Narrow convolutional neural network for arabic dialects polarity classification

ABSTRACT

The complexities and tangles of Arabic dialect in orthography and morphology typically make the sentimental analysis quite challenging. Moreover, most of the classification approaches have addressed this problem based on hand-crafted features. Since the Arabic language has multi-dialects and the language has no word-based order, the extraction process and the classification tasks are more difficult and time consuming. Deep neural network approaches applied to the Arabic language colloquial are very limited. These deep learning approaches typically comprise a structure that is very complex for small quantities of data. The structures are based on wide convolutional networks that are not capable of capturing the entire semantic and sentiment features for Arabic dialects. In this paper, a narrow structure of the convolutional neural network (CNN) has been proposed in order to obtain the tweets representations and classify the Arabic tweets into five, three and two polarities. Sensitivity analysis has been conducted to evaluate the impact of various combination structural properties, such as the number of convolutional filters, pooling size, and filter size on the classification performances. The proposed Arabic narrow convolutional neural network (NCNN) has captured the entire semantic and sentiment information contained in the tweet by maximizing the features of the detector's range. The NCNN performances were estimated to be at its optimum when structured by three convolutional layers, each one followed by the max pooling layer. The model has been developed without using lexicon resources and lexical features or augmented the dataset with extra training data. The narrow model is the first baseline model for Arabic dialects sentiment classifications for a sentence level as it is the first narrow CNN model addressing the Arabic Dialect tweets. NCNN model achieved the lowest macro average mean absolute error (MAE M) for five polarity and higher Macro average recall (P) for three and two polarities on the SemEval-2017 Arabic dialect Twitter datasets when compared to the other state-of-the-art approaches.