

## INTRODUCTION

# Processing negation: An introduction to the special issue

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This special issue is devoted to any aspect related to processing negation from a computational perspective. The call for papers was broad and welcomed contributions describing theoretical insights, annotation schemes and corpora, empirical studies on processing and representing the meaning of negation, and applications that benefit from processing negation. We received 15 submissions and 6 articles were accepted for publication after a thorough review process.

The special issue opens with a survey describing recent advances in processing negation (Blanco and Morante 2020). Six articles describing new research follow. These six articles can be grouped based on two criteria: the languages they work with and whether they process negation in order to improve some application. Three articles work with English texts (Schulder, Wiegand, and Ruppenhofer 2020; Barnes, Velldal, and Øvrelid 2020; Sykes *et al.* 2020), and three articles work with texts in other languages: Spanish (Jiménez-Zafra *et al.* 2020; Taul *et al.* 2020), and French and Brazilian Portuguese (Dalloux *et al.* 2020). Regarding applications, three articles present work on processing negation for sentiment analysis (Jiménez-Zafra *et al.* 2020; Schulder *et al.* 2020; Barnes *et al.* 2020), two work in the biomedical domain (Dalloux *et al.* 2020; Sykes *et al.* 2020), and one presents a corpus with focus on negation annotations (Taul *et al.* 2020). In the remaining of this introduction, we briefly summarize the articles in this special issue.

Schulder *et al.* (2020) present a methodology to generate lexica for sentiment polarity shifters such as *alleviate* and *failure*. They present a bootstrapping approach combining classifiers with human annotations, and the resulting lexica include polarity shifters that are nouns, verbs, or adjectives. Barnes *et al.* (2020) show that modeling negation explicitly is beneficial for sentiment analysis. More specifically, they show that a multitask neural network architecture that learns both sentiment and scope of negation outperforms one that learns negation in an end-to-end manner. Finally, Jiménez-Zafra *et al.* (2020) work with texts in Spanish and show that incorporating a scope detector into an existing model for sentiment analysis yields better results.

Taulé *et al.* (2020) define 10 criteria to identify the focus of negation in Spanish. The criteria have been defined based on a detailed and in-depth analysis of linguistic phenomena. They apply these criteria to the annotation of scope and focus in the NewsCom corpus, accounting for the first corpus annotated with focus in Spanish.

Dalloux *et al.* (2020) present new corpora for Brazilian Portuguese and French manually annotated with negation cues and their scopes in clinical documents. They also present automatic methods based on supervised machine learning approaches for the automatic detection of negation cues and their scopes, namely vector representations and neural networks. They find that LSTM-based neural architectures are more efficient than GRUs in the scope detection task. Sykes *et al.* (2020) present a new corpus of radiology reports annotated with negation. They also propose and experiment with a rule-based method and two neural network models for detecting negation

in the new corpus. They conclude that their specialized rule-based method yields better results than the neural models, albeit by a small margin.

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