Emotion Prediction using a GRU

Rebecca Long
Universität Tübingen
rebecca.long@student.uni-tuebingen.de

1 Features

Word Embeddings

Word embeddings were generated using word2vec in gensim and given a size of 100. Because of the nature of language on Twitter infrequent words were left in with min_count=1. While these words might be typos or gibberish, they might also be hashtags or slang that could be informative.

Lexicon

The NRC Hashtag Emotion Lexicon contains 16,862 words with a corresponding emotion (anger, anticipation, disgust, fear, joy, sadness, surprise, or trust) and value (indicating the strength of the corresponding emotion). The lexicon was automatically generated from tweets containing emotion word hashtags, such as #happy. (Mohammad and Kiritchenko, 2015; Mohammad, 2012) In order to be consistent with the data, only words tagged as anger, disgust, fear, joy, sadness, or surprise were used.

2 Model

16,840 tweets were used for training data and 2,105 tweets were used as test data with a batch size of 421. Words and emotions from the data and lexicon were recoded into integer representations before being used in the model. The maximum number of timesteps was set to the maximum tweet length of 31. Stacked RNNs had 3 layers per direction. Dropout was applied during training with a dropout rate of 0.95. All models had these same underlying parameters.

Seven different models were tested and the best results were obtained using a GRU with word embeddings and the NRC Hashtag Emotion Lexicon as features. While all models got very similar scores, the simple unidirectional, single-layer GRU came out on top with a micro-average precision/recall/f1 score of 54.73%.

Model	precision	recall	f1
GRU	**54.73**	**54.73**	**54.73**
Bidirectional GRU	53.82	53.82	53.82
Stacked GRU	53.82	53.82	53.82
Stacked Bidirectional GRU	53.11	53.11	53.11
LSTM	53.87	53.87	53.87
Bidirectional LSTM	53.78	53.78	53.78
Stacked LSTM	53.82	53.82	53.82

Table 1: Model comparisons of micro-average scores.

References

Saif M Mohammad and Svetlana Kiritchenko. 2015. Using hashtags to capture fine emotion categories from tweets. *Computational Intelligence*, 31(2):301–326.

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