

Aspect-based sentiment analysis of conference review forms

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Publications related to the thesis

- [1] V. Svátek, S. Juranková, R. Šalda, P. Strossa, and Z. Vondra. Creating and exploiting the mappings from conference review forms to a generic set of review criteria. In *Proceedings of the ISWC 2020 Demos and Industry Tracks: From Novel Ideas to Industrial Practice co-located with 19th International Semantic Web Conference (ISWC 2020)*, 2020. online, accessed 2-November-2020.
- [2] S. Juranková, V. Svátek, and Ch. Ghidini. Aspect-based sentiment analysis of conference review forms with Id-enabled review criteria. In *Workshop on Sentiment Analysis & Linguistic Linked Data (SALLD-1), Zaragoza, Spain, 2020*. To appear at OASIS, Dagstuhl Publishing, 2021.

Goals and motivation

The goals of this work are to:

- create a system for extracting opinions and sentiment from conference paper reviews
- categorize these opinions by the different criteria a paper is judged on
- provide an estimate for numerical scores of different criteria
- provide a rapid overview and comparison of different reviews of one paper
- allow unification of criteria scores across different conferences and reviewers

Studied conferences

This study focuses on conferences from the semantic technology field. The review structuring styles vary, while the sets of criteria are semantically similar across different conferences.

- **European Semantic Web Conference:** Numerical scores are assigned to 7 different criteria, the textual part is divided into the same categories.
- **European Knowledge Acquisition Workshop:** The reviewers comments are divided into three parts: Reasons to accept, Reasons to reject and Overall evaluation.
- **International Semantic Web Conference:** Numerical scoring of multiple criteria followed by unstructured text.

<https://github.com/jurs02>

Chosen criteria to be extracted

Semantic analysis of the field labels and reviewer guidelines of the chosen conferences led to 6 partial review metrics:

- Relevance
- Novelty
- Technical quality
- State of the art
- Evaluation
- Presentation

Methods

Development of a tool for sentiment analysis of conference reviews done in 3 major steps:

1. **Extraction of criterion expressions**
 - Taxonomy extraction based on identifying *frequent noun phrases* similar to terms in a *manually created seed taxonomy*
 - Extraction by review structure
2. **Creation of sentiment lexicon**
 - Experiments with existing sentiment lexica showed a need for a creation of a domain-specific lexicon
 - Created using a Naïve Bayes classifier
3. **Aspect based sentiment analysis**
 - The algorithm handles negations, but-words and other modifiers
 - Inspired by the holistic lexicon-based approach [1] and by the sentimentr method [2]
 - Additional fallback rules: adjectives as aspect expressions, intra sentence rules, neutral sentiment

Evaluation

Evaluation of the criterion identification

- Very diverse results across different criteria:

Criterion	Precision	Recall
Relevance	50	35.3
Novelty	63.6	25.9
Technical quality	36.4	14.3
State of the art	33.3	31.3
Evaluation	57.9	52.4
Presentation	74.3	49.1

- A substantial level of disagreement even between human annotators.

Evaluation of polarity detection

- Over **75.7%** of comments with correctly identified criterion were also correctly classified.

Conclusion

- The result for the sentiment analysis represents an improvement over a previous study [3].
- The algorithm is capable of significant advancements given a larger training dataset.

References

- [1] Xiaowen Ding, Bing Liu, and Philip S. Yu. A holistic lexicon-based approach to opinion mining, 2008.
- [2] Tyler Rinker and Vitalie Spinu. sentimentr, December 2016.
- [3] Cristina-Iulia Bucur, Tobias Kuhn, and Davide Ceolin. Peer reviewing revisited: Assessing research with interlinked semantic comments, 2019.