C-Net: Contextual Network for Sarcasm Detection

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Abstract

Automatic Sarcasm Detection in conversations is a difficult and tricky task. Classifying an utterance as sarcastic or not in isolation can be futile since most of the time the sarcastic nature of a sentence heavily relies on its context. This paper presents our proposed model, C-Net, which takes contextual information of a sentence in a sequential manner to classify it as sarcastic or non-sarcastic. Our model showcases competitive performance in the Sarcasm Detection shared task organised on CodaLab and achieved 75.0% F1-score on the Twitter dataset and 66.3% F1-score on Reddit dataset.

Challenges

- Negative emotion expressed with positive sentiment words.
  - **Context:** "I spent all my money for partying last night. . . "
  - **Sentence:** "Your parents must be really proud of you!" (Sarcasm)
- Variable context set sizes (Figure 1)
- Depends on the Platform. E.g. Reddit, Twitter etc.

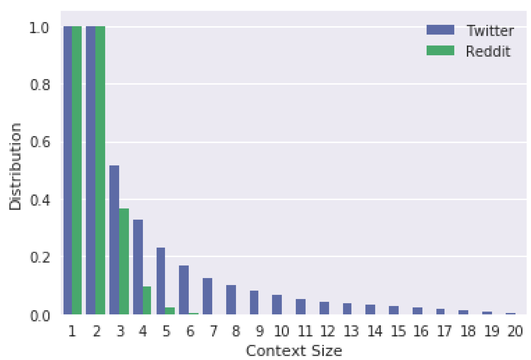

Figure 1: Context set size distribution. The x-axis shows the size of context sets in both the training datasets. The y-axis shows the percentage of data containing that much context size.

Proposed Model - Intuition

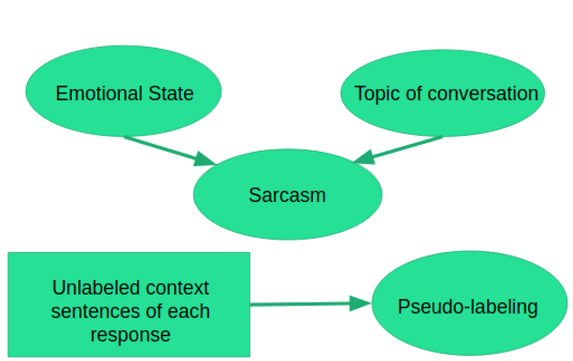

Figure 2: Motivation for C-Net

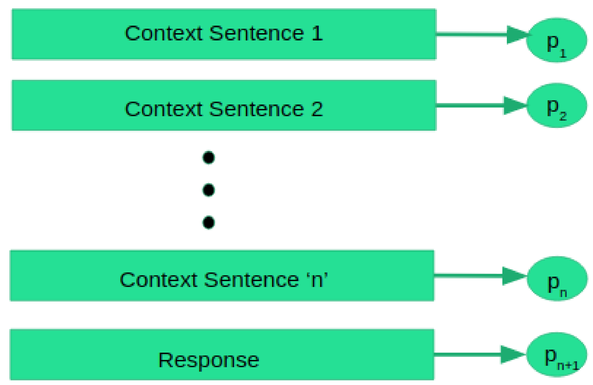

Figure 3: Assigning scores to each sentence of conversation

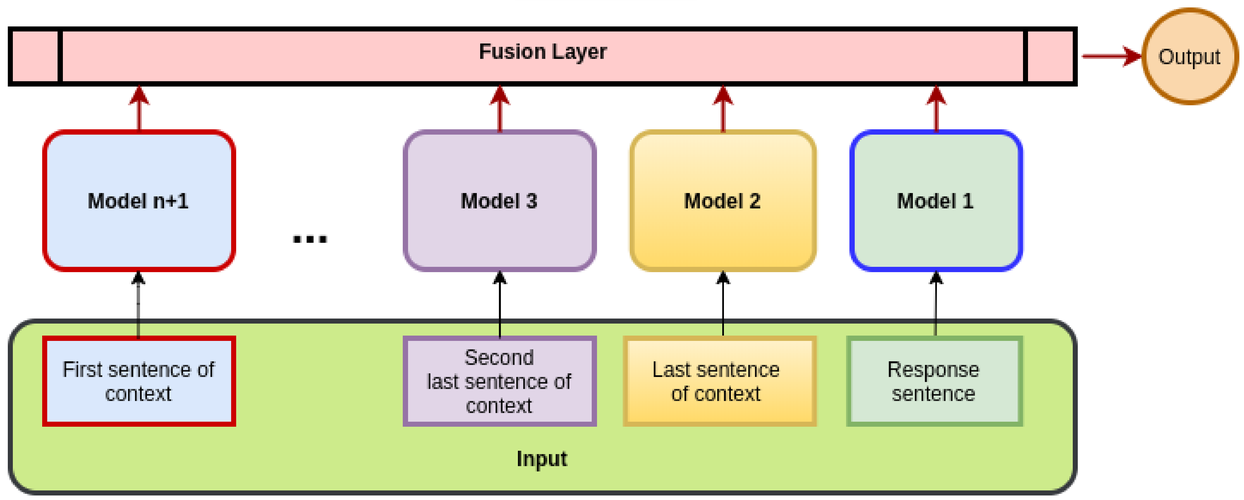

Figure 4: **C-Net Architecture.** Here, 'n' is the maximum size of the context set. Models 1, 2, 3,..., n+1 are BERT (base-uncased) models. Probability values generated by these n+1 models are used by the Fusion Layer to generate another probability value as output, which tells about the possibility of sarcasm presence in the response.

Fusion Layer

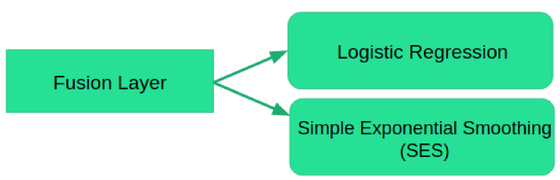

Figure 5: Types of fusion layers

Analysis and Future Work

- Results on Reddit data are counter-intuitive. Possibility: Sarcasm flags already present in pre-trained data.
- Further pre-training on target datasets.
- Approaches for variable context set size.
- Emotion detection, Humour generation.

Results

Method	Twitter	Reddit
Response Only Set		
Logistic Regression	0.685	0.622
Naive Bayes	0.673	0.626
SGD Classifier	0.668	0.626
XGBoost	0.672	0.617
SVM	0.632	0.334
Vanilla RNN	0.478	0.463
Bi-LSTM	0.497	0.481
DeepMoji	0.679	0.633
ELMo	0.684	0.544
ELMo+DeepMoji	0.681	0.518
XLNet (base-cased)	0.712	0.598
BERT (base-uncased)	**0.733**	0.671
RoBERTa (base)	0.680	**0.678**
Fixed Context Set		
C-Net+LR	0.747	0.650
C-Net+SES	**0.750**	**0.663**
Complete Context Set		
Time-stamping	0.710	0.500

Table 1: Results on test datasets (F1-scores). In the Fixed Context Set we only took last two sentences of Context Set of each response.

References

[1] Debanjan Ghosh, Alexander R. Fabbri, and Smaranda Muresan. Sarcasm analysis using conversation context, 2018.

[2] Aditya Joshi, Pushpak Bhattacharyya, and Mark James Carman. Automatic sarcasm detection: A survey, 2016.

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