Gender-Inclusive Language in Tweets about Menstruation

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Background and Research Questions

Gender-inclusive language, or language that does not discriminate against a particular sex, social gender or gender identity, and does not perpetuate gender stereotypes (United Nations, 2017), is one of those areas, especially regarding female reproductive organs.

Often times, people refer to menstruation as a problem “only women” face, reinforcing the **false equivalency between women and people who menstruate**. Discussions surrounding menstruation targeted mainly toward cis-women can be exclusive and possibly even discriminatory and dangerous (Anagnostou, 2021). Thus, **using gender-inclusive language while talking about menstruation will ensure that everyone can safely access the information they need..**

This study utilizes two multinomial naive bayes classifiers and two classification trees to categorize tweets as gender-inclusive or exclusive or neither in order to answer these particular research questions:

1. **What kind of conversations are Twitter users having about menstruation?**
2. **Do Twitter users use gender-inclusive language while talking about menstruation?**
3. **Can a classifier be used to determine whether or not a tweet is inclusive?**

The driving hypothesis for this research is that **while some Twitter users will likely use gender-inclusive language, more users will use gender-exclusive language or neither gender-inclusive nor exclusive language when talking about menstruation**.

Data

Description

The Twitter API was used to collect tweets from November 10, 2020 through November 10, 2022 that contained specific keywords. The final raw dataset contained **301,153 tweets**. Each tweet had information about the tweet id, author id, the tweet's text and date, the number of times the tweet was retweeted and the number of likes the tweet received.

This dataset was then split into **three separate datasets**, one that was used for **training (n = 280)**, one for **testing (n = 56)** and one that contained the **rest of the tweets (n = 300,817)**, using cluster sampling.

Cleaning

A new variable, **text_clean**, was added to each dataset containing a “cleaned” version of the tweet without emojis, hashtags, mentions, links, punctuations and non-alphanumeric characters, and was all lowercase and stemmed.

	text	label	tweet_id	author_id	date	retweet_count	reply_count	like_count	text_clean
0	These resources are awesome. Today is #WorldMenstrualHygieneDay - approximately half of the population experiences menstruation, and more than 2/5 of them report struggling to afford period products. There's a sharp racial divide and the pandemic has only made it worse. https://t.co/3bHTPAf7jJ	inclusive	[redacted]	[redacted]	2021-05-28	0	0	0	resourc awesom today approxim half popul experi menstruat 2 5 them report struggl afford period product sharp racial divid pandem made wors
1	Wherein women were not “weakened” during these days and were capable of all activities. \n\nThis worked well and took the stigma out of menstruation - think back when we were kids and how hush we were about “Aunt Flo” (or cultural equivalent) vs. how open we are now	exclusive	[redacted]	[redacted]	2022-02-26	0	1	0	wherein women were weaken day capabl activ work well took stigma menstruat think back kid hush aunt flo cultur equival vs open

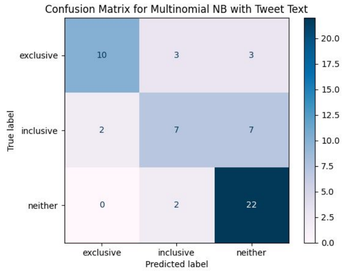
Methods

First, the training and testing data was **labeled as either gender-inclusive, exclusive or neither** based on specific guidelines that operationalized the meaning of “gender- inclusive” and “gender-exclusive.”

The cleaned text and labels from the training dataset (n = 280) were then fed into two **multinomial Naive Bayes** classification models and two **classification trees**. The accuracies, sensitivities and specificities of each model were used to determine the best model, the **Classification Tree with Text model**, which was then used to label the full tweet corpus.

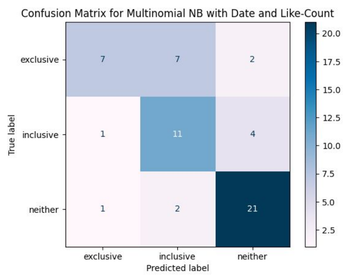
Classifiers

Naive Bayes with Text



- *Accuracy*: 0.696
- *Sensitivity*:
  - Exclusive: 0.625
  - Inclusive: 0.4375
  - Neither: 0.917
- *Specificity*:
  - Exclusive: 0.952
  - Inclusive: 0.89
  - Neither: 0.762

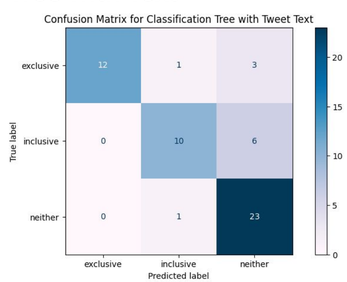
Naive Bayes with Text, Date, Likes



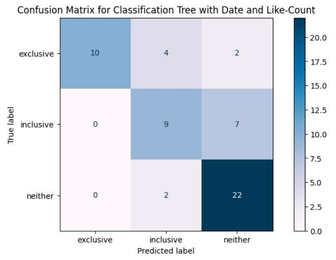
- *Accuracy*: 0.696
- *Sensitivity*:
  - Exclusive: 0.4375
  - **Inclusive: 0.6875****
  - Neither: 0.875
- *Specificity*:
  - Exclusive: 0.952
  - Inclusive: 0.816
  - **Neither: 0.842****

Classification Tree with Text

- ***Accuracy*: 0.804****
- *Sensitivity*:
  - **Exclusive: 0.75****
  - Inclusive: 0.625
  - **Neither: 0.958****
- *Specificity*:
  - **Exclusive: 1.0****
  - **Inclusive: 0.952****
  - Neither: 0.780



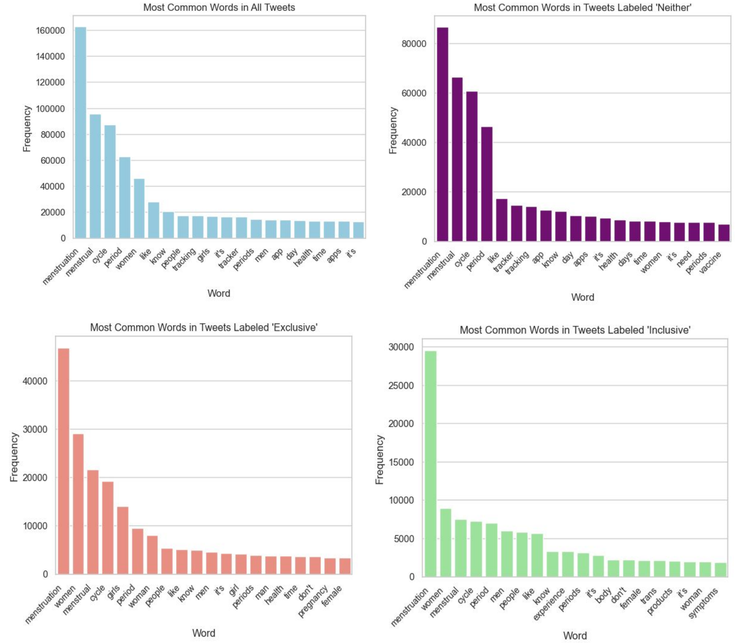
Classification Tree with Text, Date, Likes



- Accuracy: 0.732
- Sensitivity:
  - Exclusive: 0.625
  - Inclusive: 0.5625
  - Neither: 0.917
- Specificity:
  - Exclusive: 1.0**
  - Inclusive: 0.870
  - Neither: 0.780

When the chosen classifier was applied to the full corpus of 300,817 tweets, 12.5% or 37,590 tweets used gender-inclusive language and 24.4.6% or 73,266 tweets used gender-exclusive language.

Results and Conclusions



References

“Gender-inclusive communication,” *United Nations*, 2017. [Online]. Available: https://www.un.org/en/gender-inclusive-language/#:~:text=Using%20gender%2Dinclusive%20language%20means,does%20not%20perpetuate%20gender%20stereotypes. [Accessed: 19-Dec-2022].

J. Anagnostou, “How to talk about periods in a more inclusive way,” *Moxie*, 31-Mar-2021. [Online]. Available: https://moxie.com.au/blogs/the-regular/how-to-talk-about-periods-in-a-more-inclusive-way#:~:text=Instead%2C%20you%20could%20use%20language,%22menstrual%20cups%22%2C%20etc. [Accessed: 19-Dec-2022].