

Research on sentiment analysis in text based on fuzzy rules

Vũ Thị Kim Ngân

Abstract: This study presents a novel approach to sentiment analysis in textual data by integrating fuzzy logic with rule-based reasoning. Traditional sentiment analysis methods often struggle with the inherent ambiguity, vagueness, and context-dependence of natural language, where sentiments are rarely purely positive or negative. To address these limitations, this research proposes a fuzzy rule-based system that models the intensity and polarity of emotional expressions. Linguistic variables and fuzzy sets are defined to represent sentiment features, such as word polarity and modifiers, while a set of fuzzy inference rules captures the nuanced relationships between these features. The system processes text by fuzzifying input features, applying the rule base, and defuzzifying the output to yield a continuous sentiment score. Experimental evaluations on benchmark datasets demonstrate that the proposed model achieves superior accuracy and interpretability compared to conventional crisp classifiers, particularly in handling sarcasm, negations, and mixed emotions. The findings confirm that fuzzy logic provides a robust framework for capturing the subtle gradations of human emotion, offering a more flexible and human-like alternative for automated sentiment analysis.

Keywords: Sentiment analysis, text, fuzzy logic, natural language processing