I buy to support sustainable production? Which school should I send my kids to? As an organization, important questions are: How should we position ourselves in the market with respect to other competitors? Which customer segment needs to be convinced by which arguments? Which new products should we develop? And, the government level: Which counterarguments are to be expected for a new piece of legislation? Which groups will oppose a new construction project and which arguments might they use?

Dealing with such questions means arguing in its broadest sense. This may involve *deliberation*, where for a given topic or hypothesis all pro and con arguments from relevant sources are to be extracted, processed, summarized, and aggregated. Argumentation also means *validation*, where we examine a given argument or argument chain for coherence, consistency and plausibility, considering background knowledge and data from real-world domains. Not least, argumentation does also include *synthesis* tasks, in order to support decision making in a given context, integrate possible courses of action and alternatives with corresponding arguments, or render them interactively available for users.

Following the definition of van Eemeren et al. [1, 2], we understand argumentation as a dialectical process in which a set of propositions with particular implications is disputed, with the goal to make one's own position comprehensible, conclusive and acceptable for a rational third party. Arguments are usually subjective and imperfect in the sense that they are based on implicit or wrong assumptions, stay vague and ambiguous, or their formulation remains incomplete. This makes the analysis of natural language arguments a very challenging endeavor, requiring focused research efforts and innovations that combine methods from information retrieval, computational linguistics, knowledge representation and inference, Semantic Web, as well as human–computer interaction.

For this special issue on "Argumentation Technology", we have invited contributions from researchers who conduct research on robust argumentation machines, argument mining, argumentation theory, etc. After careful reviews by several experts and revision of the papers, we have accepted five contributions.

Christian Nawroth, Felix Engel, and Matthias Hemmje focus on argumentation in the medical domain. In their paper "Utilizing Emerging Knowledge to Support Medical Argument Retrieval," they describe and evaluate a system that detects emerging named entities in argumentative contexts of medical documents to retrieve more argumentative results in scenarios where an evidence-based medical decision is to be formed.

Niklas Rach, Klaus Weber, Yuchi Yang, Stefan Ultes, Elisabeth André, and Wolfgang Minker study different styles of argumentation in their paper "EVA 2.0: Emotional and Rational Multimodal Argumentation between Virtual Agents." Using a dialog game scenario based on hotel and restaurant reviews, the interactions of virtual avatars following a rational or an emotional style of argumentation can be assessed by human observers.

Natalie Dykes, Stefan Evert, Merlin Göttlinger, Philipp Heinrich, and Lutz Schröder describe an approach to mine arguments from social media sources in their paper "Argument Parsing via Corpus Queries." Tweets matching predefined argumentation patterns are transformed in modal logic formulas to gain an overview of typical argumentation schemes in Twitter discussions on the Brexit.

Robin Schäfer and Manfrede Stede survey the current state of the art in argument mining on Twitter. In their paper "Argument Mining on Twitter: A Survey," they review the structural modeling and detection of argumentative components and relations in tweets as well as stance detection.

Philipp Heinisch and Philipp Cimiano focus on predicting the frame of an argument (i. e., the aspects of a controversial topic that an argument emphasizes and the narrative it constructs). In their paper "A Multi-task Approach

***Corresponding author: Matthias Hagen,** Martin-Luther-Universität Halle-Wittenberg, Halle (Saale), Germany, e-mail: matthias.hagen@informatik.uni-halle.de
Philipp Cimiano, Universität Bielefeld, Bielefeld, Germany, e-mail: cimiano@cit-ec.uni-bielefeld.de
Benno Stein, Bauhaus-Universität Weimar, Weimar, Germany, e-mail: benno.stein@uni-weimar.de

to Argument Frame Classification at Variable Granularity Levels," they suggest and evaluate a supervised multi-task classifier to classify frames of arguments at variable granularities and to predict the frame cluster of an argument.

References

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Bionotes

Philipp Cimiano
Universität Bielefeld, Bielefeld, Germany
cimiano@cit-ec.uni-bielefeld.de

Prof. Dr. Philipp Cimiano studied computer science and computational linguistics at Stuttgart University. He obtained his PhD and habilitation in Applied Computer Science from the University of Karlsruhe. He is full professor for computer science at Bielefeld University since 2009. His main research topics include natural language processing, text mining, knowledge engineering and management, question answering, linked data and knowledge representation. He was nominated as one of top 10 researchers to watch for the future of AI by the IEEE Intelligent Systems Magazine. He is editorial board member of the Semantic Web Journal, the Journal of Web Semantics, the Semantic Computing Journal and the Journal of Applied Ontology.

Matthias Hagen
Martin-Luther-Universität Halle-Wittenberg, Halle (Saale), Germany
matthias.hagen@informatik.uni-halle.de

Prof. Dr. Matthias Hagen studied computer science at the Friedrich-Schiller-Universität Jena where he also obtained his PhD on algorithmic and computational complexity issues of the equivalence test of monotone Boolean formulas. He is full professor of "Big Data Analytics" at the Martin-Luther-Universität Halle-Wittenberg since 2018. His current research interests include information retrieval and web search (e. g., query understanding, conversational search), natural language processing (e. g., argumentation), as well as data analytics and mining (e. g., simulation and sensor data).

Benno Stein
Bauhaus-Universität Weimar, Weimar, Germany
benno.stein@uni-weimar.de

Prof. Dr. Benno Stein is chair of the Web-Technology and Information Systems Group at the Bauhaus-Universität Weimar. His research focuses on modeling and solving data- and knowledge-intensive information processing tasks. Common ground of his research are the principles and methods of symbolic Artificial Intelligence. Benno Stein has developed theories, algorithms, and tools for information retrieval, machine learning, natural language processing, knowledge processing, as well as for engineering design and simulation (patents granted). For several achievements of his research he has been awarded with scientific and commercial prizes.