COMP4420 Project Proposal: Sarcasm Detection

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1 Introduction

Sarcasm is a feature of natural language that is notoriously difficult to define and identify in both the spoken and written word. The assumption that a statement will be recognized as sarcastic is typically contingent upon the listener/reader knowing some outside piece of contextual information beforehand. However, this external information isn't always known, and even when it is, the relationship between it and the statement at hand may not always be clear. When this happens, the meaning can be obscured as a result, often leading to avoidable scenarios involving miscommunication.

Recognizing sarcasm typically involves picking up on subtle cues and nuance that can be difficult to identify. This can often pose a challenge for populations who encounter greater difficulty when processing certain aspects of a language. For example, someone trying to interpret a language they don't speak natively will likely have to expend more mental effort to parse out meaning from words, which in turn makes it more difficult to pick up on nuance, including sarcasm. Being unfamiliar with the cultural norms, idioms, etc. that inform the established meaning of the locally spoken language can also be a source of confusion. In addition, many neurodivergent people, in particular those with autism, can struggle to recognize and/or communicate certain social cues in conversation due to differences between their cognitive experience of language and what is expected of them.

Finally, there are unique challenges faced in detecting sarcasm in the written word. It is often possible in practice to infer a statement is sarcastic, even without necessarily having the context to understand *why* by listening to changes in the tone of the speaker. However, when translated into the written word, some or all of this information is lost, making sarcasm even more difficult to detect when only text is given. With the Internet now being extremely important to modern infrastructure, and with text being the predominant medium for online communication, this problem has become increasingly apparent over the years. This project shall explore and contrast different approaches to disambiguating sarcasm by applying concepts from the fields of computational linguistics and machine learning.

2   Dataset

The dataset used will be a collection of tagged newspaper headlines [1].

3   Evaluation Method

Since the dataset was created in 2016, during a period of political turmoil, there may be some bias in the data. It will be interesting to see what words have the highest correlation with a sarcastic headline. Additionally, news headlines usually have a lot of proper nouns, so it may help to use named entity recognition when encoding the headlines.

Sentiment analysis is a core natural language processing task so there is a lot of data available on what types of models work. We plan on using several for this project. Naive Bayes classifiers are lightweight models that have traditionally been used in sentiment analysis. Deep averaging networks are able to leverage the universal approximation properties of neural networks, but are lightweight since they don't capture context. In recent years, recurrent neural networks have gained popularity due to their ability to capture context with the attention mechanism. Since news headlines are often one or two sentences, there is not much need to capture long distance dependencies.

Since the task is a binary classification task, precision, recall, and F1 are good metrics to use. Accuracy will also be used to compare findings to results from Misra et al. [1].

References

[1] Rishabh Misra and Prahal Arora. "Sarcasm Detection using News Headlines Dataset". In: *AI Open* 4 (2023), pp. 13–18. ISSN: 2666-6510. DOI: https://doi.org/10.1016/j.aiopen.2023.01.001. URL: https://www.sciencedirect.com/science/article/pii/S2666651023000013.