

Sarcasm Detection in Natural Language Processing Applied to English Text

Speech and Language Processing

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 - What is sarcasm?
 - Sarcasm in NLP
 - Our solution
- Preprocessing
- Training and Evaluation
- Conclusion

What is sarcasm? How to detect it using NLP techniques? How is the current state of the art on this subject?

Introduction



What is sarcasm?



- According to the Cambridge Dictionary:

Meaning of **sarcasm** in English

f t

sarcasm

noun [U]

UK  /ˈsɑː.kæz.əm/ US  /ˈsɑːr.kæz.əm/

[Add to word list](#)

the use of remarks that clearly mean the opposite of what they say, made in order to hurt someone's feelings or to criticize something in a humorous way:

- "You have been working hard," he said with **heavy** sarcasm, as he looked at the empty page.

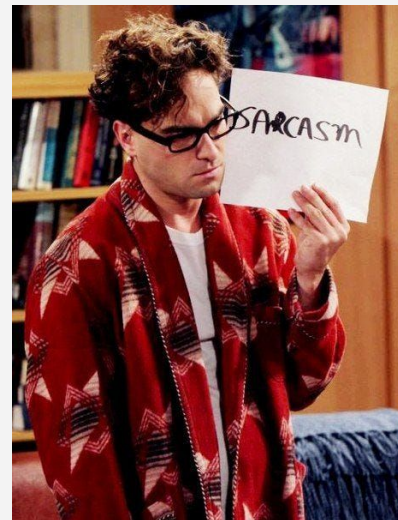
What about sarcasm in NLP?

- Several approaches are utilised in NLP to address sarcasm detection:
 - Context Analysis
 - Sentiment Analysis
 - Pragmatic Analysis
 - Lexical and Syntactic Analysis
 - And more...



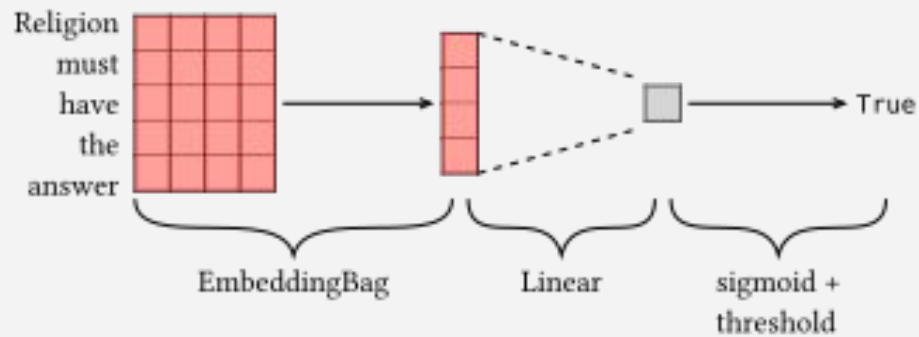
What are we proposing here?

- Based on [7], we want to explore a voting system
 - Binary output
 - True: the input is sarcastic
 - False: the input is non-sarcastic
 - Models
 - 1st approach: Non-contextualised sentence analysis
 - 2nd approach: Contextualised sentence analysis
 - 3rd approach: Contextualised contrast analysis



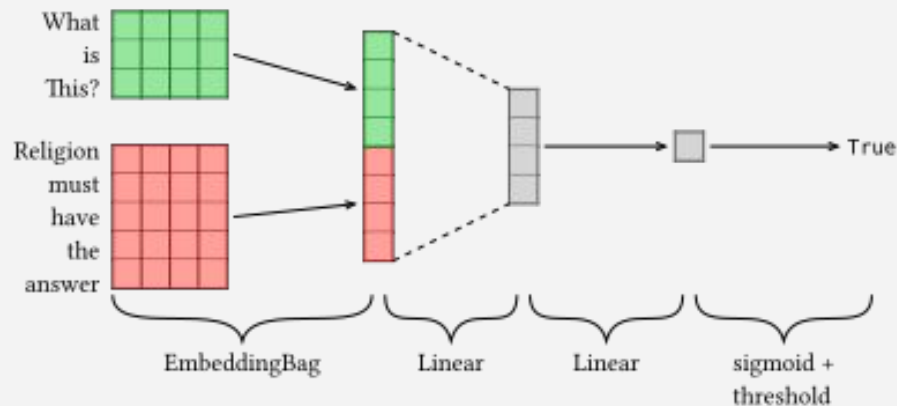
Models - 1st approach

- Taking into account only a non-contextualised sentence
 - Binary output
 - True: the input is sarcastic
 - False: the input is non-sarcastic
 - Test accuracy of 65.2%



Models - 2nd approach

- Taking into account the initial comment and the remark (situation and sentence)
 - Binary output
 - True: the input is sarcastic
 - False: the input is non-sarcastic
 - Test accuracy of 60.7%



Models - 3rd approach

- Based on [6], we explored the contrast between situation and remark
 - Valence Aware Dictionary and sEntiment Reasoner (VADER)
 - Negative Situation + Positive Remark: the input is sarcastic
 - Otherwise: the input is non-sarcastic
 - Test accuracy of 50.4%



Where did the data come from?
Why wasn't it immediately
usable? How did we use it?

Preprocessing

2

Where did the data come from?

- Self-Annotated Reddit Corpus (SARC) [1]

Why wasn't the data immediately usable?

- Huge dataset
 - > 20GB when loaded with pandas

Why wasn't the data immediately usable?

- Huge dataset
- Strange formatting

```
7uaac|c07fd66 c07fjge|1 0
7u896|c07f3md c07f3ls|1 0
7zh4a|c07tw3b c07tw7x|0 1
7zgc5|c07twjg c07u16m|1 0
7zp51 c07uja7 c07umjb|c07unti c07unuf|0 1
80bas c07w7ly|c07wa3d c07wdt8|0 1
```

How did we use the data?

```
{"7u4r6": {"text": "Up  
vote For Simultaneous  
\"Million Person\" Mar  
ches on Wall Street An  
d D.C.", "author": "[de  
leted]", "score": 48, "u  
ps": 104, "downs": 56, "  
date": "2009-02", "crea  
ted_utc": 1233540251, "  
subreddit": "Economics
```

```
7uaac|c07fd66 c07fjge|1 0  
7u896|c07f3md c07f3ls|1 0  
7visa|c07jcz3 c07it38|0 1  
7vq9q|c07jfvv c07jy05|1 0  
7xdys|c07o37s c07o350|1 0  
7xvrx|c07pkib c07ph11|1 0  
7zh4a|c07tw3b c07tw7x|0 1  
7zgc5|c07twjg c07u16m|1 0  
7zp51 c07uja7 c07umjb|c0...  
80bas c07w71y|c07wa3d c0...
```

How did we use the data?

```
,label,text_parent,text_post
0,1,"I've been searching for th...,Religion must have...
1,0,"I've been searching for th...,"It's obviously tr...
2,1,"Michael Phelps Apologizes ...,"Wow...he smoked po...
3,0,"Michael Phelps Apologizes ...,"Wow, his girlfrie...
4,0,Utah wants to create a data...,I think the govern...
5,1,Utah wants to create a data...,Another idea from ...
6,1,"The Six Million Dead Jews o...", "Oh right, *both* ...
7,0,"The Six Million Dead Jews o...", "i know this seems...
8,1,WSJ begins the Jeb Bush cam...,Good luck with that.
```

How was our model trained?
How did we verify its results
were correct?

Training and Evaluation

How were our models trained?

- Huge dataset
 - > 20GB when loaded with pandas

How did we evaluate the results?

- Independent evaluation dataset

Some practical results. What we did.
What worked. What didn't work. If we had
more time...

Conclusion



Some Practical Results

Situation 0 : When something bad happens

Remark: That's just what I needed today!

M1: False

M2: True

M3: True

Voting Result: True

- Test accuracy
 - M1 = 65.2%
 - M2 = 60.7%
 - M3 = 50.4%

Some Practical Results

Situation 1 : When you expected something to happen, especially after warning someone about it

Remark: Well, what a surprise.

M1: True

M2: True

M3: True

Voting Result: True

- Test accuracy
 - M1 = 65.2%
 - M2 = 60.7%
 - M3 = 50.4%

Some Practical Results

Situation 2 : Chart showing how people's political views change as they age, based on 172,853 people's self-proclaimed political views on OKcupid.

Remark: Good lord... my chart is the exact opposite of this.

M1: False

M2: False

M3: True

Voting Result: False

- Test accuracy
 - M1 = 65.2%
 - M2 = 60.7%
 - M3 = 50.4%

Conclusion

- Studied
 - ML concepts
 - Text mining theory
 - PyTorch framework
- Developed
 - 3 approaches for sarcasm recognition
 - Non contextualised sentences
 - Contextualised sentences
 - Sentiment contrast
 - Voting system based on the Condorcet's jury theorem

Future work

- Condorcet's jury theorem
 - Use more reliable voters
- Decrease the system complexity
 - Maybe through the loss function
 - Important for embedded applications
- Apply Named Entity Recognition (NER)
- Expand the idea to speech analysis

References

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