

Confused and Thankful: Multi-label Sentiment Classification of Health Forums

Victoria Bobicev¹ and Marina Sokolova^{2,3}(✉)

¹ Technical University of Moldova, Chisinau, Moldova
victoria.bobicev@ia.utm.md

² IBDA, Dalhousie University, Halifax, Canada
sokolova@uottawa.ca

³ University of Ottawa, Ottawa, Canada

Abstract. Our current work studies sentiment representation in messages posted on health forums. We analyze 11 sentiment representations in a framework of multi-label learning. We use **Exact Match** and **F-score** to compare effectiveness of those representations in sentiment classification of a message. Our empirical results show that feature selection can significantly improve **Exact Match** of the multi-label sentiment classification (paired t-test, $P = 0.0024$).

Keywords: Sentiment classification · Multi-label learning · Medical forums

1 Motivation

Separation of sentiments is a major challenge in sentiment classification. Due to a *yes-no* approach which assigns a text with one label and one label only, single label learning algorithms thrive and succeed when sentiment classes are easily dichotomized. At the same time, even short texts can combine various sentiments and objective, factual information, e.g. *my oldest had his th bday today & he had the stomach flu it still was a nice day I even got to spend some special time whim & hubby*. Overlap in sentiments can hardly be resolved by single-label binary or multiclass classification. We hypothesize that annotating texts with ≥ 2 sentiment labels and applying multi-label classification can benefit our understanding of the text sentiments. Applied to online health forums, multi-label sentiment classification improves understanding of patients' needs and can be used in advancing patient-centered health care (Bobicev, 2016; Liu and Chen, 2015; Melzi et al. 2014).

Online health forums allow for studies of well-being and behavior patterns in uncontrolled environment (Aarts et al. 2015; Navindgi et al. 2016; Hidalgo et al. 2015). Giving and receiving emotional support has positive effects on emotional well-being for patients with higher emotional communication, while the same exchanges have detrimental impacts on emotional well-being for those with lower emotional communication competence (Yoo et al. 2014). It has been shown that positive emotions present more frequently in responding posts than in the posts initiating new discussions (Yu, 2011).

In this study, we analyze how 6 score-based, 4 multi-dimensional and 1 domain-based sentiment representations affect accuracy of multi-label sentiment classification of