New Ontology-Based Model for Sentiment Aspect Detection

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ABSTRACT

Sentiment aspect detection aims to identify the presence of sentiments towards specific aspects of an entity, such as a product, restaurant, or policy. Sentiment aspect detection plays a crucial role in aspect-based entity sentiment analysis. A typical approach for detecting sentiment aspects involves applying machine learning techniques to train a model based on human-annotated data. Although machine learning-based models have achieved significant progress, these models often act as a "black box" and lack transparency in their reasoning processes. It is unclear what factors contribute to the models' effectiveness in detecting sentiment aspects.

To address the issue of intransparency in machine learning-based sentiment aspect detection models, this study aims to investigate the effectiveness of ontology-based models for sentiment aspect detection in restaurant reviews. The model was developed based on ontology terms related to six key restaurant aspects: food, service, ambience, cleanliness, location, and price, using 6,000 annotated Yelp reviews. Different ontology model construction strategies, including the source of ontology terms and part-of-speech (POS) tags, were explored. The ontology-based models were evaluated based on performance improvement over a baseline model for accurately detecting sentiments associated with sentiment aspects.

The results showed the effectiveness of the ontology model as compared to the baseline model across all restaurant aspects except food: service (21.81%), price (12.95%), cleanliness (9.49%), ambience (7.81%), and location (3.69%). These findings help to understand the impact of an ontology model on sentiment aspect detection and provide an ontology-based approach for more interpretable sentiment aspect detection models.

ALISE RESEARCH TAXONOMY TOPICS

Ontologies; Machine learning; Data Mining.

AUTHOR KEYWORDS

Ontology; Sentiment aspect detection; Entity aspects analysis; Data analysis; Online restaurant review.

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