
Detecting Condensation

DSI 17 Capstone Project - Sarah Lim Kai Hua

Project Goals

- Identify what condensation is
 - Not much existing research
 - Difficult to identify
 - Make a model that can detect it
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Stakeholders

- Social media platforms trying to detect condescension
 - Social scientists analyzing how people converse
 - People trying to not be condescending
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Data Source

- 5200 Posts/Reply pairs from Reddit (50/50 split)
- Labelled by people (on Amazon)
- Corpus created by researchers in order to help research into condescension

```
@inproceedings{wang2019talkdown,  
  author = {Wang, Zijian and Potts, Christopher}  
  title = {{TalkDown}: A Corpus for Condescension Detection in Context},  
  booktitle = {Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing  
  url = {https://www.aclweb.org/anthology/D19-1385},  
  year = {2019}  
}
```

Exploratory Data Analysis



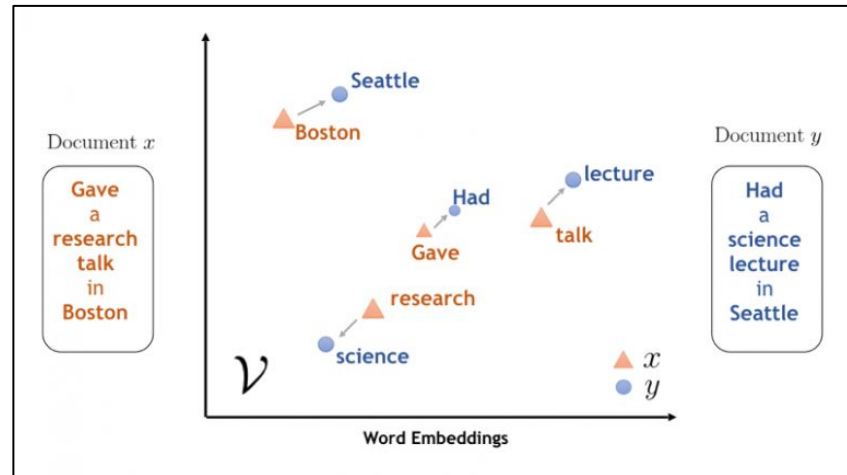
- Best way to classify condescending text is by looking at the reply
 - Most common responses to condescending text are the word “condescending” and swear words.
 - Least condescending words are “don’t mean”, “stay”, “took” (hard to find a pattern here)
- If the original post (not the reply) has the word ‘condescending’, it is **less** likely to be condescending
- Using the reply gives a much higher level of accuracy (0.77)
- Not using reply: 0.57 ROC AUC

Measuring Topic Changes

- Creators of corpus suggest that condescension causes a change in the topic of conversation, so I tried to measure this.
 - How can we determine the topic of a block of text?
 - We can use sentence embeddings
 - BERT is a way of generating these embeddings.
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Word and Sentence Embeddings

- Word embedding: representing words so that similar words have similar representations
- Words are converted into vectors
- Sentence embedding converts sentences into vectors based on their meaning.
- BERT is able to do this (using a pre-trained model)



How does BERT work?



- Neural network trained on a lot of text
- Trained by randomly removing words from a sentence and making the model fill the blanks in.
- It is able to determine the context of a word (by looking at the other words)
- The model also returns a vector (size 768) for sentence embeddings. This is what we will use.



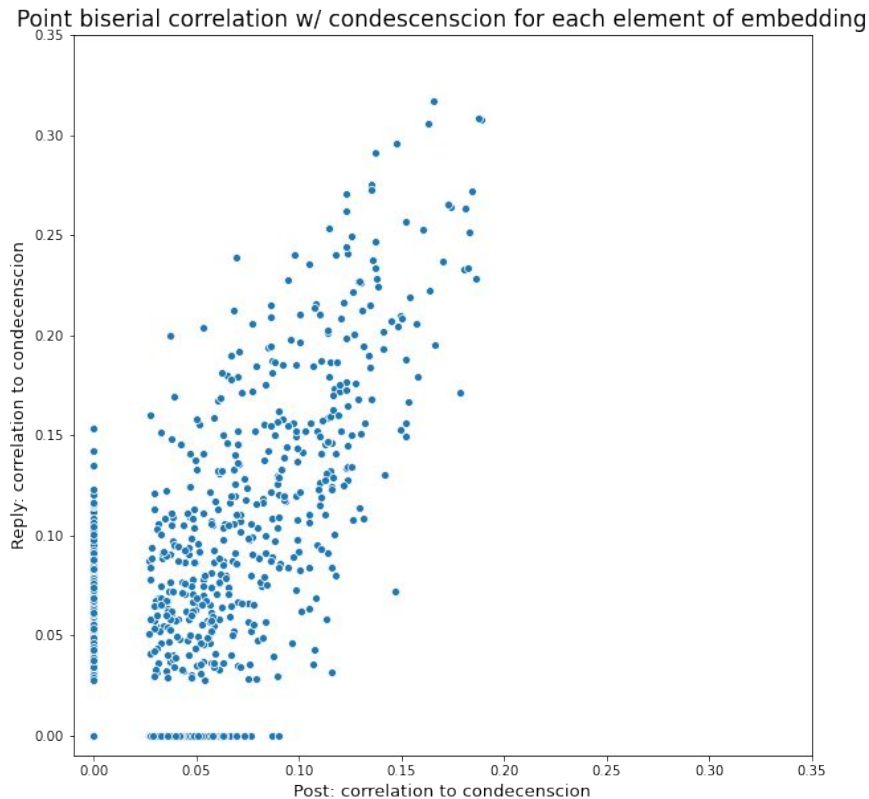
More BERT (if needed)

- Based on 'transformer' model by Google
 - For each word, model looks at all other words in the sentence (like a CNN), and creates an embedding. This means the words are more accurately represented, like so:
 - "I sat on a **log**"
 - "The **log** book was on the shelf" (different embedding)
 - By stacking these transformers we can get BERT
 - In addition, there is a hidden 'word' (token) at the start of every sentence that has the embeddings of the entire sentence. This is the 'sentence embedding'
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Condensation is a cycle

- Embeddings have size 768. The exact meaning of each element is not easily explainable but we can still use it.
- For each of the 768 embeddings, how well does it correlate with condensation?
 - We can use a statistical test to check this
 - Plot the results of this statistical test
- Conclusion: replies to condensing posts exhibit condensing behavior

2. Are **also** highly correlated with condensation in the reply (in fact, even more correlated, since the slope is > 1)

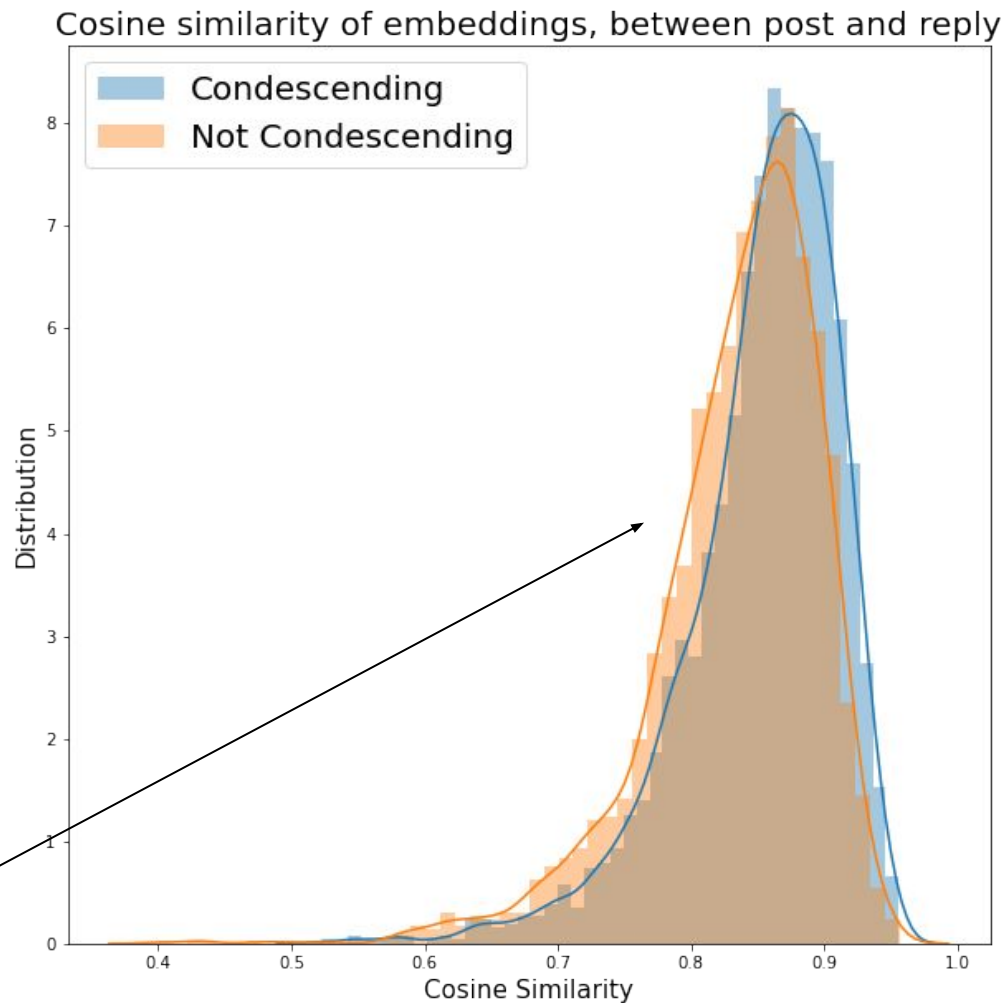


1. Embeddings highly correlated with condensation in posts

Condescension changes the topic

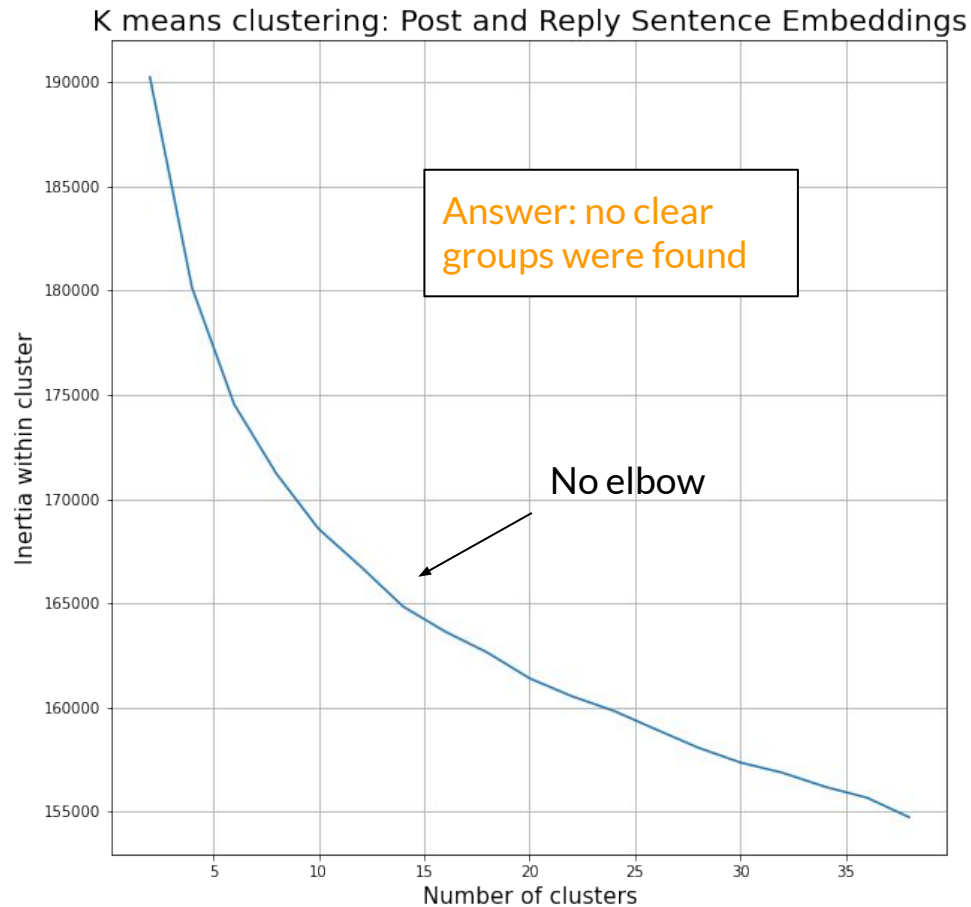
- As mentioned earlier the corpus' authors believe that condescension changes the topic of the conversation
- To plot the similarity between 2 things, we can use **cosine similarity**
- Condescending posts have more similarity (?)

Condescending posts tend to lock in the topic



Types of Condescension

- People reply to condescension with:
 - The word “condescending”
 - Insults/swear words
- Can this reply be grouped?
- In addition, can we group condescending text into different categories?
 - Perhaps there are different ways of being condescending
- Apply unsupervised learning to the sentence embeddings



Predicting Condensation Using Embeddings

- Basically, take these embeddings and stick them into various models
 - ROC AUC for models:
 - Logistic Regression: 0.78
 - Random Forest: 0.73
 - Neural net: 0.76
 - It's quite close and probably comes down to tuning hyperparameters more precisely. Logistic regression is fast so that seems like a good choice.
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BERT again



- We would still like to create a model that can detect condescension directly
 - Basic models don't work very well without the reply
 - Most findings still have to do with reply, or interaction between post and reply
 - Reply is not always available, or long enough to be useful
 - Directly apply a NLP model to the **post only**
 - Use BERT again, but this time use transfer learning
 - This step is at the end since it loses most explainability
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0.7
(AUC ROC)

- This only uses the post, not the reply
 - Model has somewhat high false negatives (36%)
 - Earlier models (not BERT) had ~0.57 AUC ROC
 - Still not accurate enough to reliably replace a human
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Conclusions

- Condensing text is still difficult to classify
 - Models perform **better with access to the reply** (0.78 vs 0.7 AUC ROC)
 - Condensing speech is **replied to with more condensation**
 - People who are condensing tend to **change the topic** of the conversation
 - The most condensing feature is when someone replies with 'condensing'
 - However, "condensing" (when used in the **post**) is very related to being **not** condensing
 - I had a very hard time spelling 'condensation'
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Conclusions (for stakeholders)

- Social platform moderators: responses to condescension are also condescending, at least to our model
 - If they are taking action (e.g. issuing warnings) against condescending people, should the responses be included in this group too?
 - For social scientists: it might be worth looking at sentence embeddings
 - For longer chains of conversations
 - For other types of behavior that they might want to study (e.g. misinformation)
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Further steps

- Corpus only consists of one post and 1 reply
 - Since condescension leads to more condescension, it may be worth analyzing entire chains of comments
 - Can also analyze how different types of replies to condescension affect the conversation (e.g. does being nice help steer conversation back on track?)
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 - Requires labelled data for longer chains, which is why I didn't do it
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Q & A

(Also this is the last presentation so it's finally over)
