Author: Jacob Fuehne

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Research Paper Summary

CARER: Contextualized Affect Representations for Emotion Recognition, *Association for Computational Linguistics*, 2018

1. Problem definition and the main ideas of the research

In language, emotion is expressed in nuanced ways, which vary by collective or individual experiences, knowledge, and beliefs. In this paper, it is proposed that the best way to understand emotion in the many different contexts of language is to have a mechanism capable of capturing and modelling the different linguistic nuances and phenomena. This paper seeks to use a semi-supervised graph based approach to construct structural descriptors which are used to form contextualized affect representations from text.

2. Significance of research study (Importance and Challenges of research problem)

In order to capture emotion from all texts, a program must have knowledge of linguistic phenomena such as slang and coded words. Previously, the field has required rule-based and statistics based approaches to model these behaviors, but this requires hand crafted resources and cannot handle the evolving nature of linguistic variability. Even if one is able to identify the relationship between linguistic variations, it's difficult to determine the association to a group of emotions. Modelling linguistic behavior like this is particularly important in socially and culturally influenced text, such as opinionated content.

3. Main research questions and assumptions

This research seeks to resolve how the field models linguistic variability in text while capturing emotion. The assumption here is that by modelling an emotion corpus as a complex

graph, where relationships between linguistic variations can be determined across sentences, one is able to better associate linguistic variations such as slang and coded words with a group of emotions. By using a graph, it also requires less manual effort than traditional approaches to achieve domain knowledge and capture contextual and latent information.

4. Research Methodology

For the data, the authors construct a set of hashtags to collect a separate dataset of English tweets from the Twitter API. Anger, anticipation, disgust, fear, joy, sadness, surprise, and trust are used as the emotions and 339 hashtags serve as noisy labels. The data is preprocessed and the hashtag in the last position of a tweet is considered the ground truth.

The proposed CARER model combines a multi-layer CNN architecture with a matrix form of the enriched patterns. An embedding matrix of the pattern score is fed into two 1-D convolutional layers. It is then passed through a ReLU activation function to produce a feature map matrix. This matrix is fed into two hidden layers and a dropout is applied for regularization. It is then trained using Adam optimizer and a softmax is used to generate the final classifications.

5. Experiments

To test the proposed graph based algorithm, the model is applied to several emotion recognition tasks, with F1-score being used as the evaluation metric. In the experiments, CARER had better results than all conventional methods, including state-of-the-art methods (EmoNet and DeepMoji), on all emotions tested by a significant margin. The results of this paper demonstrate that CARER not only outperforms previous approaches in classification, but that the margin of improvement is larger in instances of limited computing resources and limited data. CARER is demonstrated to capture rare words and disambiguating emotional meaning that previous models could not do.

6. Discussion

6.1 Important aspects

- Improving performance utilizing pragmatics and linguistic knowledge

  As mentioned in lecture, pragmatics and linguistic knowledge research in computational linguistics is underdeveloped compared to other linguistic aspects such as phonetics. The graph based approach proposed successfully leverages these to outperform previous approaches.

6.2 Limitations of the paper

- Lack of transparency in test data and code

  This paper suffers from a common annoyance in computational linguistics research, which is that the code implementation and test data mentioned in the paper is not readily available to the public (which is a problem if the method proposed truly does outperform other models so significantly). The only way to verify the results shown is by manually reading through the methodology and trying to reimplement a working version.

6.3 Questions for presenter

- Why do you think that the CARER graph based approach is so stable in its performance across different amounts of features compared to other models?