Sarcasm Detection

Is using Sentiment the right approach?

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Introduction

Hypothesis: Sentiment Aids in Sarcasm Detection.

Sarcasm detection is a modern day topic for research in Natural Language Processing. The Primary agenda of this report is to support our approach and perform some basic tests in order to determine if Sentiment can be a viable feature in order to determine sarcasm.

Task

The idea is to perform feature engineering on the existing Sarcasm dataset which I obtained from Kaggle. Scale it down. And then infuse sentiment features for user comments to try and see if the end performance to detect sarcasm increases. This shall act as a step up baseline for next report, before actually getting to work with the Sentiment based Transformers, I'd like to read some related work to avoid unintended plagiarism and find points to support my initial hypothesis for this report.

Literature Survey

I. Sarcasm Detection using Context

The authors David Bamman and Noah A. Smith of Carnegie Mellon University, speak about how context matters, which is for granted. I agree with this, sarcasm is unlike any other text classification problem, we just cannot use some weights to determine the label of a text based on words used, rather the problem being understanding in what way the words were actually used.

Authors also talk about inferability, trying to emphasize on how people use sarcasm, when they are confident about it will be understood by their audience.

Their findings are in the direction of show casing the importance of the environment in which the words were used in, this aids in sarcasm detection.

Tags: The authors used tweets from users on twitter where users use tags to better determine their emotion behind the text, one such tag that the authors are primarily interested in is "#sarcasm" tag within tweets.

Their approach was to use Binary Logistic Regression rather than using complicated models and transformers. They also performed 10 fold cross validation, on the dataset they

obtained from twitter containing the tweets with tags "#sarcastic" where it is the primary tweet and not a retweet. They further filter this to only include tweets which are sarcastic and are written in response to a parent tweet. Personally this hints that I am moving in the right direction with my hypothesis gaining ground from this paper: Determining sarcasm takes place in a conversational manner, most often sarcastic texts exist in response to another text. So using both parent comment and child comment in my dataset is the optimal approach.

Quantity and Quality: The authors took immense time to filter data to narrow down their training sample size to a total of 9,767 positive tweets and 9,767 for negative as well; which shows that I don't have to use large sampled datasets as it would make no sense, and would rather over fit the model.

I'd like to take away from three things from this paper that are supportive of my hypothesis:

> *Sarcasm exists in Conversational fashion for text classification purposes, this aids to the overall complexity of models detection sarcasm.*
>
> *Quantity of Data can be significantly scaled down for our work, and Quality: our dataset needs to be balanced for further exploration and model fitting.*
>
> *Sentiment aids Sarcasm Detection.*

Our approach of using Transformers can be also challenged reading this paper:

Do we really need to use Transformers for Sarcasm detection with the hope of being able to detect sarcasm? This paper obtained some outstanding results in terms of classification metrics, granted the dataset used was much simpler, yet enough to challenge the approach of needing to use transformers.

II. Sentiment and Sarcasm Classification

The authors of this paper, argue against assumption that Sarcasm and Sentiment are two independent tasks, their work tries to prove that these tasks are correlated. They also claim that their method of using a Multitask learning framework, out performs the "state of art" by 3-4% but they never happened to mention what model they were referring to or whose work they were referring to when they used the phrase "state of art" upon which this entire paper stands upon.

Their reasoning however can be slightly useful, they say users often use sarcasm for emphasizing their sentiment, which is true in some cases. And claim that many authors out there just vaguely try and solve sarcasm detection based problems without looking at the semantical relationship between sentiment and its aid in determining sarcasm.

They quote serval people under their methodology to try and emphasize that most sarcastic sentences carry negative sentiment. And the authors use this idea to perform both sentiment and sarcasm classification. They use Glove word embeddings with padding. They basically use two fully connected neural networks, for sentence level word representation and attention network to encode sentence level context.

This inspires me to further challenge my idea: Do we really need to use transformers? Can this be solved in a simpler way? They use very traditional setup for their network with activation function being ReLU, and Softmax for Binary classification, and categorical cross-entropy as the loss function, while ADAM being their optimizer.

All of this adds up to try and deviate to experiment the fact if sarcasm can be detected without having to use complex models. Are we really trying to detect sarcasm? Or are we trying to use complex models to detect sarcasm? These are some key questions I can ask myself now having read their work and their results which are outstanding, after a 10 fold cross validation, however the question still arises, what they select as baseline? They call it “State of the art” but never really talk anything about it.

Conclusion

In conclusion, I can say we are headed in the right direction to try and use Sentiment of text as aid for Sarcasm detection.

The quantity of data that we use right now, is way out of proportion in terms of what actual authors with significant results had used. It is totally unnecessary and waste of computational resources of having such large dataset, which can be rather used for additional testing, and model evaluation but not training.

The idea of us using Transformers can be challenged. However, the best case to detect sentiment out there, theoretically leans towards using transformers trained for this specific purpose.

I shall experiment with some transformers to try and determine the best case for our purpose of feature engineering and then use that to create the needed dataset. As data is foundational.

References

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