



Identification of patterns and metrics to distinguish toxic and non-toxic Reddit communities

June 23, 2020

Outline

1. Introduction

- a. Motivation and Mission
- b. Research questions and objectives
- c. High level project overview

1. Project Details

- a. Selection of communities
- b. Tools and Data pipeline
- c. Solution Workflow

1. Results

- a. Trends of toxicity and sentiment
- b. Effect of toxicity user activity and churn
- c. Community response to toxic comments

1. Conclusion, Challenges & Future Work

Community Health



- Two Hat's mission:
 - Help social networks build **safe and healthy online communities**
 - Find metrics that characterize the health of online communities
- Capstone project mission:
 - Explore patterns and identify metrics that relate to the level of toxicity present in a community
 - Develop Community Health Toolkit



General Questions

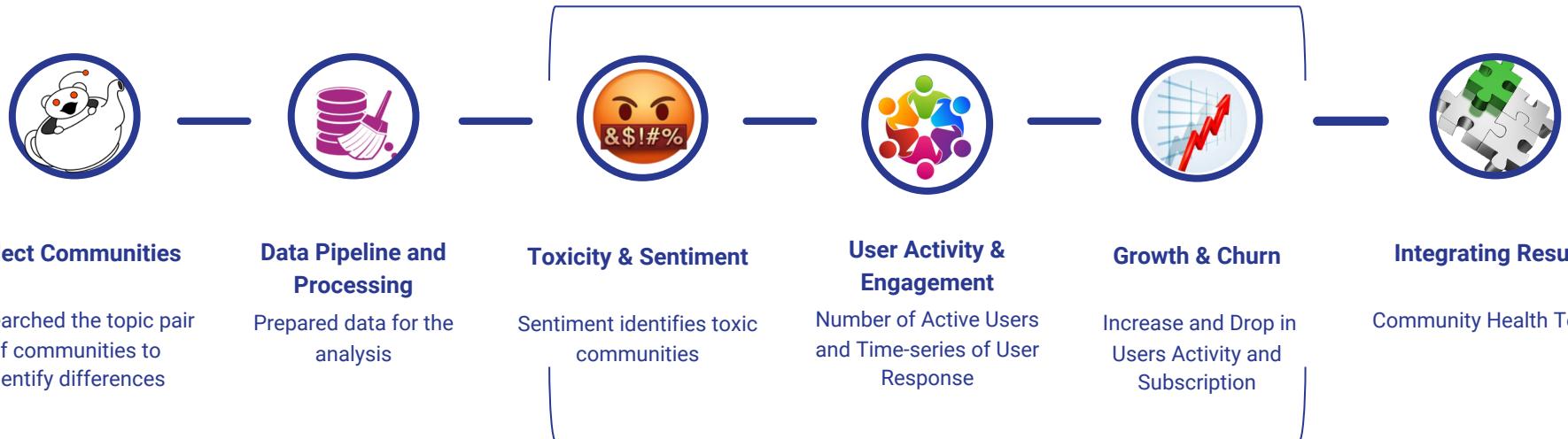
- How do we measure community health?
- How do we detect online harms?
- What is the impact of online harms on communities?

Capstone Project Objectives

- Community Health Toolkit
 - Levels of overall toxicity and sentiment
 - Effect of toxicity on user activity and churn
 - Community response to toxic comments



Project Overview



Non-toxic



- r/truegaming
- r/buddhism
- r/PoliticalDiscussion



Toxic

- r/gaming
- r/atheism
- r/the_donald

Tools and Data Pipeline



Comments (2014-2018)



Functions library



Two Hat Toxicity tool



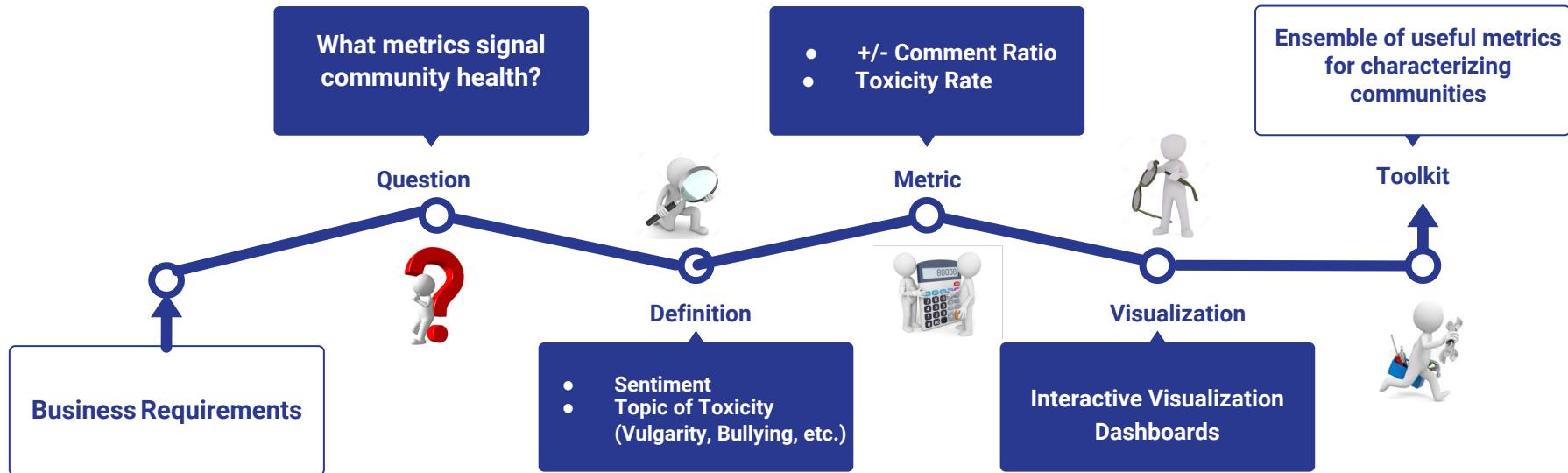
Sentiment labelling



Power BI

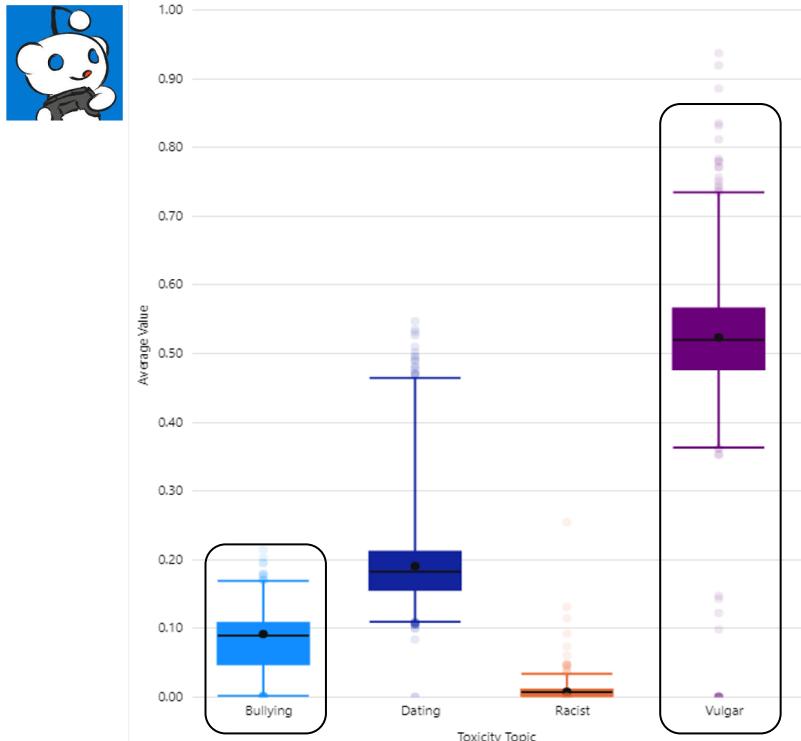


Solution Workflow

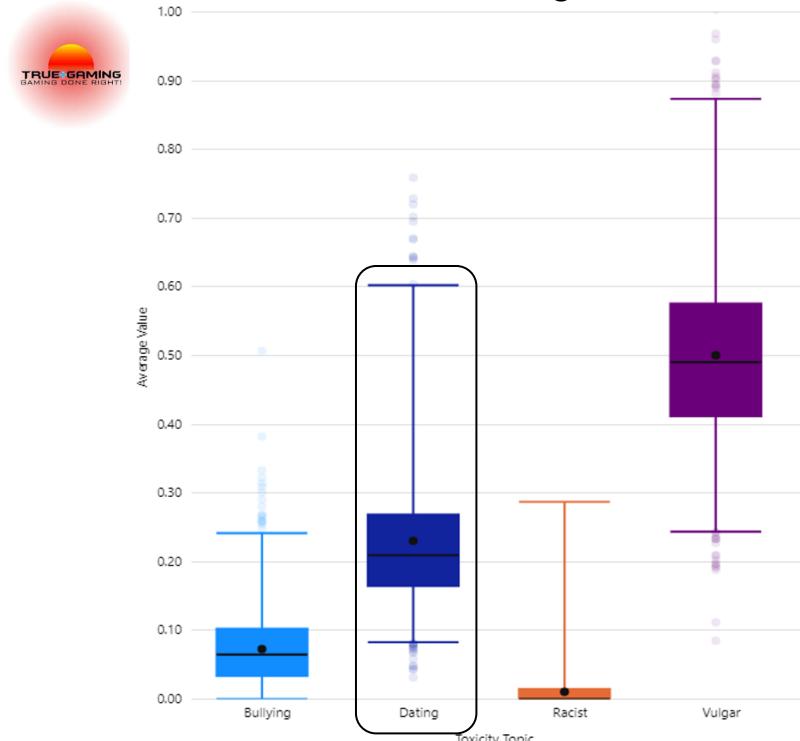


Toxicity Trends can indicate Community Health

Gaming

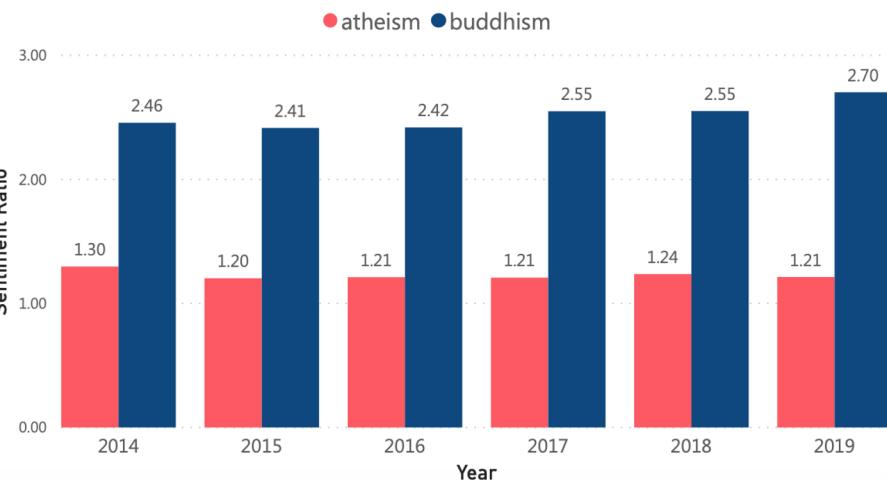


TrueGaming

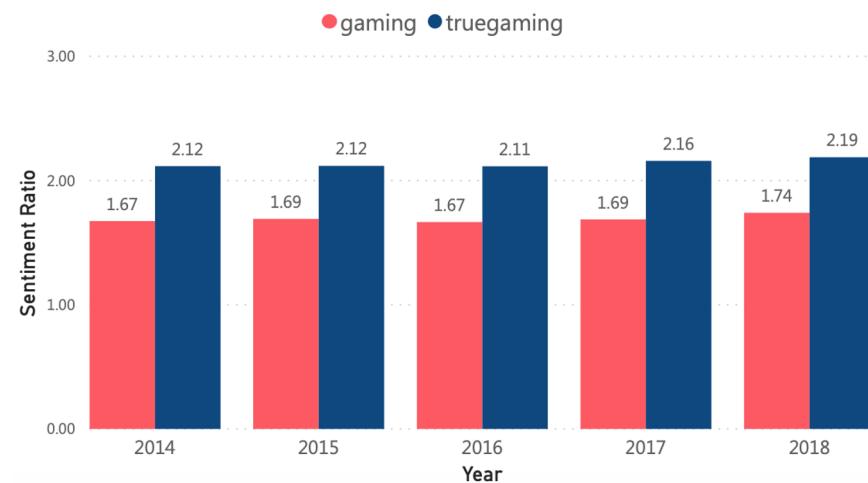


Sentiment can identify Community Health

Religion

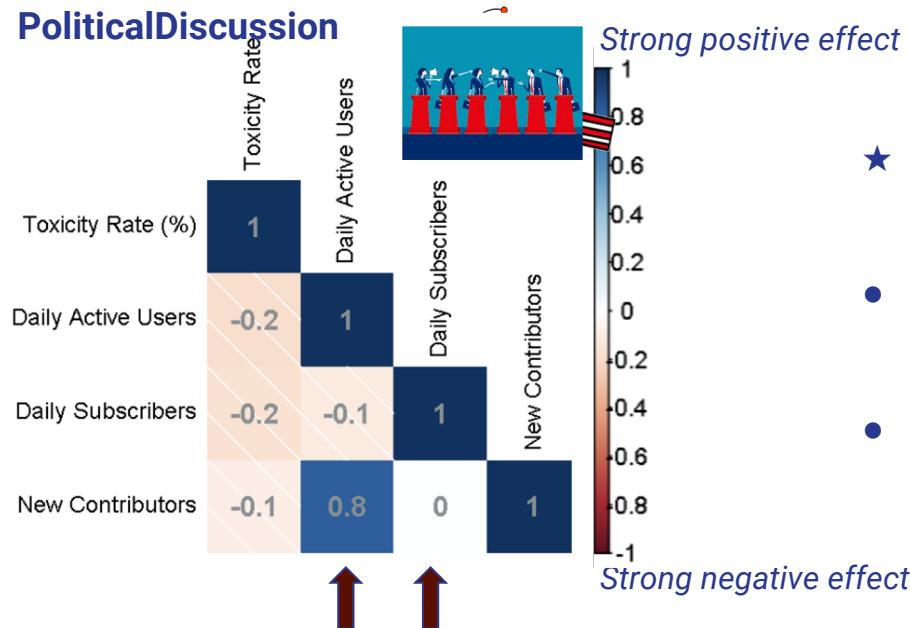


VideoGames



Toxicity effect on Users Activity & Community Growth

PoliticalDiscussion

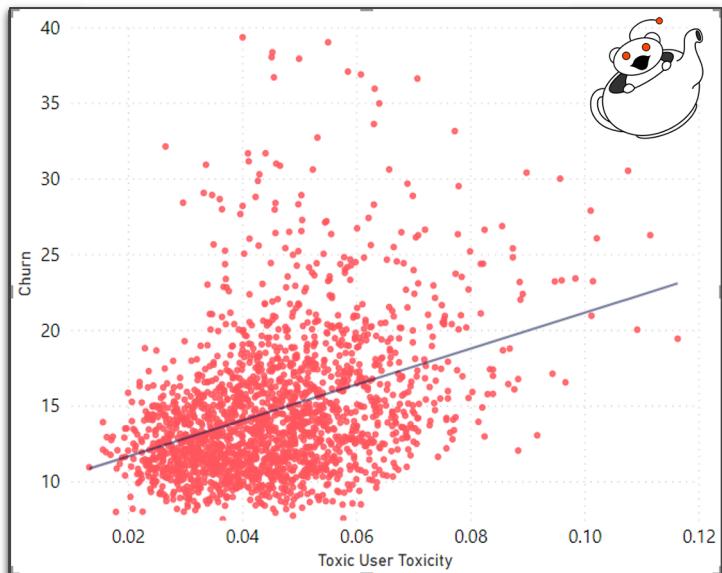


- ★ Daily Active Users are not affected by Daily Toxicity Rate
- Increase of Active Users attract New Contributors
- Daily Subscribers relationship to Active Users vary between communities

Effects of toxicity on Churn

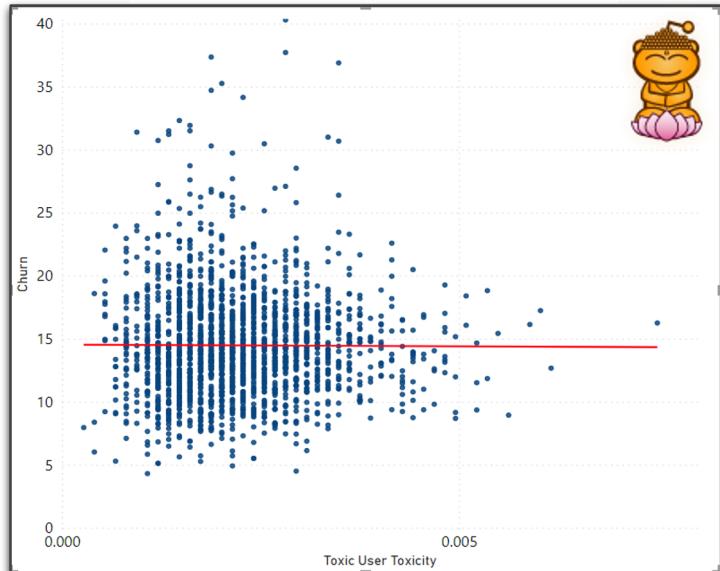
Religion

Atheism



VS

Buddhism

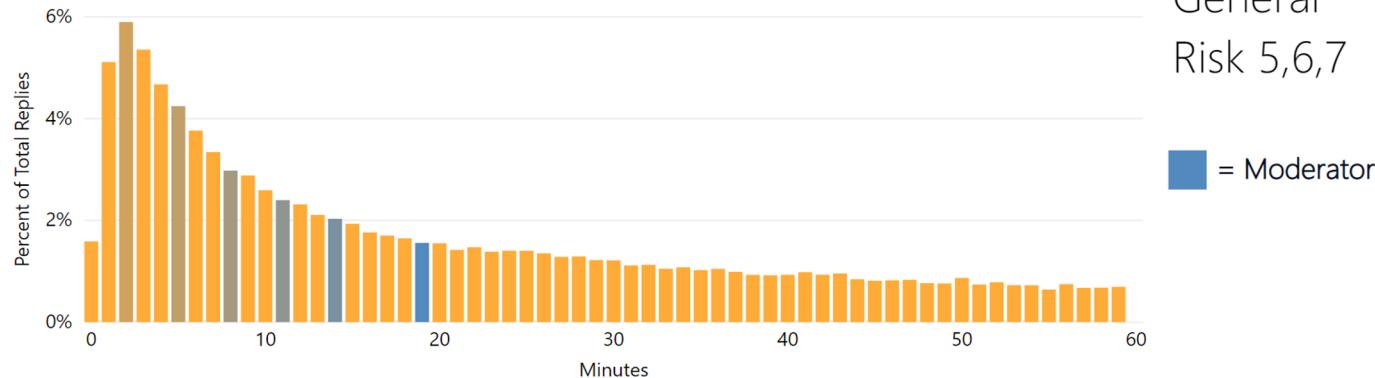


Positive Correlation

No Correlation

Response to Toxicity - ~~Moderators~~

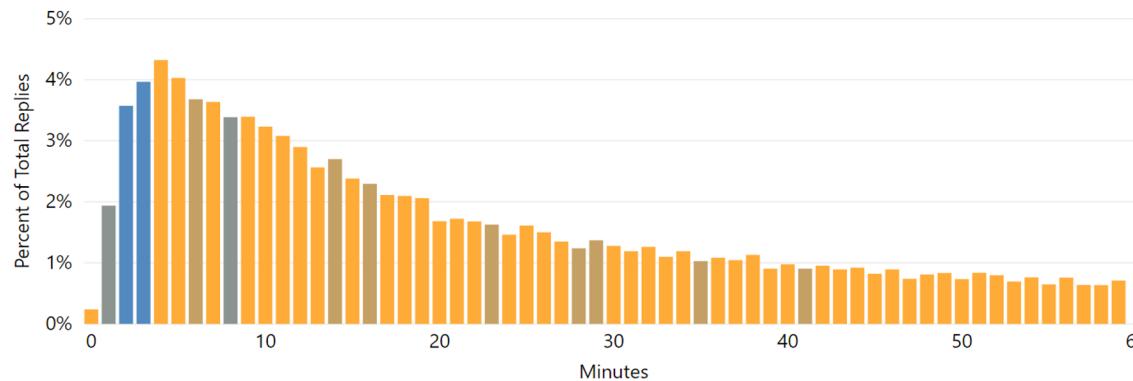
The Donald



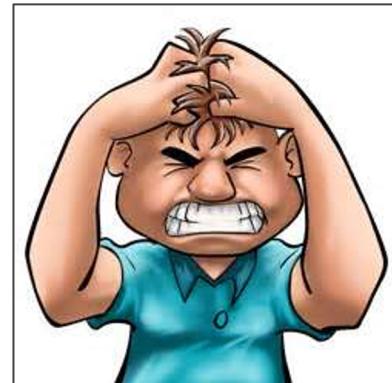
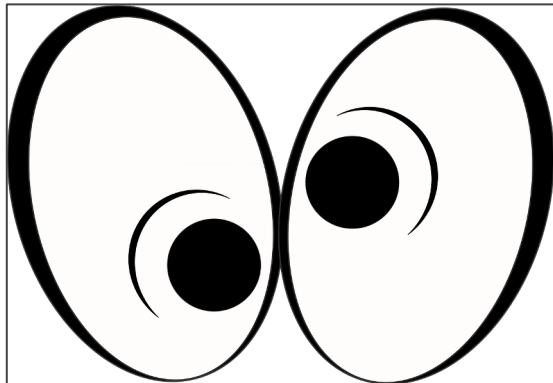
General
Risk 5,6,7

Blue = Moderator

Political Discussion



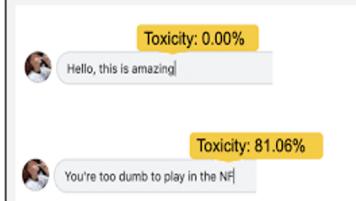
Conclusions - Solution



Research questions



Toxicity analysis



Sentiment analysis



Deeper community analysis



Community Health Toolkit



Conclusions - Generic Insights and details

Main Observations

- Sentiments and toxicity provide consistent patterns of health
- They aren't always indicative of churn, engagement or growth

Other Interesting insights

- Higher Active Users → More New Contributors
- More Subscribers doesn't mean Active Community
- Some communities are attracted to toxicity

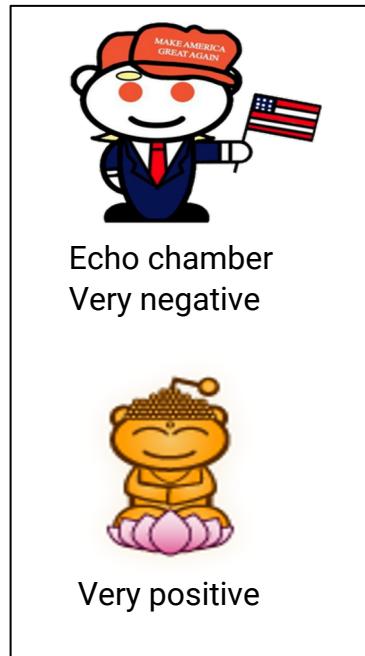


Community Health Toolkit



A Collection of visualizations from toolkit will provide community managers a more accurate assessment of community health

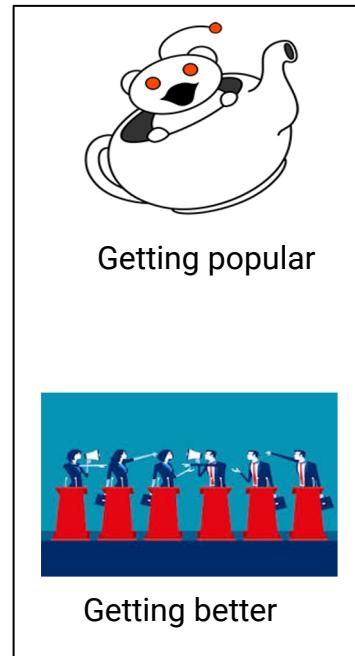
Conclusions - Community Insights from toolkit



Churn/user activity is unaffected by toxicity



Toxicity patterns are very similar



Moderators play a key role

Challenges

Data challenges

- Messy data (Inconsistent dates, data types, multiple sources etc.)
- Debugging (API Limitations, memory issues, size of data)

Resource limitations

- Privacy, Security and licensing limitations for some tools like Tableau
- Processing big files without a database

Topic based challenges

- Diversity of community dynamics by themes
- Community Health is a complicated topic and many more variables are at play besides toxicity

Future Work

New features for toolkit

- Retention metric and trends
- PCA, factor analysis features
- Influencers Impact
- Effects of Controversiality

New areas to explore

- Topic modelling (LDA)
- Identification of sentiment groups that churn
- Depth of discussion analysis
- Application of toolkit to paid subscription communities + comparison with open communities
- Network analysis

Acknowledgement



- Liza Wood
- Two Hat Research Team
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- Dr. Ramon Lawrence
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- Jeff Bulmer
- Debangsha Sarkar
- MDS Program Staff, faculty and Classmates





QUESTIONS





Thank you

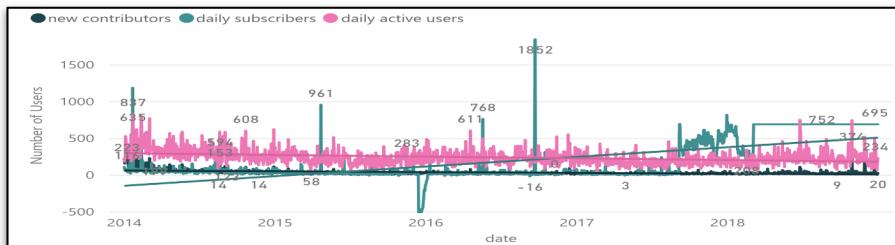
Additional Slides

Toxicity effect on Users Activity & Community Growth

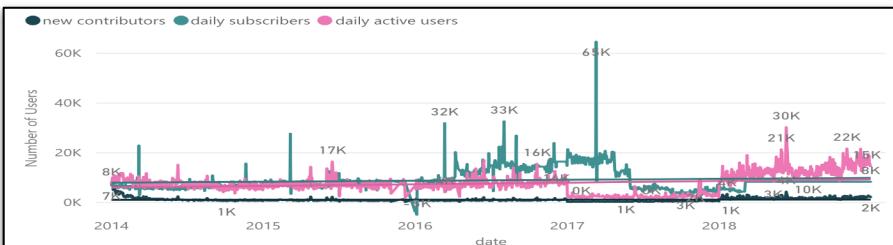


Truegaming

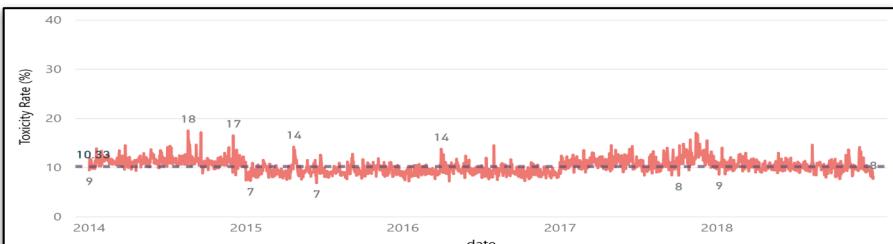
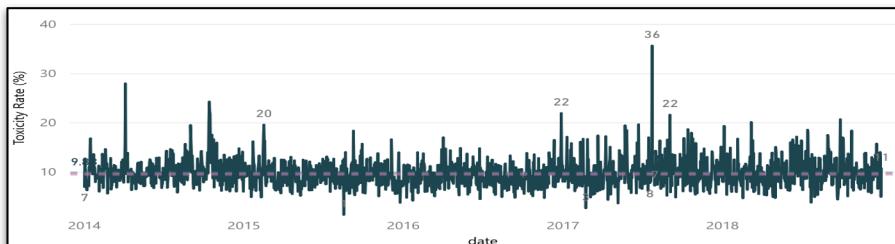
Users Activity



Gaming
Users Activity



Toxicity Rate

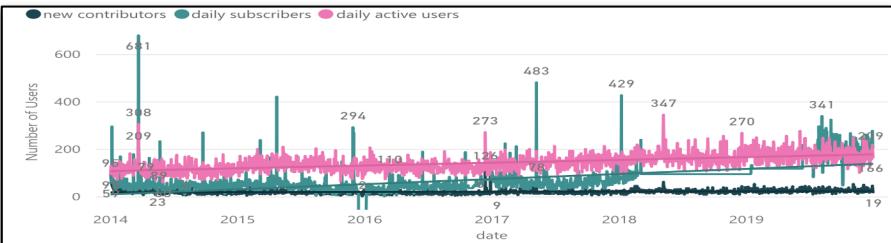


Toxicity effect on Users Activity & Community Growth



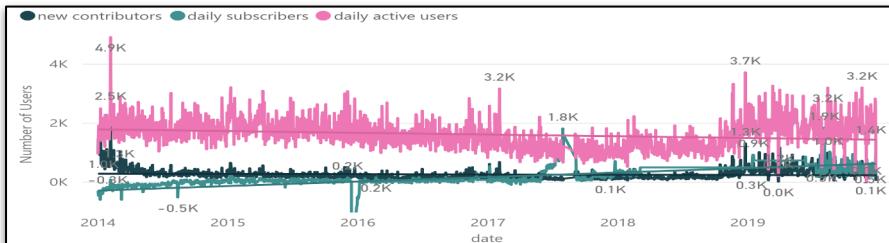
Buddhism

Users Activity

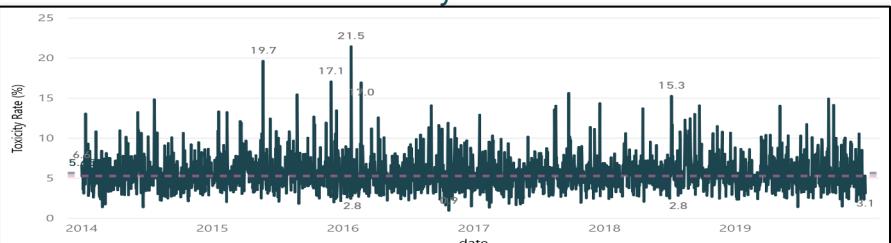


Atheism

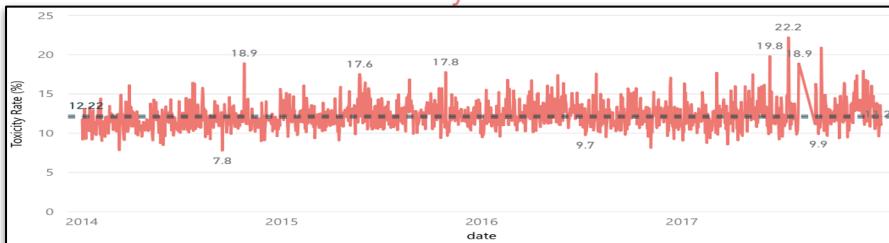
Users Activity



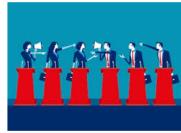
Toxicity Rate



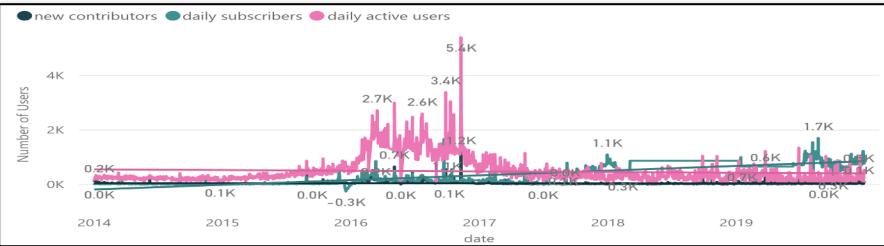
Toxicity Rate



Toxicity effect on Users Activity & Community Growth

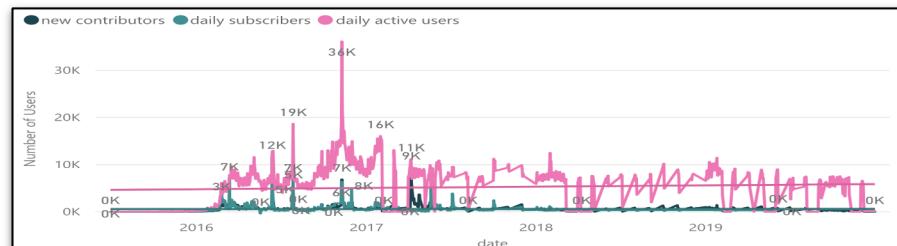


Political Discussion
Toxic User Toxicity Rate

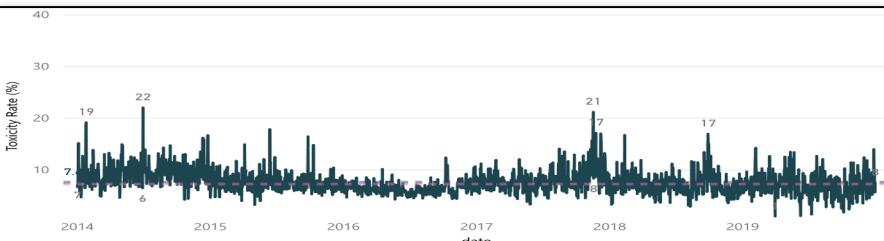


the_Donald

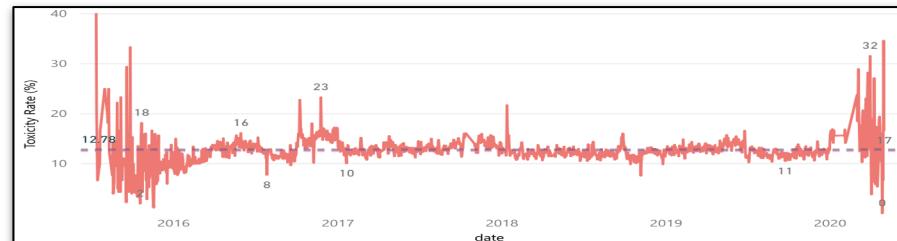
Toxic User Toxicity Rate



Toxicity Rate



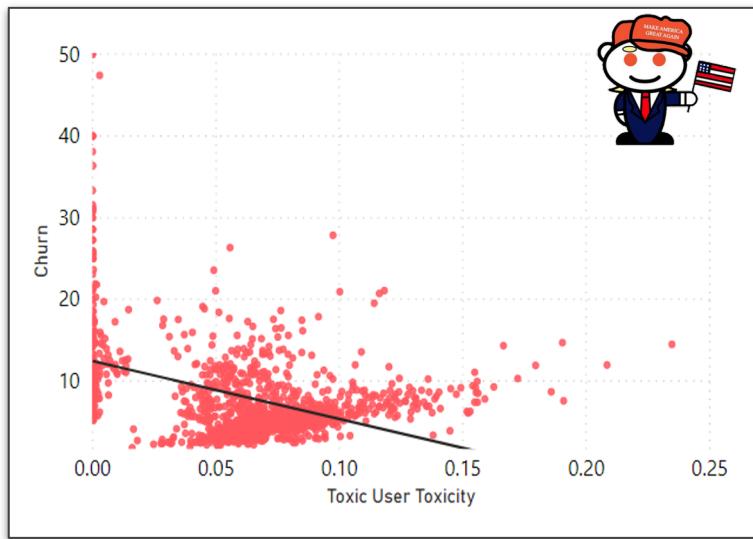
Toxicity Rate



Churn : Effects of toxicity on Churn

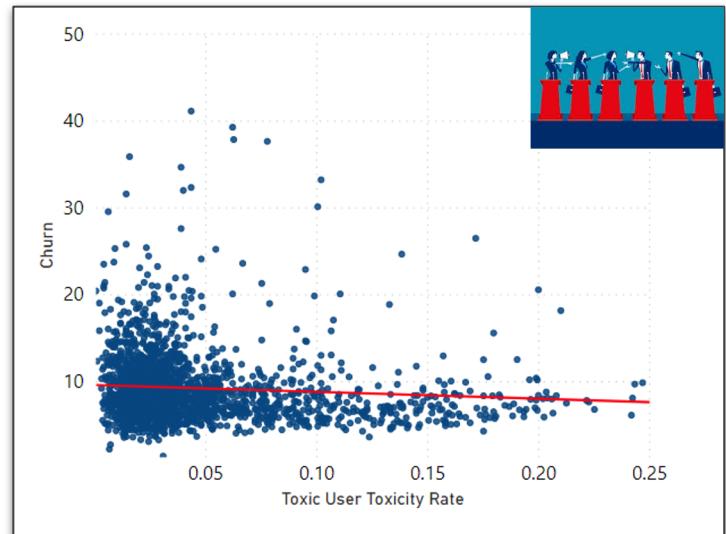
Politics

The Donald



VS

Political Discussion



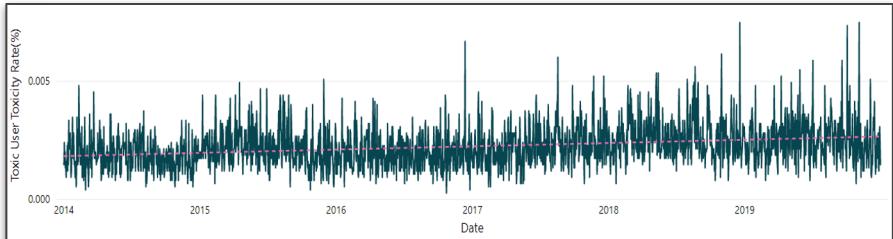
Negative Correlation

Weak Negative Correlation

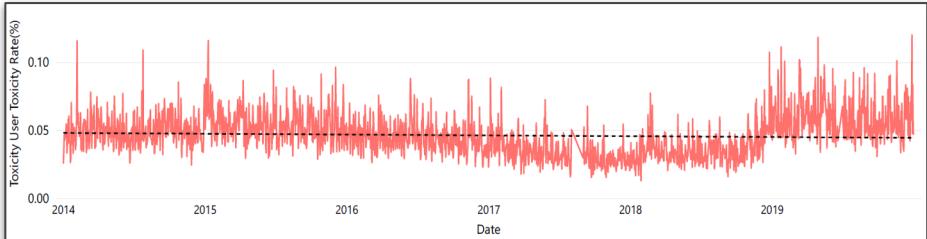
Churn : Effects of toxicity on Churn - Detailed View



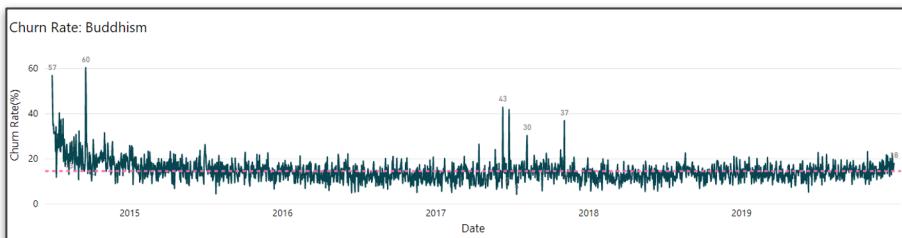
Buddhism
Toxic User Toxicity Rate



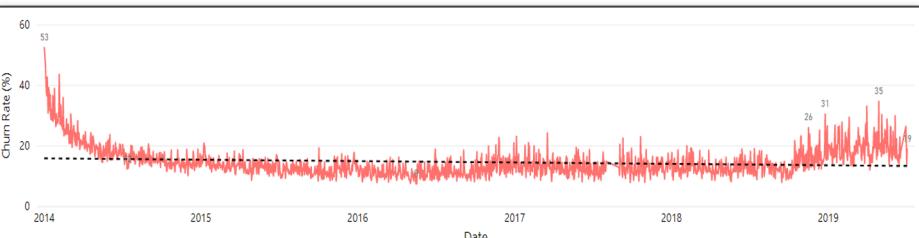
Atheism
Toxic User Toxicity Rate



Churn Rate



Churn Rate

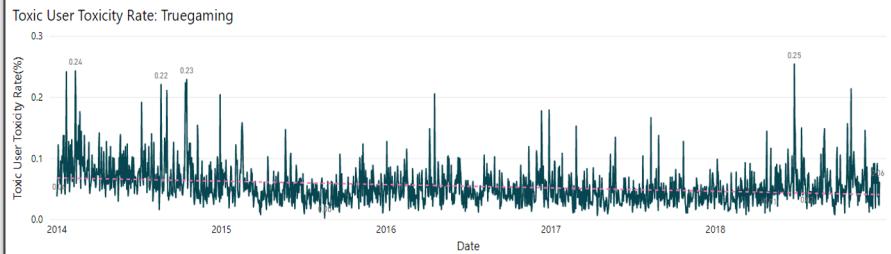


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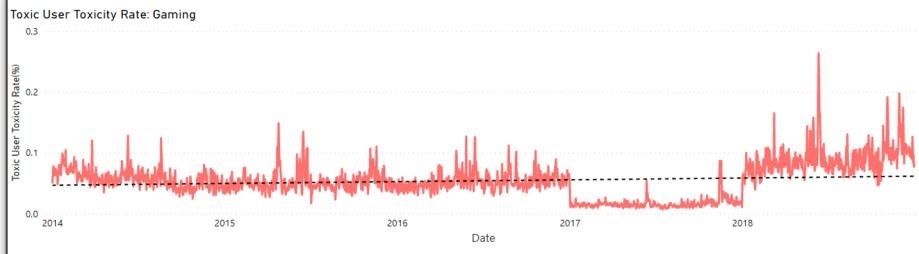
Truegaming

Toxic User Toxicity Rate

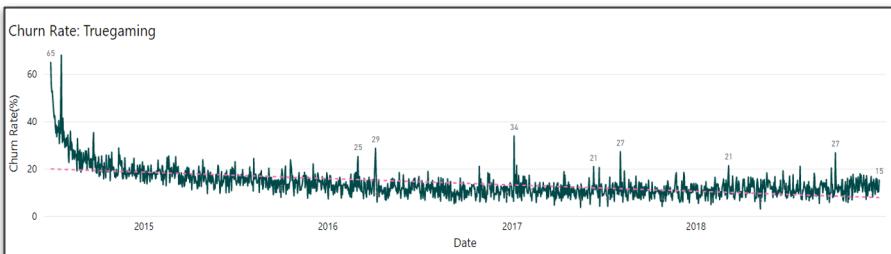


Gaming

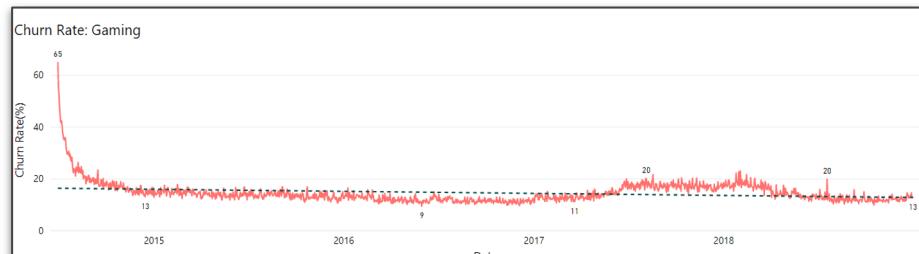
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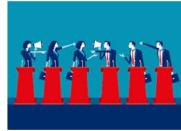
Churn Rate



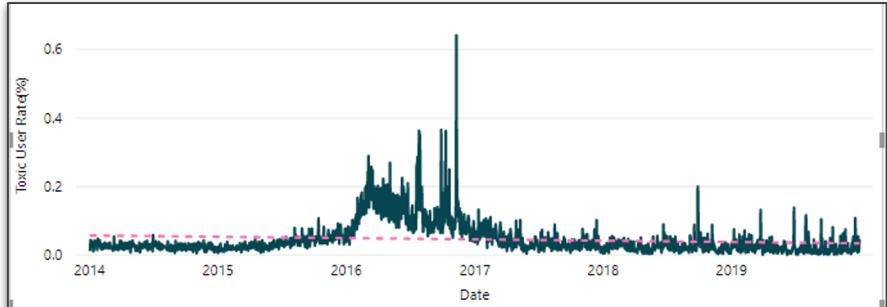
Churn Rate



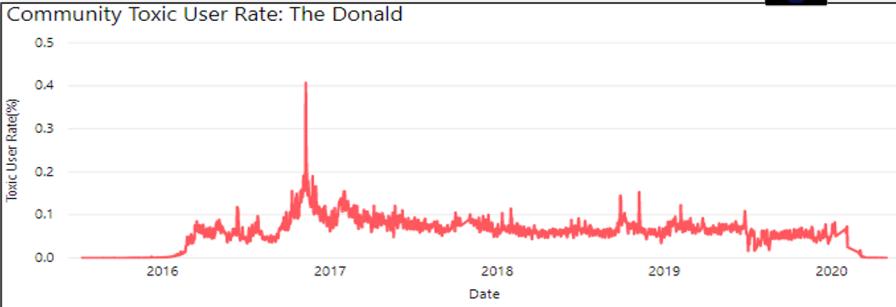
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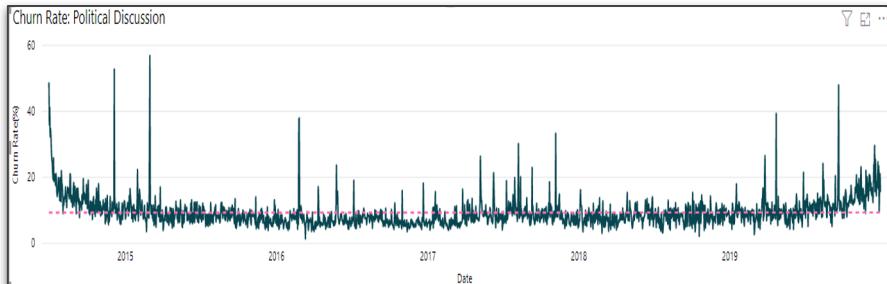
Political Discussion
Toxic User Toxicity Rate



The Donald
Toxic User Toxicity Rate



Churn Rate



Churn Rate

