



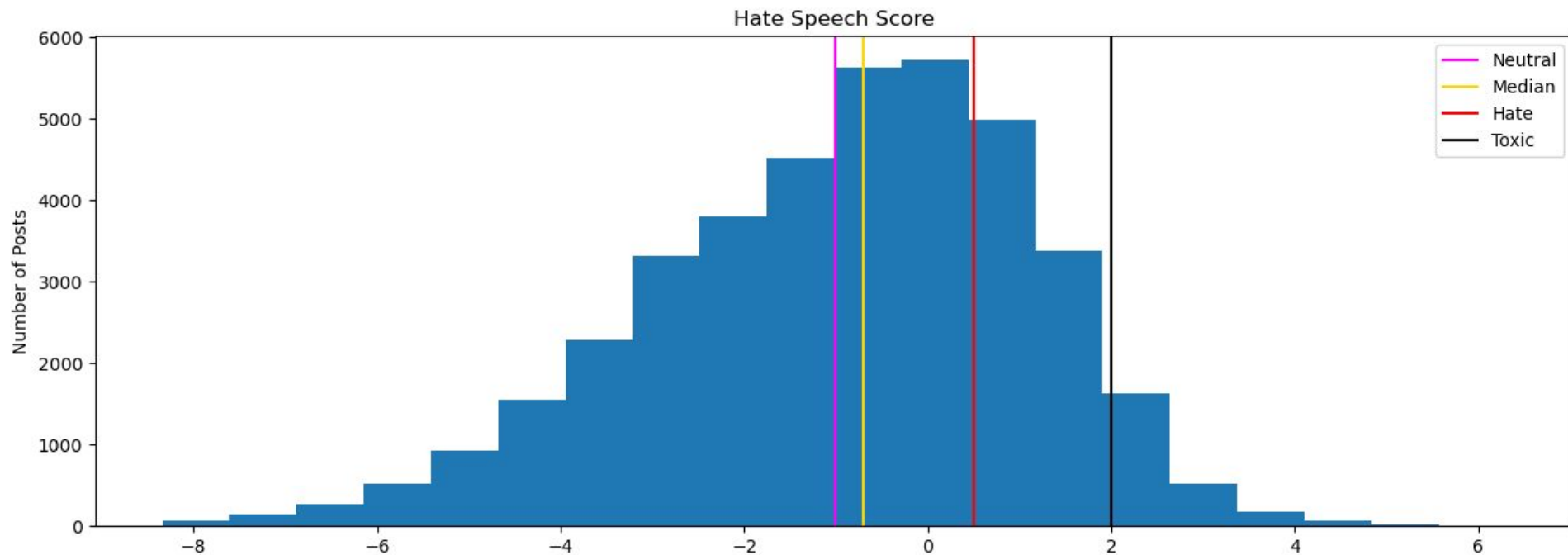
# Malevolence Prevention

Now or Never, A Proposition in Curbing Hate Speech

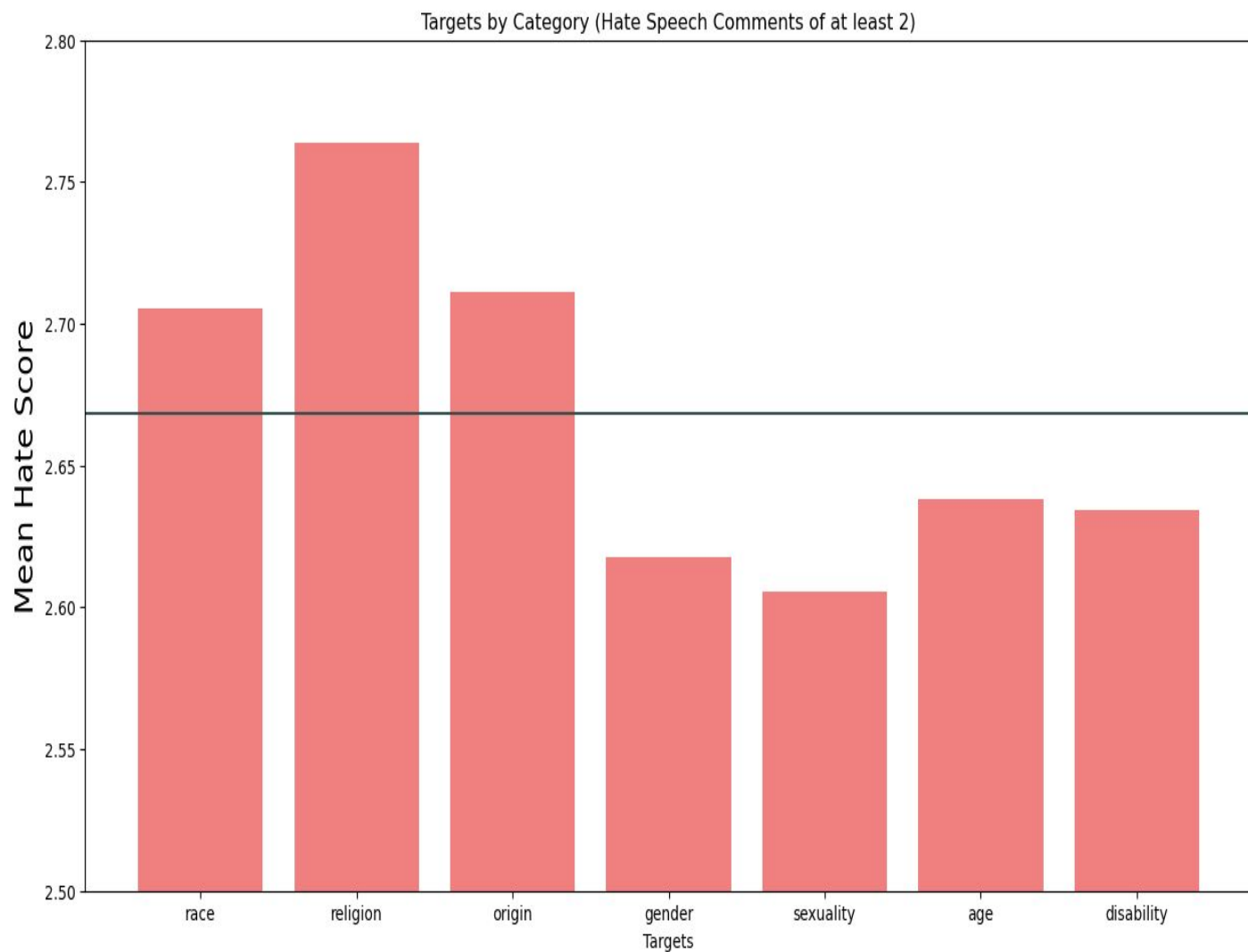
# Problem Statement:

- Hate speech is a malevolent thing that must be monitored, stopped, and demonstrated how terrible it is.
- A local school, unable to read all of their students' social media accounts, reached out to you to make a predictive model to identify different levels of hate speech posts for their staff to focus on.
- Their expectation is to have multiple staff members review the 'toxic' hate speech and speak to the student in front of their parents; 'general' hate speech would just be reviewed by one teacher and talk to the student.
- Data used is from a Berkeley 2020 study, gathered via Twitter, Reddit, and Youtube's APIs.

- Below is the distribution of hate speech scores from Berkeley, with a distribution of comments on the Internet being slightly skewed to the right (mean being  $-.94$ , so approximately at the border between defensive and neutral comments).
- Real life hate speech might vary; our data and project is focused online.

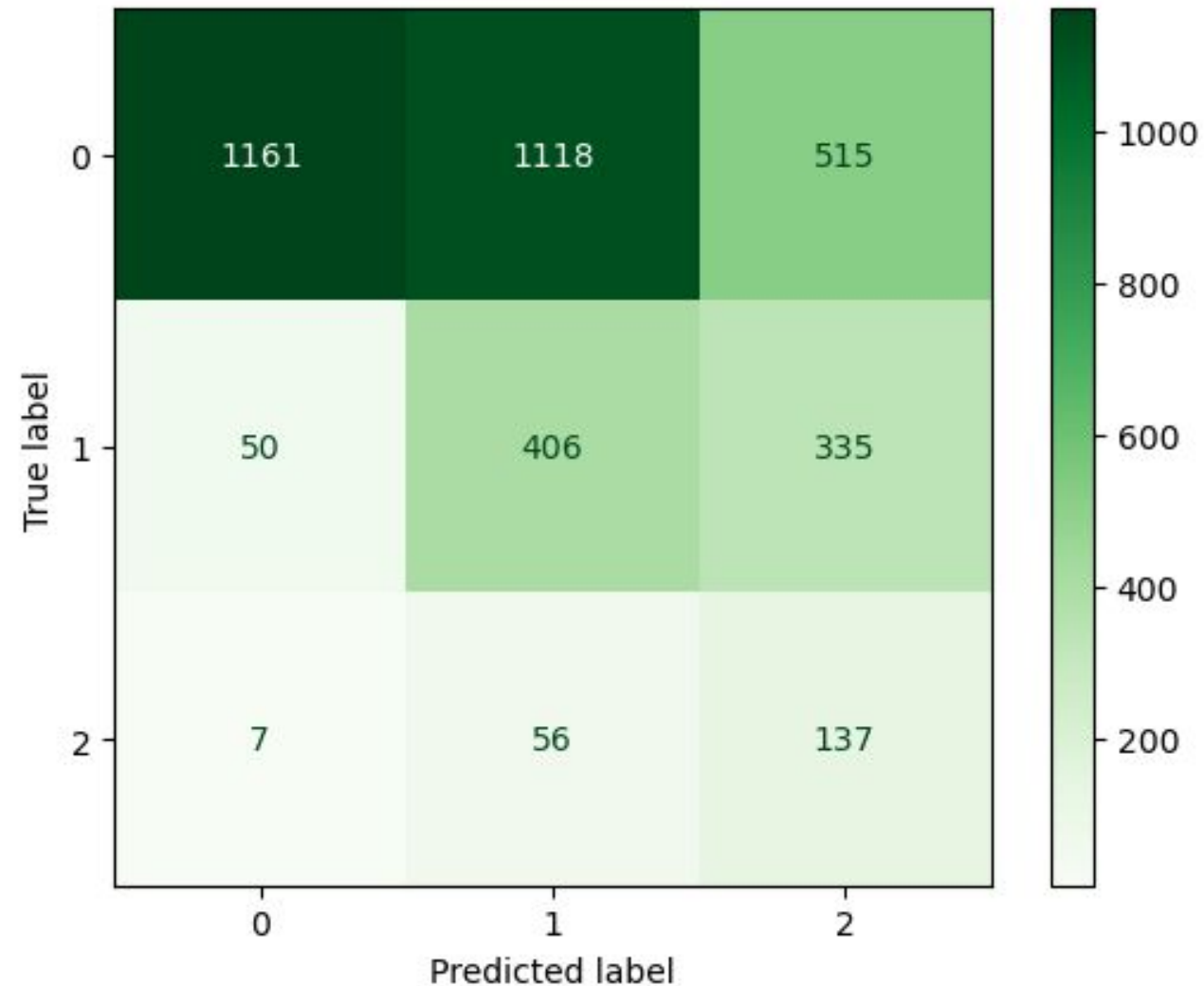


- Relatively, extra care should be focused on race, religion, and origin based-hate speech comments.
- Pragmatically, targets in the 'minority' should be treated more seriously.
- Regarding prevalence: Almost half of all toxic hate speech is gender based.



# Methodology

- The original dataset was condensed and grouped by comment.
- After EDA, a hate speech score of 2 was chosen as the threshold to separate 'normal' from toxic hate speech.
- After cleaning, random replacement was needed to make up for the discrepancy in classes (74, 21, and 5% correspondingly).
- A custom sensitivity-weighted metric was used when grid searching through the many models and combinations of parameters.
- In short, modeling this data was not easy.
- Ultimately, the final model chosen was a TF-IDF Logistic Regression model, with a custom sensitivity of 63% (94% general sensitivity if this would be a mere binary classification).

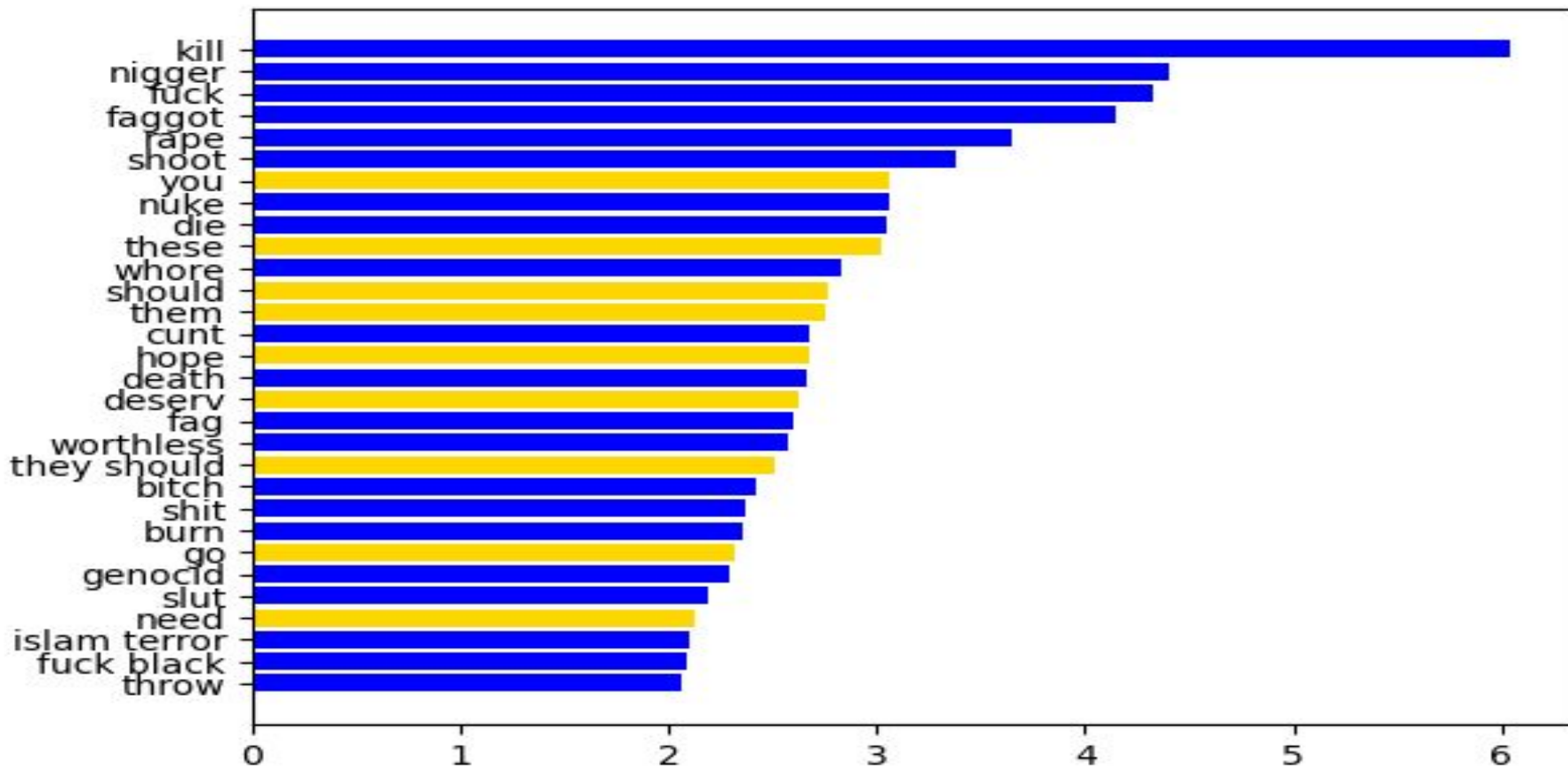


- Despite training on a total of 12k posts and testing on almost 4k, this is the best I could presently manage.
- Although I can say I'm quite pleased with sensitivity, the model clearly overreacts to false positives, resulting in quite a lot propping up in our system, likely the necessary price to stop potential crime.

**WARNING !**

**SOME VIEWERS MAY FIND THE  
FOLLOWING VIDEO DISTURBING  
VIEWER DISCRETION IS ADVISED**

# TF-IDF's 30 Most Frequent Terms of Toxic Hate Speech





# Conclusions

- Afterwards, the model, focusing on individual comments, was applied to a Streamlit application to process social media accounts' posts.
- Upon identifying one significantly confident prediction of a toxic post or three of a 'standard' posts (their respective median prediction confidence, .58 and .94\*), appropriate measures would be taken by the school.
- A sliding scale was added to the system to accommodate for less confident predictions, deducting linearly the thresholds needed to call the teachers' attentions.

# Future Ideas

- Model with SVM and Recurrent Neural Networks as well as any other algorithm that allows for weighted focus.
- Experiment with a fourth class, splitting up defensive and ambiguous comments.
- Discover a way for the application to re-confirm past predictions, lowering the risk of false negatives.
- Construct new targets outside of what was already accounted for, such as body image.
- Explore other features that would not be noticed on a pure textual analysis: Initial post, urls, emojis, etc.
- Get more data!

