Toxic Language Classification:

Cleaning Up Wikipedia

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Disclaimer

This dataset contains text that may be considered profane, vulgar, or offensive.

VIEWER

DISCRETION

ADVISED

Why is this project important?

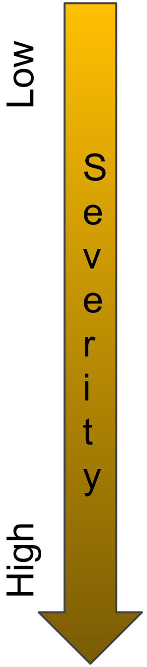
Dataset from Alphabet-sponsored Kaggle Competition to develop tools to “help improve online conversation”

Competition Objective to Identify and classify comments labeled as belonging to one or more of six different “toxic language” categories

In **this presentation** we will conduct preliminary topic analysis on the dataset to draw distinctions amongst the different categories of toxic language

The Six Category “Tags”

Dataset contains multi-tagged comments; “rating” refers to the number tags a comment has received



Toxic. General taboo, rude language

Obscene. Profanity

Insult. Rude, degrading

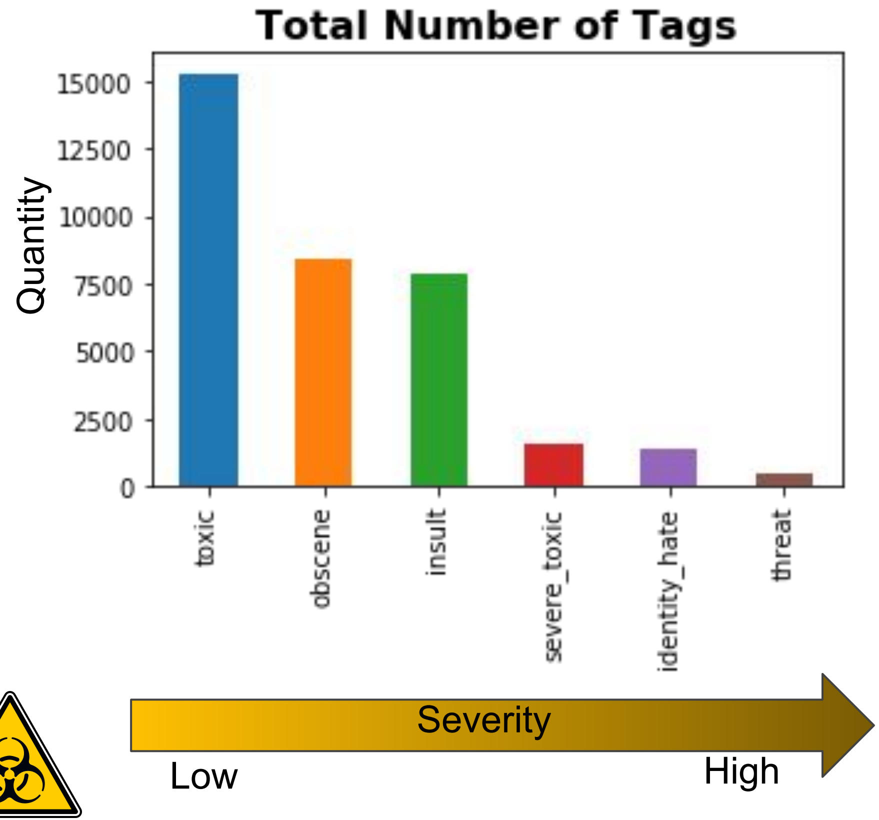
Severe Toxic. Extreme language, statements not classified as Threat or Identity Hate

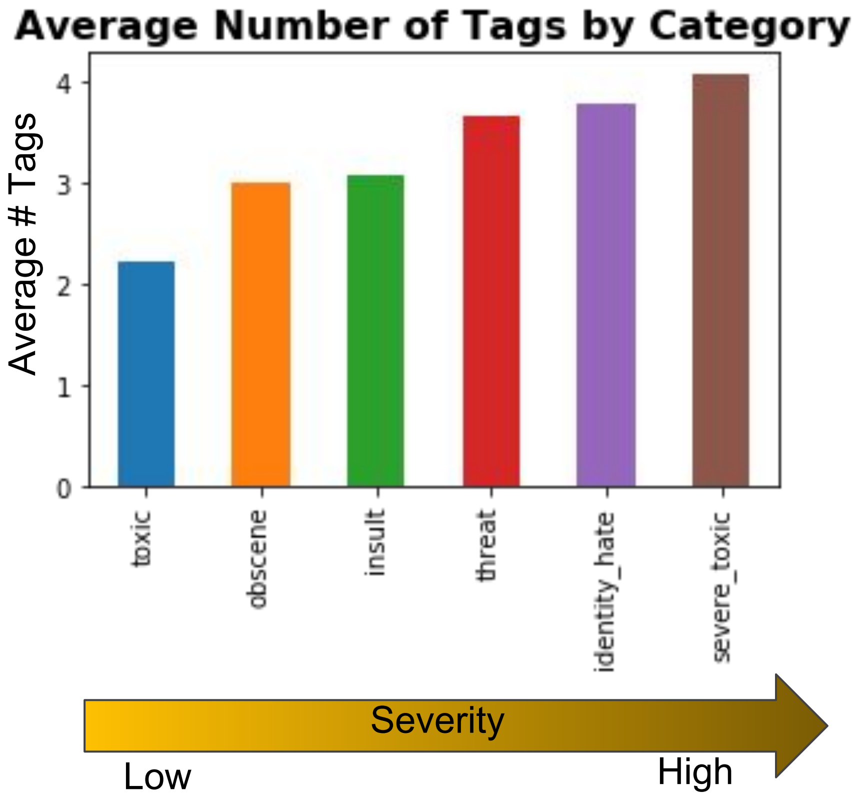
Identity Hate. Attacking race, religion, orientation

Threat. Death wishes, threats

The Six Categories of Toxic Comments

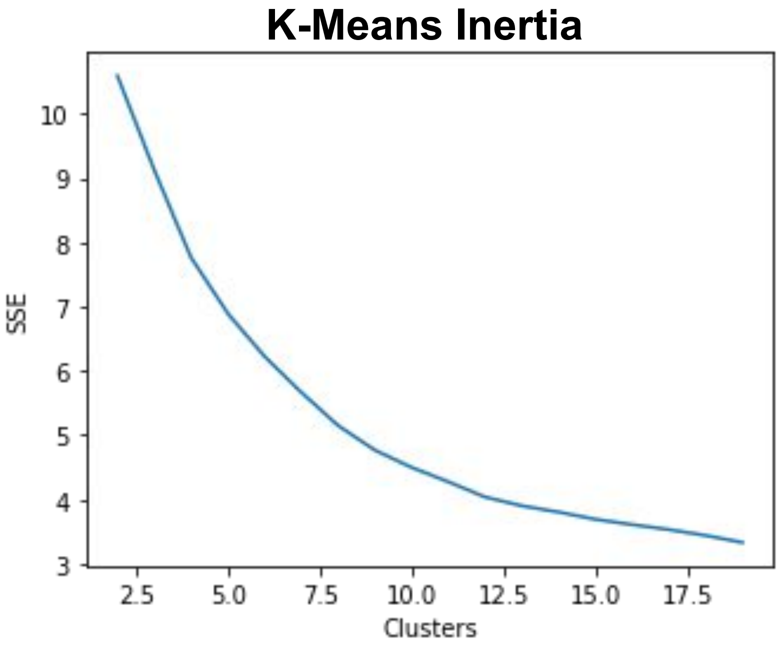
Dataset contains multi-tagged comments; “rating” refers to the number tags a comment has received

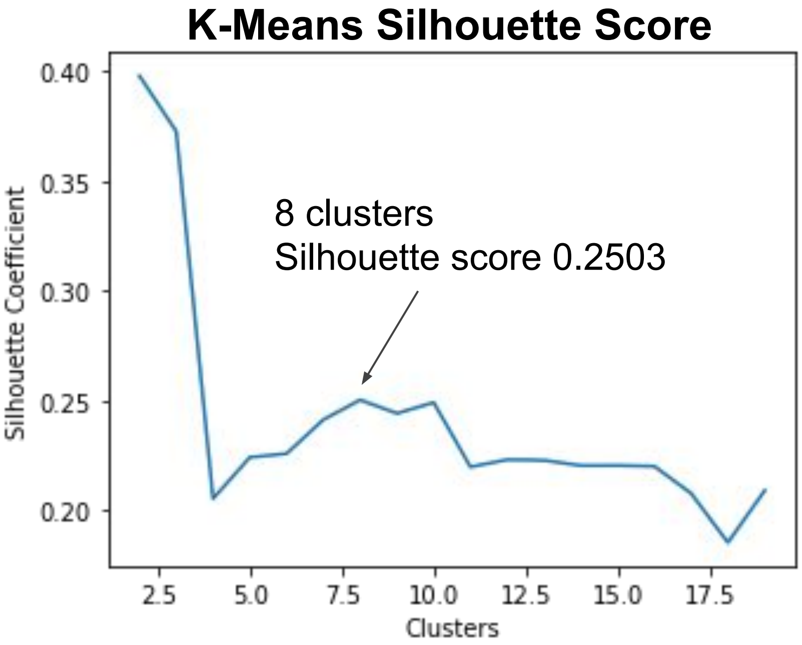




K Means Clustering: Toxic Words (All Rated > 0)

We can see some of the classifications within these clusters



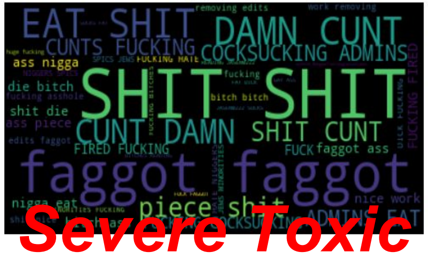


8 clusters
Silhouette score 0.2503

K Means Clustering: Toxic Words (All Rated > 0)

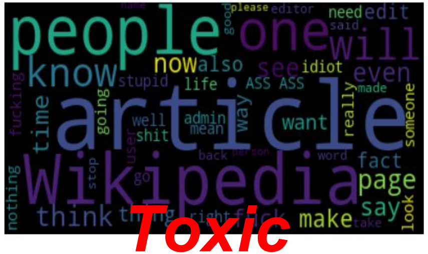
We can see some of the classifications within these clusters

Cluster 0



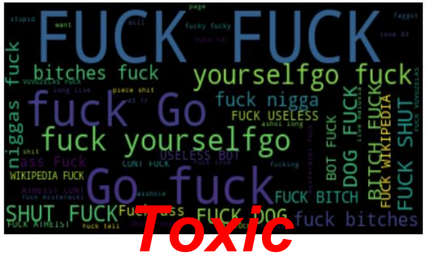
Severe Toxic

Cluster 1



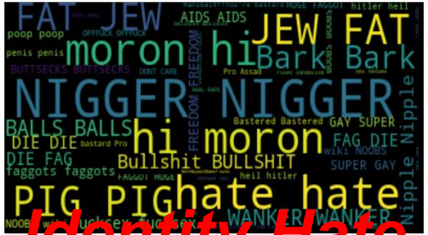
Toxic

Cluster 2



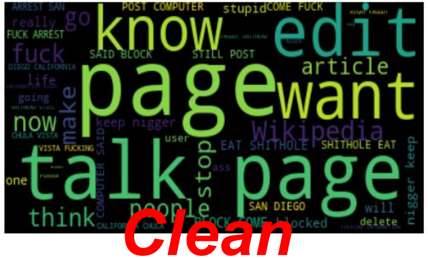
Toxic

Cluster 3



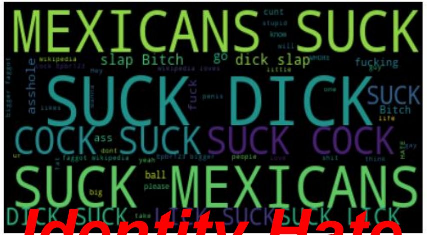
Identity Hate

Cluster 4



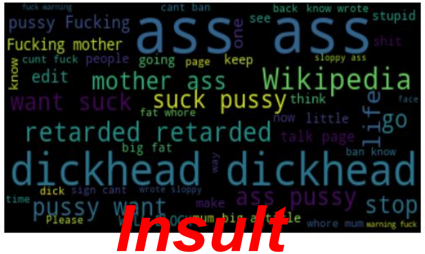
Clean

Cluster 5



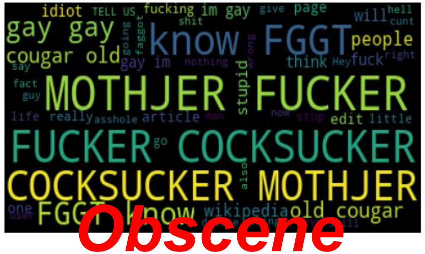
Identity Hate

Cluster 6



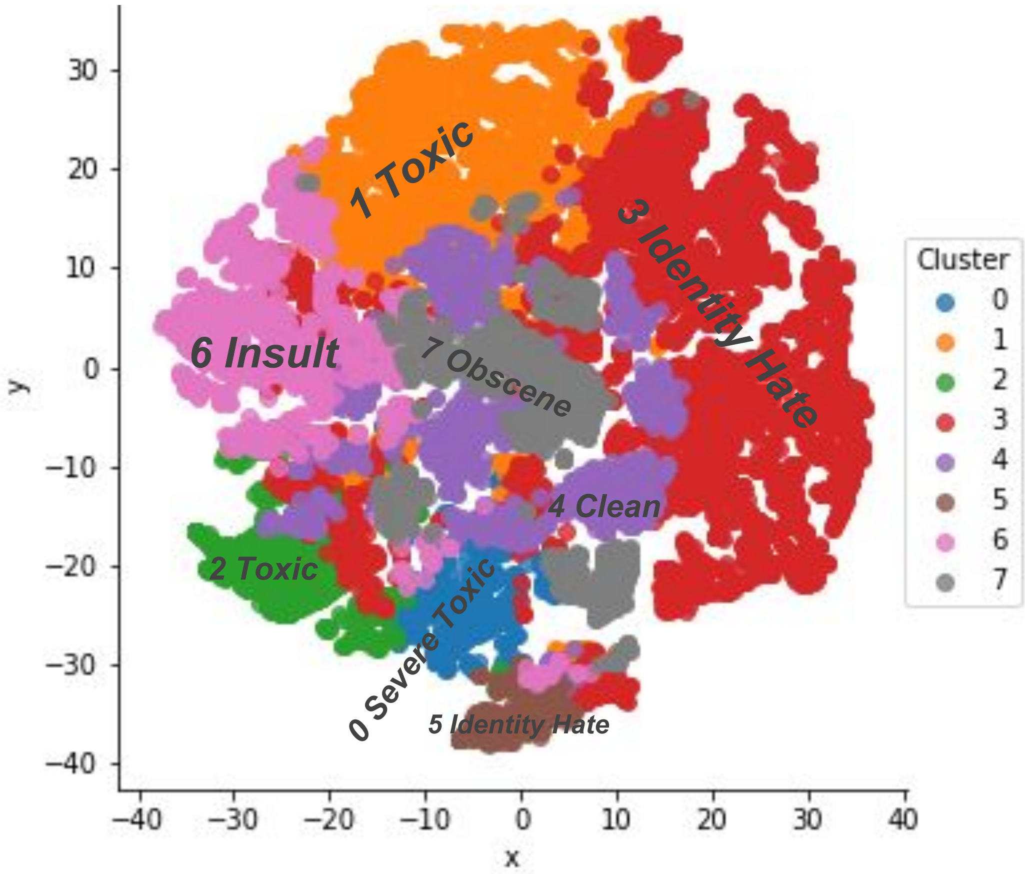
Insult

Cluster 7



Obscene

T-SNE: Toxic Words (All Rated > 0)



Key Takeaways

Different platforms will have different thresholds for “toxic comments”

Approach toxic language from multiple angles:

- General inappropriate language (i.e., “bad words”) may be acceptable on some forums
- Language which threatens or attacks a person’s identity (“identity hate”) does not always use “bad words” and must be recognized in context

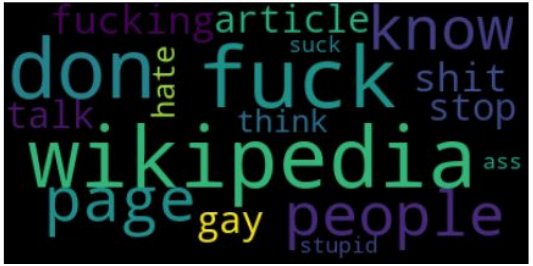
While models today do a reasonable job of identifying these issues, the ultimate decision of appropriateness remains subjective and a challenge for machines to fully grasp!

Questions?

APPENDIX

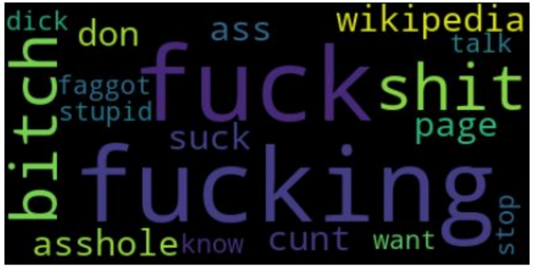
Category Samples

Toxic



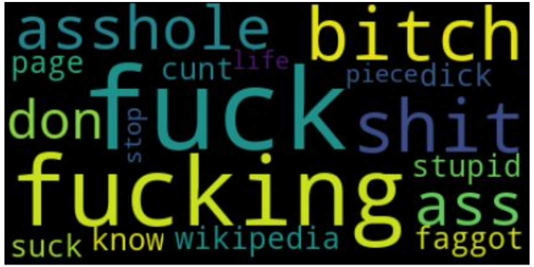
Taboo, rude

Obscene



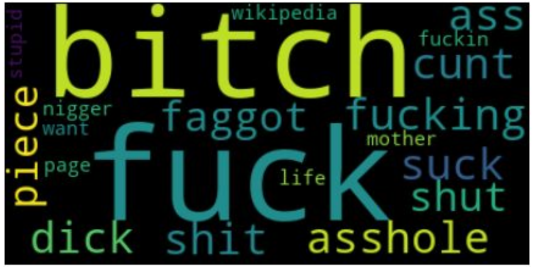
Profanity

Insult



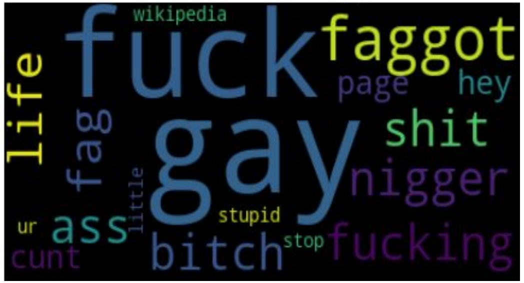
Rude, degrading

Severe Toxic



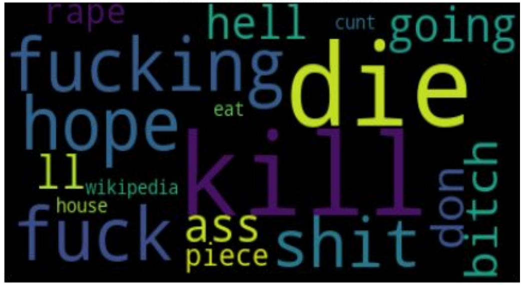
Extreme language

Identity Hate



Attacking race, religion and orientation

Threat



Threats of death

Techniques Utilized

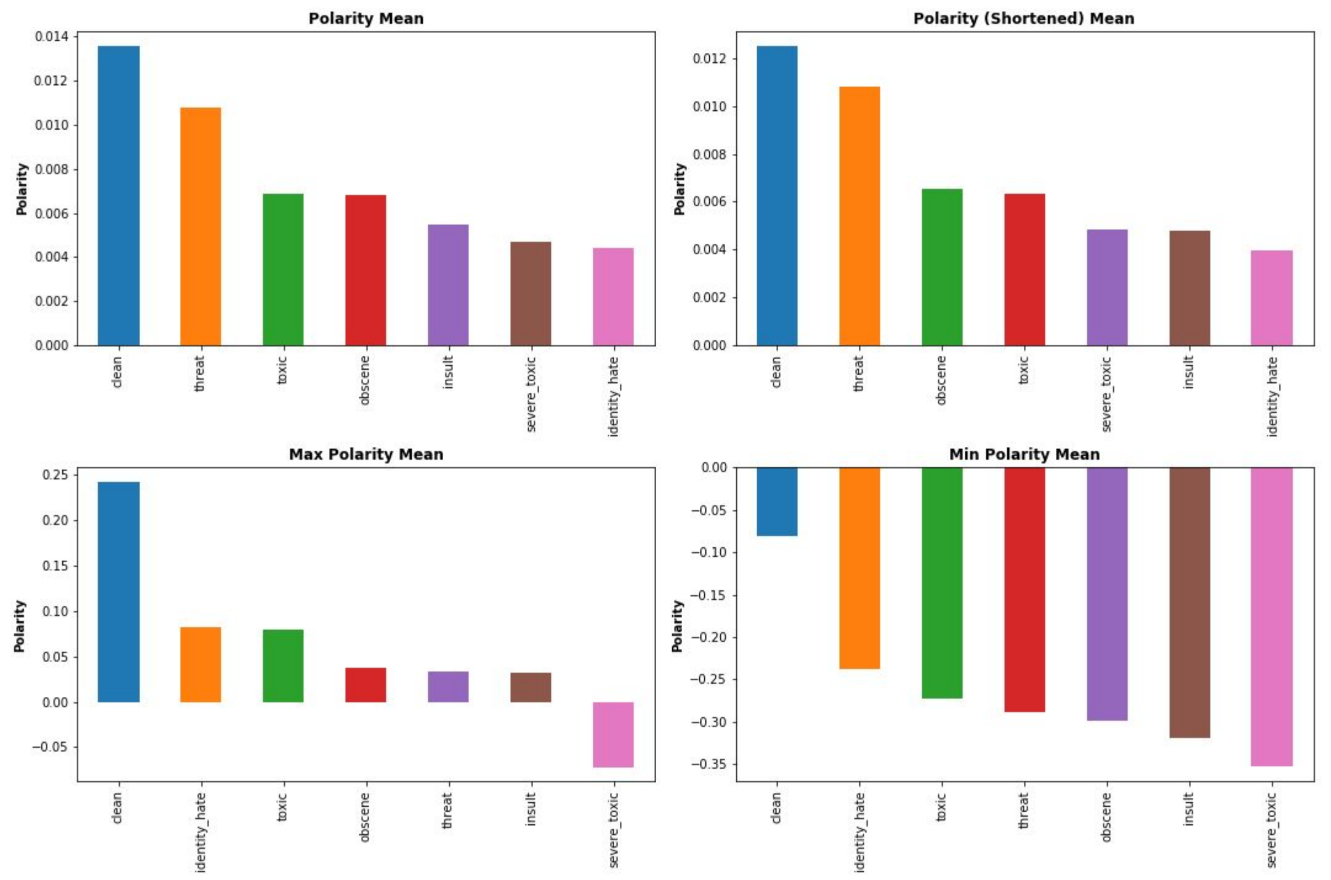
TF-IDF. Used to gauge the word importance within a collection or corpus, increases proportionally to number of times a word appears in the document and is offset by frequency of word in corpus

NMF. Matrix factorized into multiple matrices with no negative elements

K-Means Clustering. Determine optimized number of clusters by silhouette coefficient

T-SNE. Embeds high-dimensional data into low-dimensional scatter plot

Polarity by Category



Polarity Mean

Polarity (Shortened) Mean

Max Polarity Mean

Min Polarity Mean

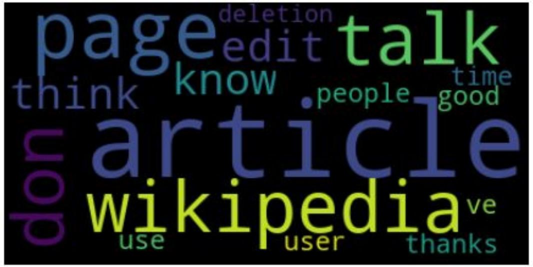
Topic Modeling by Category: TF-IDF/NMF

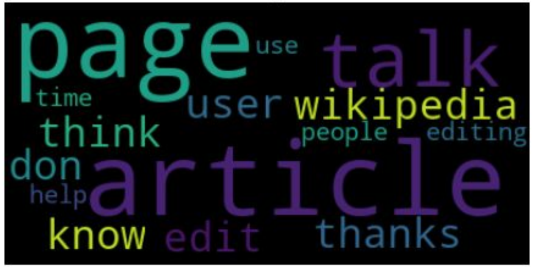
TF-IDF/NMF - Frobenius Norm

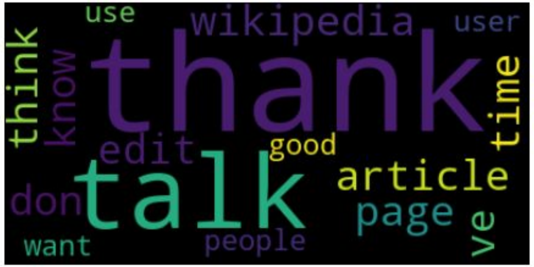
TF-IDF/NMF - Kullback-Leibler Divergence

LDA

Clean

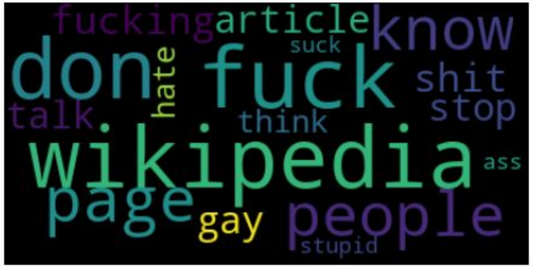


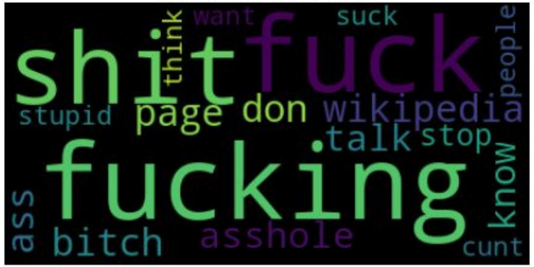


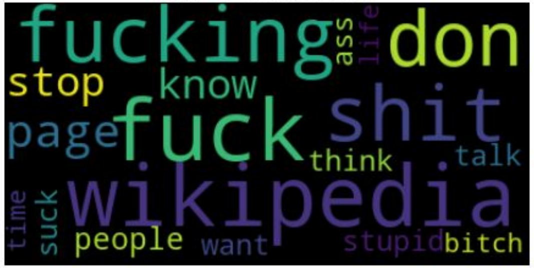


Discussions of article edits

Toxic







Derogatory language

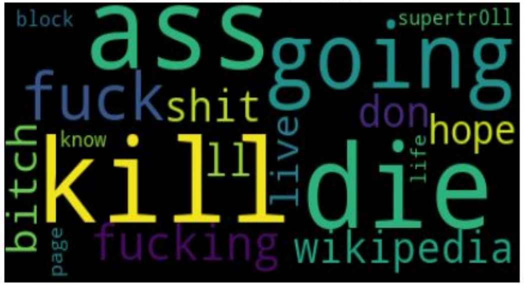
Topic Modeling by Category

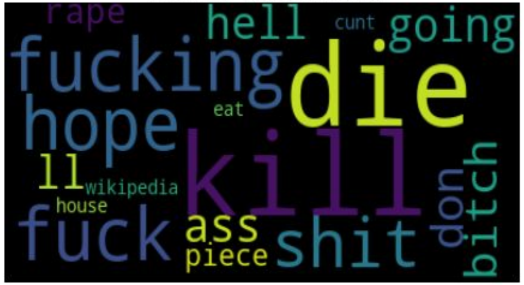
LDA

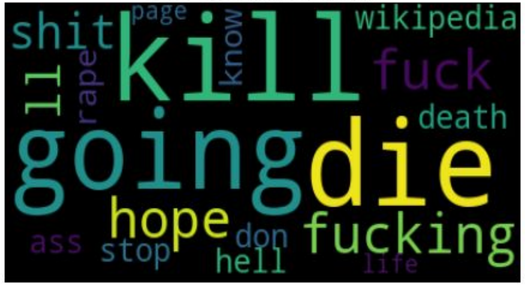
TF-IDF/NMF - Frobenius Norm

TF-IDF/NMF - Kullback-Leibler Divergence

Threat

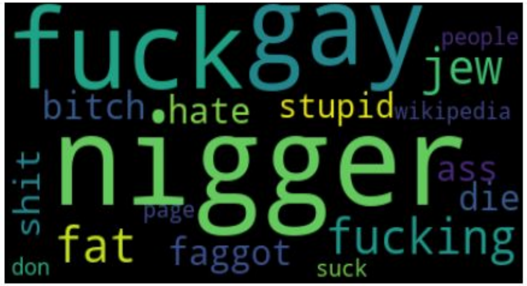


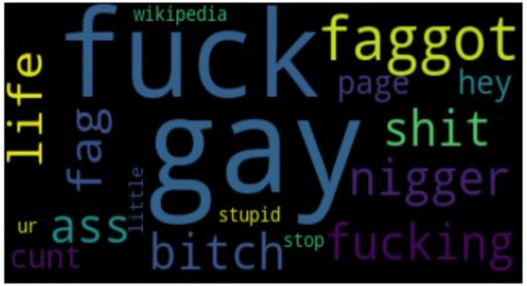


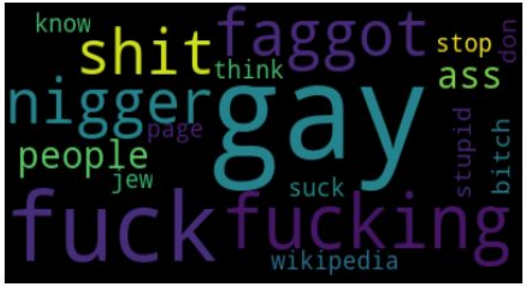


Threats of death

Identity Hate



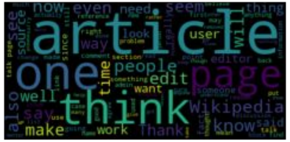




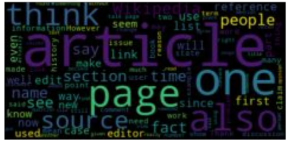
Attacking race, religion and orientation

K Means Clustering: All Words (Toxic + Clean)

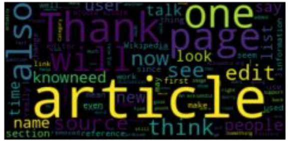
All_Words Cluster 0



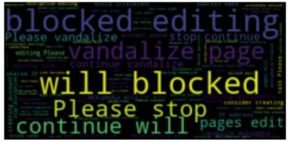
All_Words Cluster 1



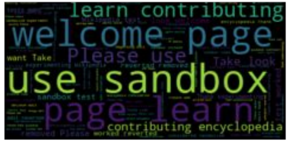
All_Words Cluster 2



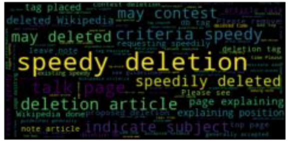
All_Words Cluster 3



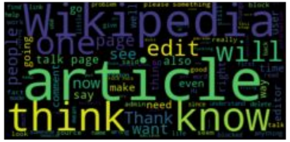
All_Words Cluster 4



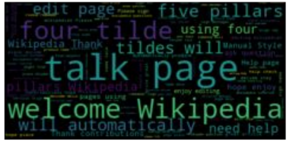
All_Words Cluster 5



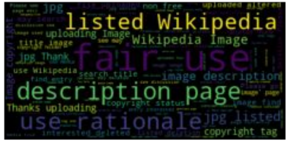
All_Words Cluster 6



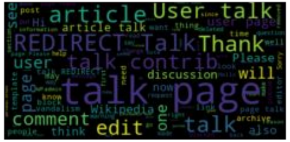
All_Words Cluster 7

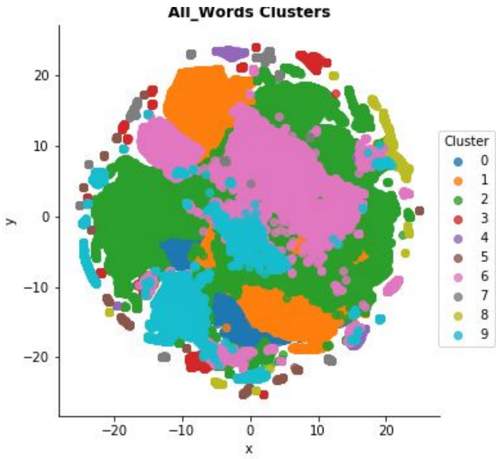


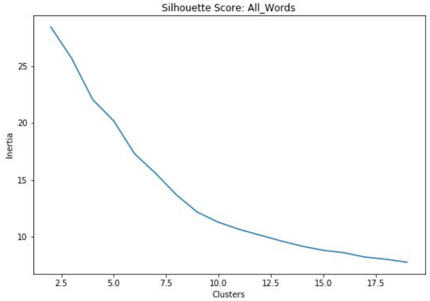
All_Words Cluster 8

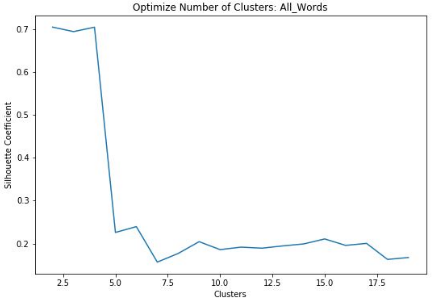


All_Words Cluster 9



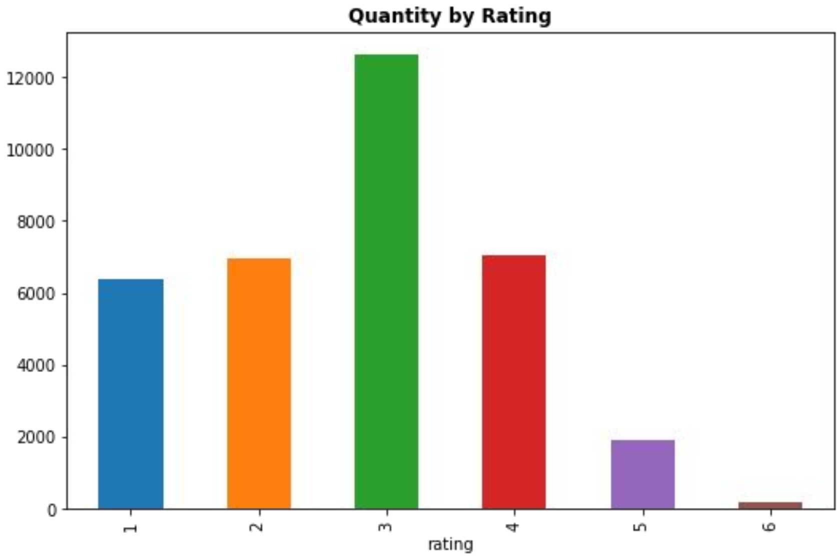


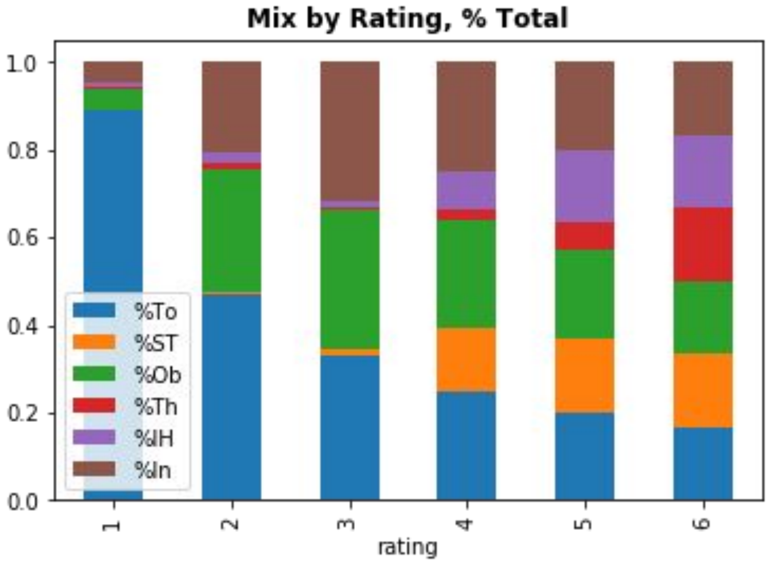




The Six Categories of Toxic Comments

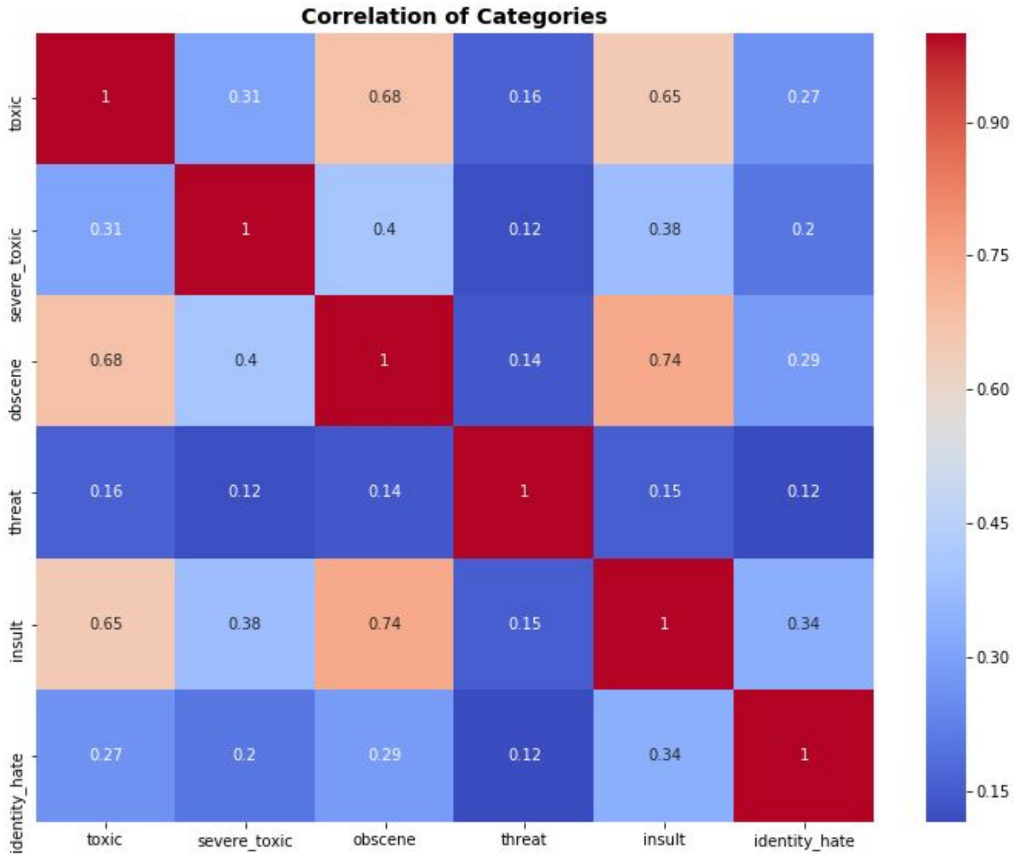
Dataset contains multi-tagged comments; "rating" refers to the number tags a comment has received





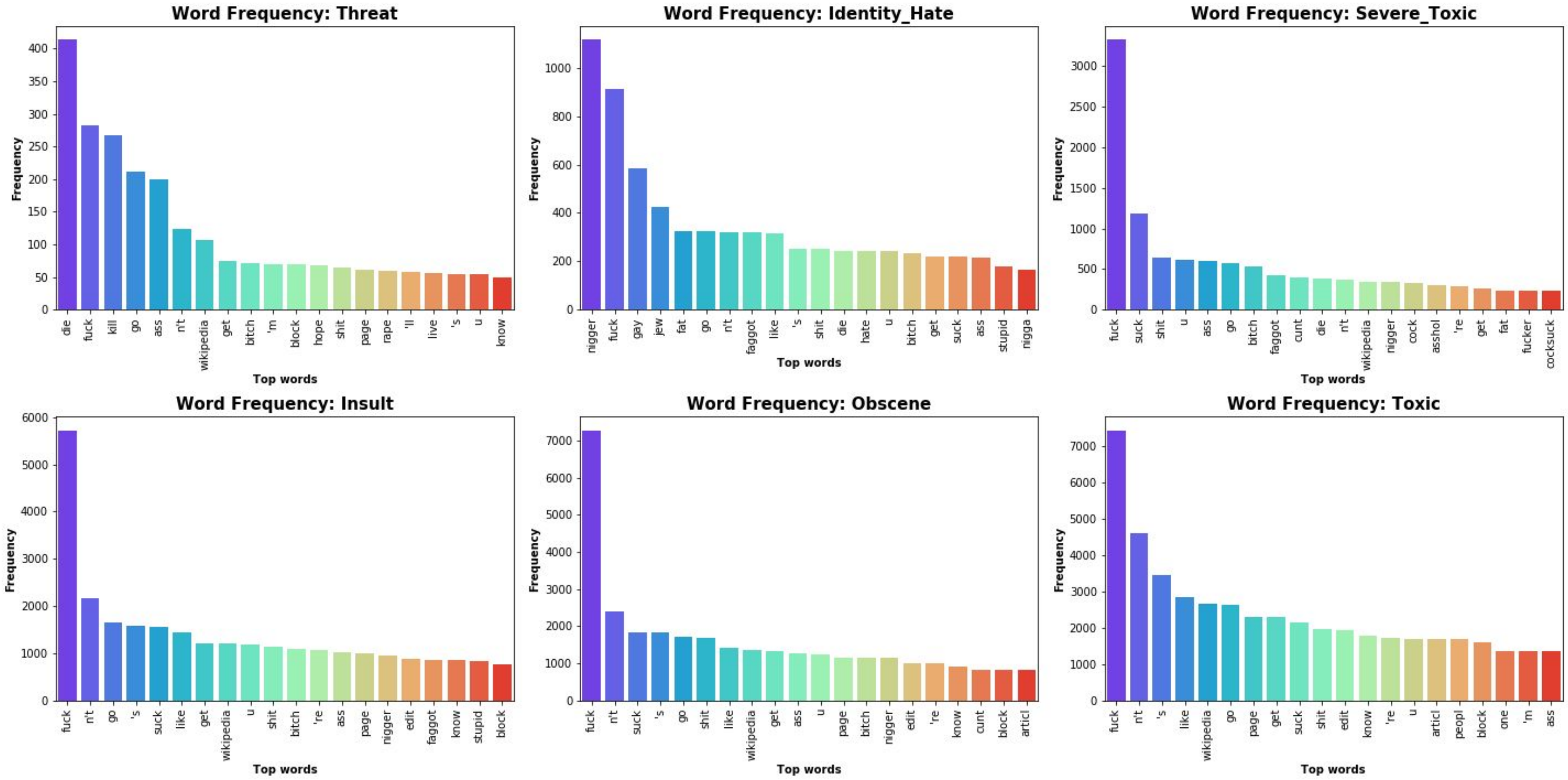
Rating means the number of "tags" per comment

Category Correlation

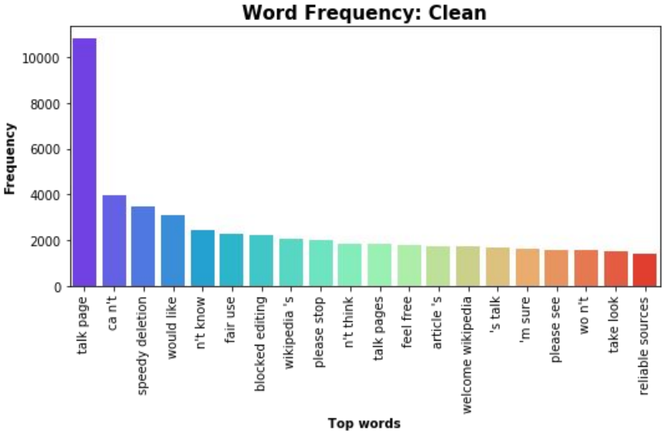


Word Frequency: Singles

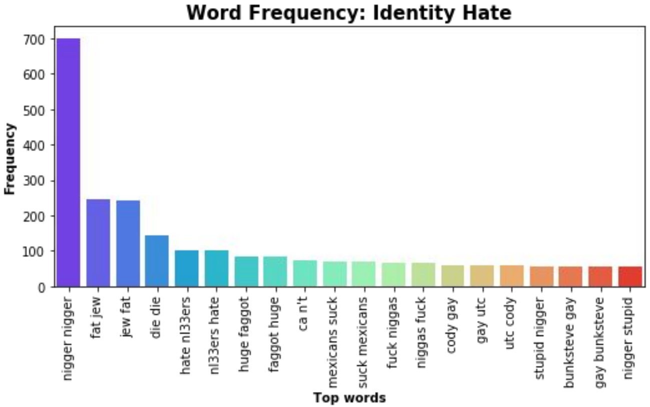
Only stopwords filtered



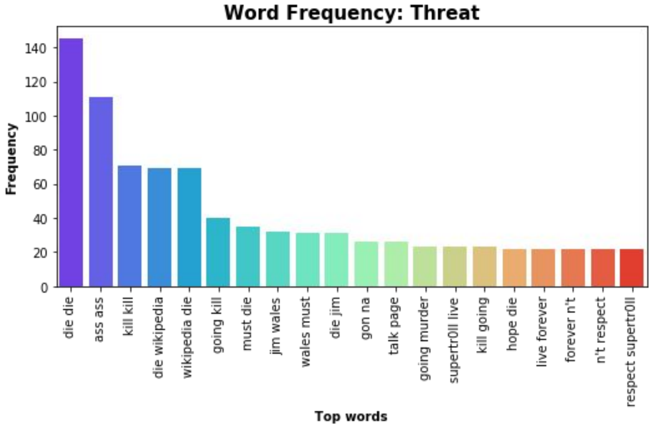
Word Frequency: Bigrams



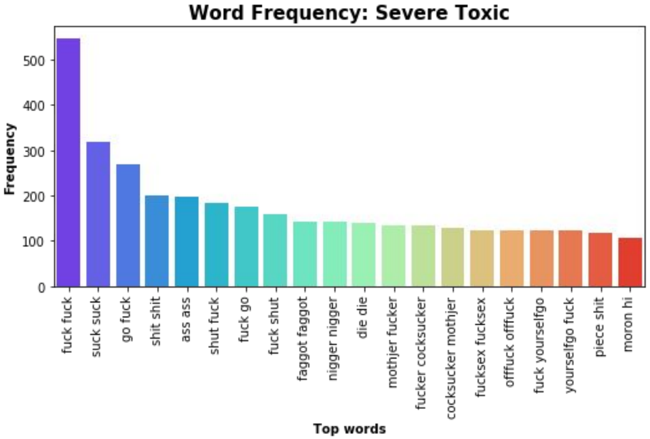
Word Frequency: Clean



Word Frequency: Identity Hate

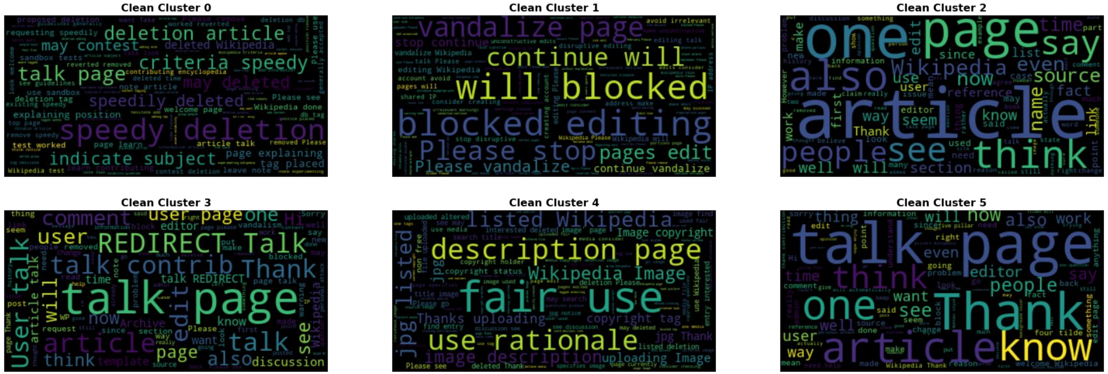


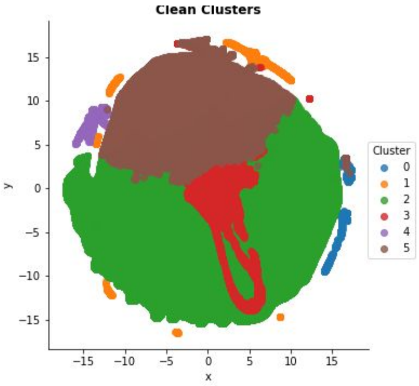
Word Frequency: Threat

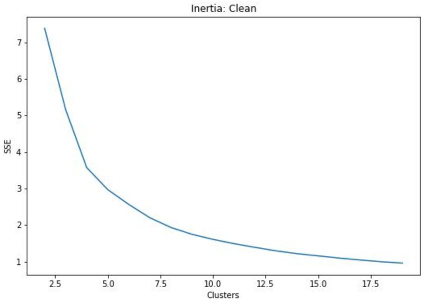


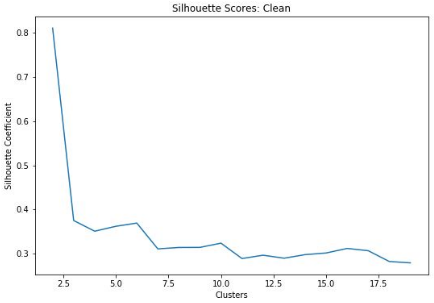
Word Frequency: Severe Toxic

K Means Clustering: Clean Words (All Rated == 0)



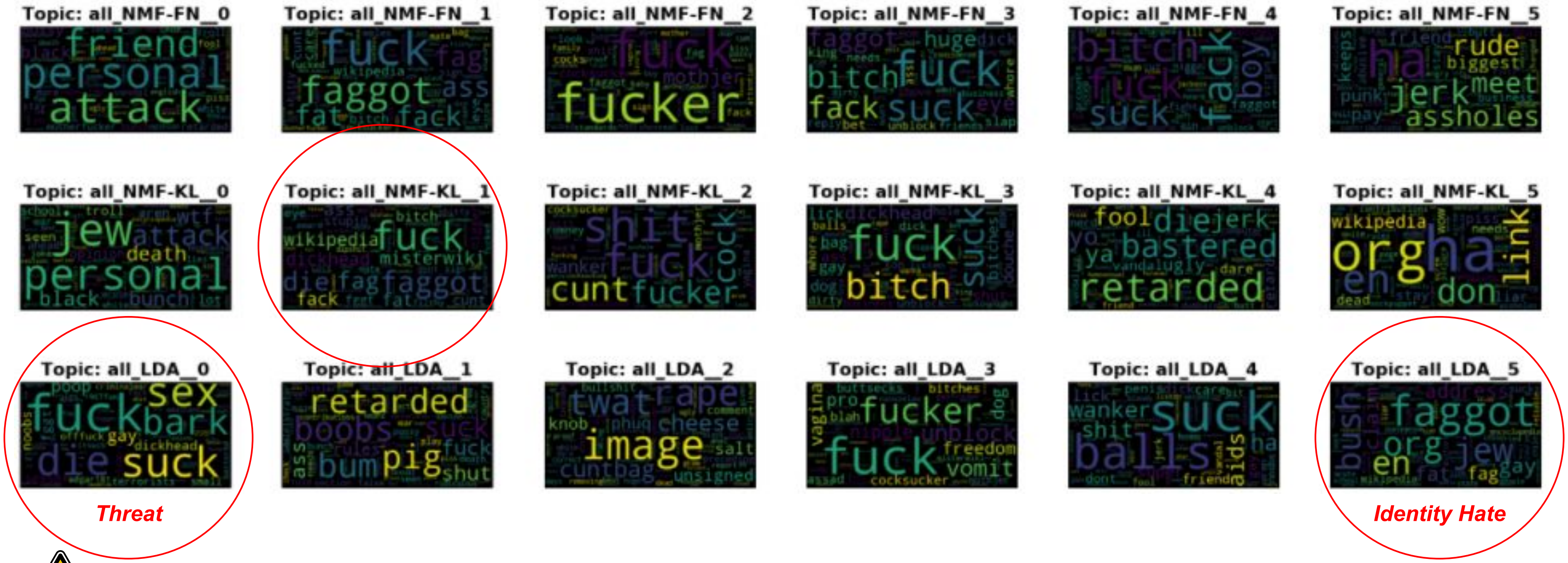






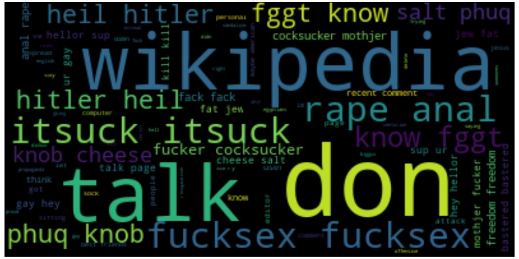
Topic Modeling, 6 Topics from Rating > 0

All tagged as at least one form of toxic language
6 categories, topical modeling also roughly ties to these

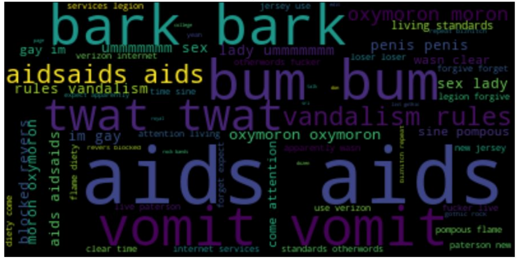


LDA WordClouds By Toxic Bigram Topic

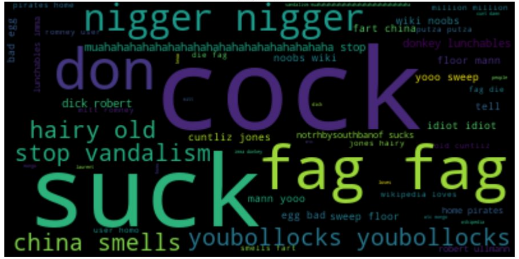
Topic: 0



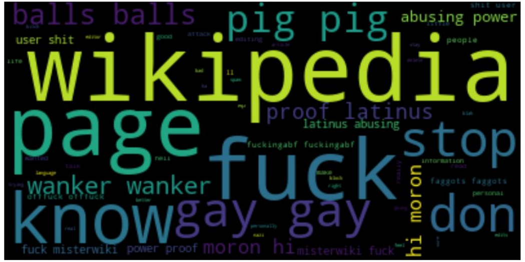
Topic: 1



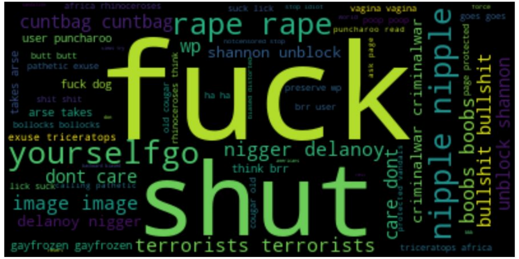
Topic: 2



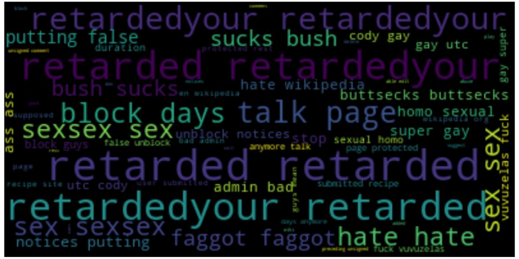
Topic: 3



Topic: 4

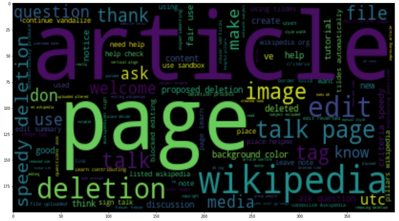


Topic: 5

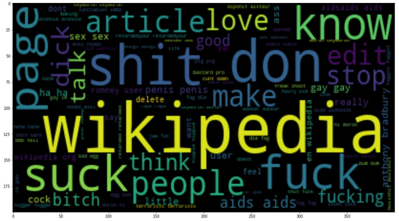


LDA WordClouds By Class

Clean



Toxic



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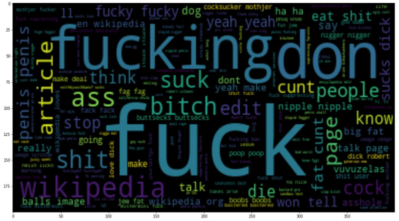
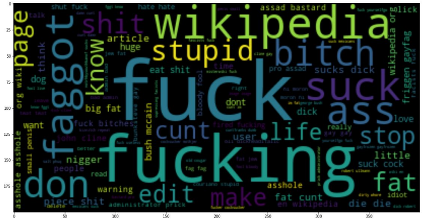
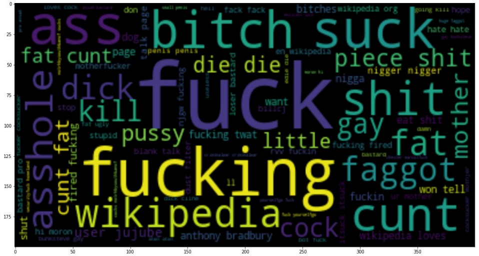


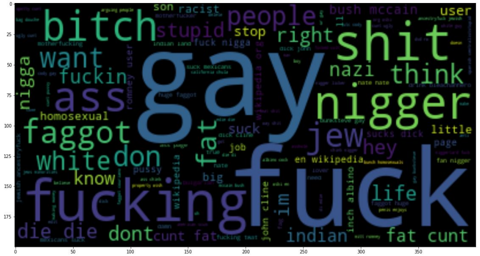
Insult



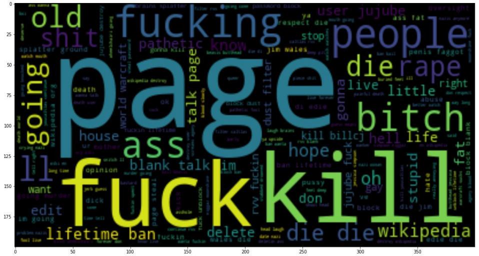
Severe Toxic



Identity Hate



Threat



LDA, 6 Topics

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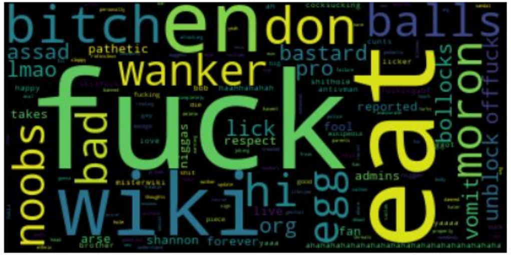

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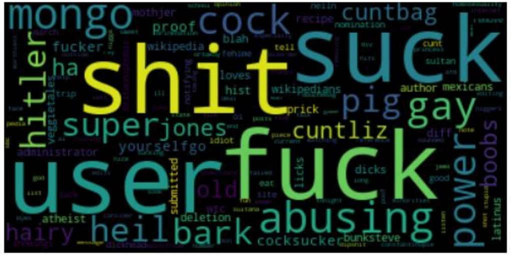

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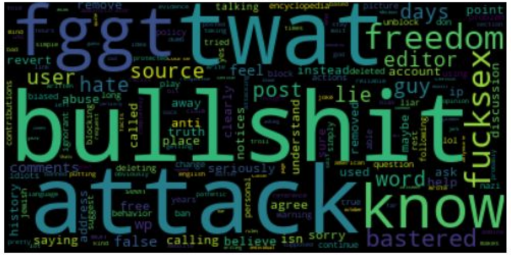

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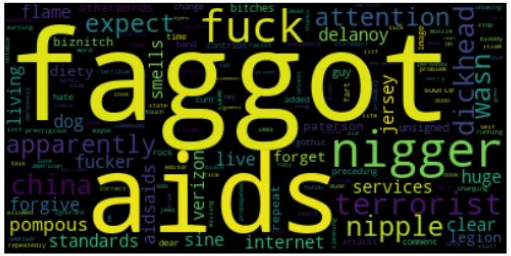

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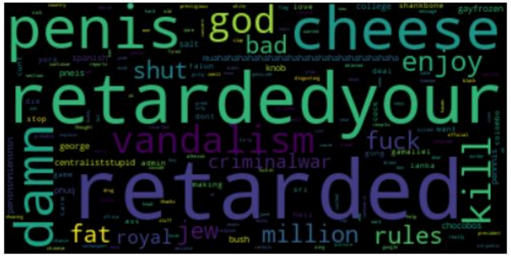

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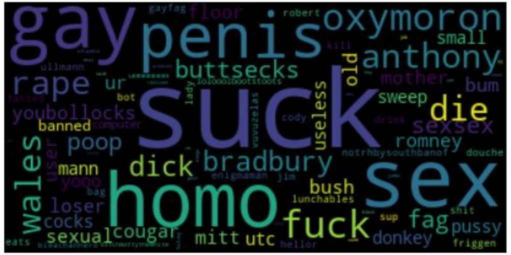
gay
penis
oxymoron
small
anthony
buttsecks
rape
suck
mother
bum
sweep
die
youbollocks
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romney
wales
dick
bradbury
mann
homo
sex
loser
cocks
bush
fuck
fag
pussy
sexual
cougar
mitt
utc
donkey
useless
old