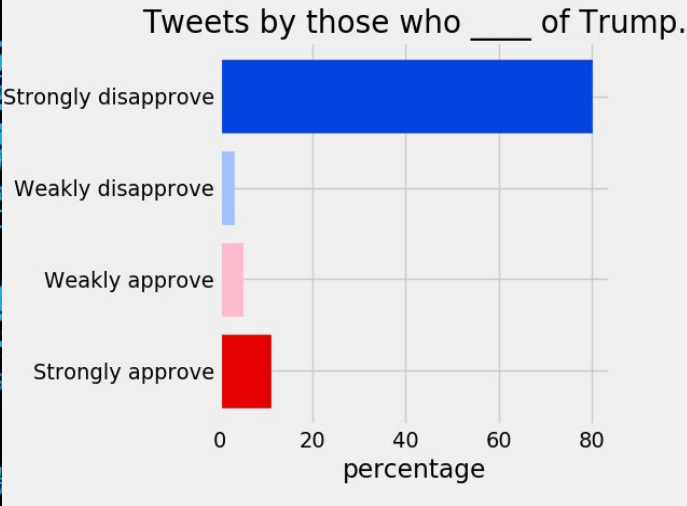




Segmentation of Twitter Users with Machine Learning

Introduction



Twitter is readily available, rich source of OSINT (open-source intelligence) data that is often cited by news media organizations as being representative of the voice of the common man.

But is it really? According to Pew Research Center, of the 22% of adults in the USA who use twitter, the vast majority of tweets come from just 10% of users. In other words, **twitter serves as a platform that amplifies the voice of a mere 2.2% of the US population.**

Of these 2.2% of users, only 16% approve of Trump, a figure which is at odds with his national approval rating of 43% (29 Jan 2020, fivethirtyeight.com)

This lack of balance presents a challenge to companies seeking to use twitter as a source of customer feedback.



SEASON 1

A LITTLE LATE WITH LILLY SINGH

Critics Consensus

The delightful Lily Singh breathes fresh air into the world of late-night comedy with an energetic new show that's willing to play with the format in ways that will keep viewers looking forward to staying up *A Little Late*.



100%

TOMATOMETER

Critic Ratings: 10



20%

AUDIENCE SCORE

User Ratings: 1644

**Rotten
Tomatoes**



DAVE CHAPPELLE: STICKS & STONES

Critics Consensus

Edgy, but empty, *Sticks and Stones* won't break any bones, but it won't elicit many laughs, either.



35%

TOMATOMETER

Total Count: 17



99%

AUDIENCE SCORE

User Ratings: 40,094



Objectives

- To hear the voice of groups that lack representation on twitter but have a large impact on our company's bottom line.
- In this case, we will examine how we can use machine learning to segment users according to their political leanings, conservative and liberal.
- Once users are divided, we will examine and evaluate the findings of our machine learning model.

Understanding the subject matter

Liberal

- Judges should push their own agenda
- More of an internationalist
- Socialist
- Non-Christian
- Want to take away the right to bear arms
- Discriminatory
- Pro-choice
- Big government, high spending, high taxes

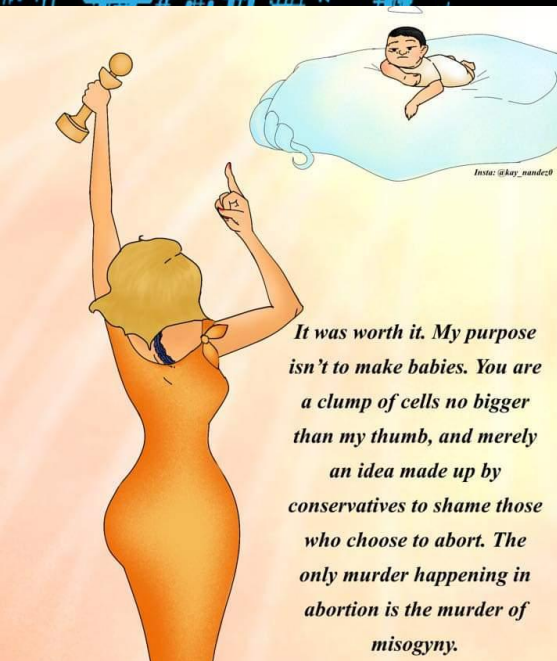
Conservative

- Judges should uphold the Constitution
- Die hard patriot
- Capitalist
- Christian
- Right to bear arms
- Non-discriminatory
- Pro-life
- Reduce the size of government, low taxes, balanced budget



Data

#MichelleWilliams



#MichelleWilliams



Therese Shechter
@TrixieFilms

YES Michelle Williams! 🙌 Thanks for reinforcing the need to control our own bodies—to a global TV audience. Also you were great in Fosse Verdon 🌹 (All we'd add is 'when and if' to make it perfect.)
#childfreebychoice #mybodymychoice #abortion #goldenglobes 🏆 #michellewilliams



Chris Traynor
@christraynor

#MichelleWilliams advocating for Women's Choice was the most graceful & impactful I've heard in years. Her revelation about having an #Abortion was beyond brave. As a man, I found her call for women to vote in their self-interest, AS MEN DO, to be timely, strong and necessary.



Reese Witherspoon
@ReeseW

What a speech by #MichelleWilliams! Thank you for being a champion of women, you are an inspiration 🙌
#GoldenGlobes



Shireen Qudosi
@ShireenQudosi · Jan 7

Replying to @LilaGraceRose

My son is 8 yrs old and I didn't have to kill him to be a Muslim Reformer. Taking on the biggest multi-generational crisis of our time — religious extremism — is a hell of a bigger deal than a trophy for dressing up and playing pretend as an actor. #MichelleWilliams #GoldenGlobe



Lisa C
@cybermom1999 · Jan 9

#MichelleWilliams seized a national stage and cut through the emotional posturing of abortion advocacy to reveal its hollow, egotistical core. Indeed, her speech was not about rape, **the** life of **the** mother, or other seemingly complex circumstances.



Rhiannon Anderson
@RhiRhi1600

So grateful to be a woman living during a time in society where women are empowered to murder their unborn child so they can succeed in life. Because Lord knows we aren't able to succeed otherwise because we're so weak-willed and fragile. #GoldenGlobes 🏆
#MichelleWilliams



Sheila Zilinsky
@RealSheilaZ

It occurred to me she's holding a golden calf (idol) and bragging about the human sacrifice she made to acquire it. #Baal #Molech
#MichelleWilliams

#MichelleWilliams



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Reese Witherspoon ✓
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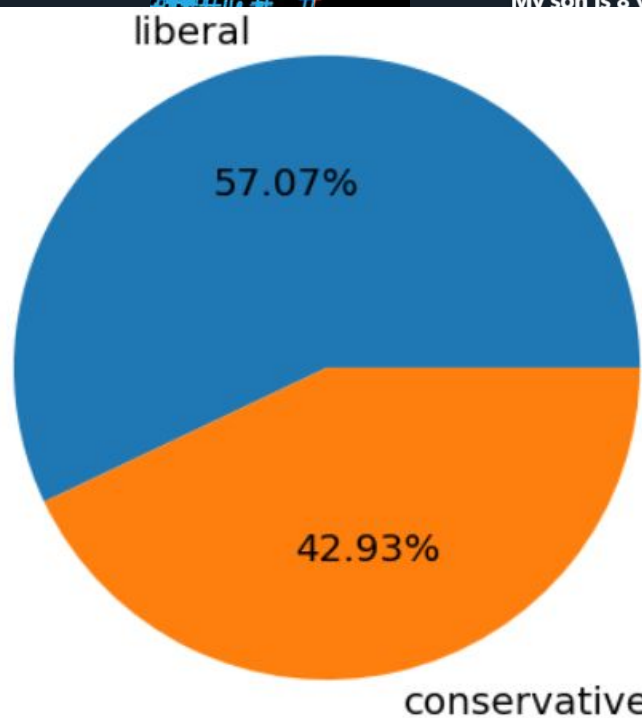
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ams

nsky 🇺🇸 🎵
laZ

to me she's holding a golden calf (idol) and she's making a sacrifice she made to

acquire it. #Baal #Molech
#MichelleWilliams



Total unique users: 8380

The background of the slide is a dense, abstract pattern of blue and orange hash symbols (#). These symbols are arranged to form a large, stylized letter 'A' that spans the width of the slide. The blue symbols are concentrated on the left side of the 'A', while the orange symbols form the right side and the top bar. The overall effect is a vibrant, digital-looking texture.

Procedure

Data cleaning

Expand contractions:

I'll -> I will.

Remove emails and
links.

Space out emojis and

hashtags:

🌽 #PopCorn -> 🌽 #PopCorn

Remove punctuations:

!"#\$%&'()*+,-./:;<=

>?@[\\]^_`{|}~""



Condense gender
pronouns:
they/them -> gpnouns
ze/zir -> gpnouns

Split hashtags into
words:
#PopCorn -> Pop Corn

[illegible][illegible][illegible][illegible]

The image is a complex digital collage centered around the name "Michelle Williams". At the top, a large, bold "#MichelleWilliams" hashtag spans across the frame. Below this, a central photograph of actress Michelle Williams, wearing an orange one-shoulder gown, is partially obscured by several overlapping elements. To her left, there's a screenshot of a tweet from user "Therese Shechter @TrixieFilms" dated Jan 7, which says "YFS Michelle Williams! 🙌 Thanks for reinforcing the". Below this tweet is another comment from "@ReeseW" asking "What a speech by #MichelleWilliams! Thank you for being a champion of women, you are an inspiration 👏👏 #GoldenGlobes". To the right of the central photo, there's a tweet from "Shireen Qudosi" replying to "@LilaGraceRose", stating "My son is 8 yrs old and I didn't have to kill him to be a Muslim Reformer. Taking on the biggest multi-generational crisis of our time — religious". Further down on the right, another comment reads "It occurred to me she's holding a golden calf (idol) and bragging about the human sacrifice she made to acquire it. #Baal #Molech #MichelleWilliams". Two word clouds are also present: one on the left side of the collage with words like "women", "love", "resistance", "mom", "fan", "Trump", and "activist"; and another on the right side with words like "MAGA", "Conservative", "Christian", "Proud", "Life", "American", and "Veteran". The background of the entire collage is decorated with a pattern of blue and red hash symbols (#).

[illegible][illegible]

The image is a collage centered around the actress Michelle Williams. At the top, a large, bold hashtag "#MichelleWilliams" is displayed against a background of smaller, colorful hashtag symbols. Below this, there are several social media elements. On the left, a tweet from Therese Shechter (@TrixieFilms) reads "YES Michelle Williams! 🙌 Thanks for reinforcing the". To the right, a tweet from Shireen Qudosi (@ShireenQudosi) dated Jan 7 says "My son is 8 yrs old and I didn't have to kill him to be a Muslim Reformer. Taking on the biggest multi-generational crisis of our time — religious". In the center, a photograph of Michelle Williams, wearing an orange dress, is shown. To the left of her photo is a word cloud with terms like "Resist", "Love", "Proud", "MAGA", "Conservative", "Christian", and "Trump". To the right of her photo is another word cloud with terms like "MAGA", "Love", "Conservative", "Christian", and "Trump". Below the photo, a tweet from @ReeseW says "What a speech by #MichelleWilliams! Thank you for being a champion of women, you are an inspiration 🙌🙌 #GoldenGlobes". At the bottom right, a quote is visible: "It occurred to me she's holding a golden calf (idol) and bragging about the human sacrifice she made to acquire it. #Baal #Molech #MichelleWilliams". The entire collage is framed by a border of colorful hashtag symbols.

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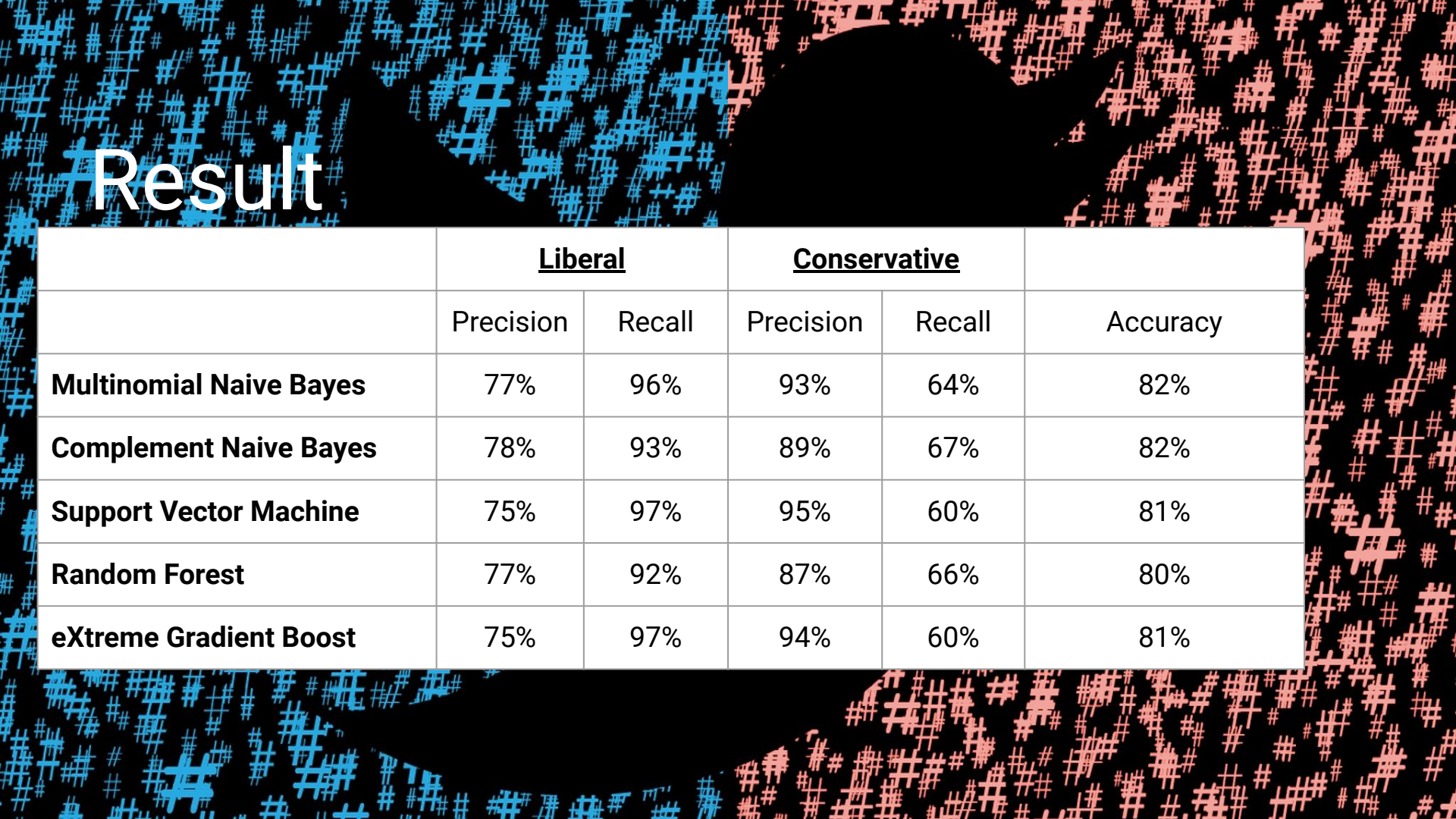
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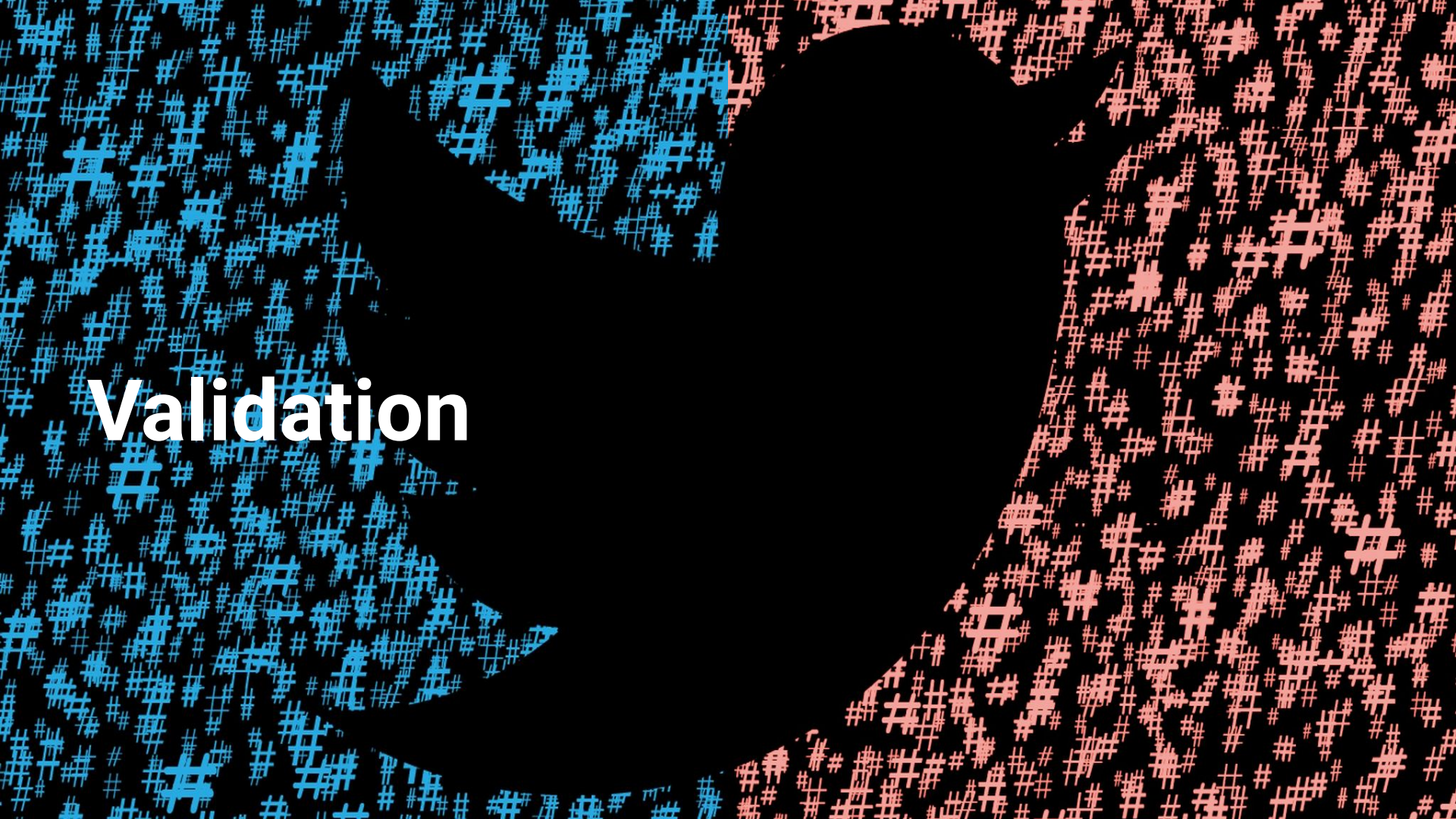


Modeling



Result

	<u>Liberal</u>		<u>Conservative</u>		
	Precision	Recall	Precision	Recall	Accuracy
Multinomial Naive Bayes	77%	96%	93%	64%	82%
Complement Naive Bayes	78%	93%	89%	67%	82%
Support Vector Machine	75%	97%	95%	60%	81%
Random Forest	77%	92%	87%	66%	80%
eXtreme Gradient Boost	75%	97%	94%	60%	81%



Validation

@jk_rowling



J.K. Rowling
@jk_rowling

Dress however you please.
Call yourself whatever you like.
Sleep with any consenting adult who'll have you.
Live your best life in peace and security.
But force women out of their jobs for stating that sex is real?

#IStandWithMaya #ThisIsNotADrill



The Nation



Eric Priuska @EricPriuska · 19 Dec 2019

I'm not using TERF anymore because those transphobes are neither radical nor feminists. They use the exact same arguments as old white men and don't deserve special status.

They, and this includes @jk_rowling, are bigots, transphobes, and hatermongers.
Fuck them all



Bethany Shoreditch @BethanySpeaking · 19 Dec 2019

Science is a transphobe's dog whistle. Sex has absolutely nothing to do with so-called "chromosomes" or genitalia. Doctors literally randomly assign sex and gender at birth. When will @jk_rowling understand this?
#CancelJKRowling #JkRowlingsOverParty #JKRowlingsATerf



Rachel Young @meatbeagle · 19 Dec 2019

Replying to @jk_rowling

You are a human starting pistol. The harm and abuse you stirred up today has created indelible scars for many and this will cost lives as tens of thousands of oppressed people who have taken small comfort in your work confront your hatred. Shame on you. I thought you were better.



Chris Rogers @FoxThistleRose · 19 Dec 2019

I REALLY can't with @jk_rowling and her TERF transphobic views. I know we are all complex people with layers and that no one is perfect. But for someone who created a whole world with lessons on inclusion and anti bigotry, she sure doesn't get it. 💔

#TransRightsAreHumanRights



Kermit @HombreDeFlorida · 19 Dec 2019

Now that @jk_rowling has come out as a TERF, she's decided to make some big announcements about the Harry Potter franchise: all of the characters vote Conservative, and Hermione is a Boris Johnson supporter. Also, Newt Scamander wanted Britain to remain neutral during World War 2

@jk_rowling



Lesbian Conservative @lesbianoutsider · 19 Dec 2019

Replying to @glaad @jk_rowling

Anti-science & not a threat to women. So you admit that 'trans women' are not REAL women.

Women's sports are being destroyed by these men. Women's bathrooms & locker rooms are now open to the male public.

No one should lose their job for stating the obvious.



SuzyQ @S

Replying to @XRufio @ForwomenScot and 2 others

Who the heck are you hanging out with? Every lesbian I know is concerned about the erasure of sex-based rights and women's spaces, or being accused of being transphobic if they aren't attracted to someone with a penis if they 'identify' as a woman.



Reggie Mcleod @mcleod303 · 20 Dec 2019

Replying to @jk_rowling

#IStandWithMaya #ThisIsNotADrill I'm about as liberal as any other but this whole "choose your gender" crap is way beyond stupid and nauseous. Define yourself as you wish but not everyone in a free society should ever be held accountable in Law for your choices.



paul c @waster19teen76 · 19 Dec 2019

Replying to @neutralkmilkscot @jk_rowling

JK Rowling well done for having the courage to say what the overwhelming Majority are thinking.
#IStandWithJKRowling



EvelynWinters DEBoosted @EveleenWinters · 19 Dec 2019

Replying to @juzz_18 @JuliaHB1 and 2 others

People denying that fact that there are only two sexes.
Male and female.

You can identify as a tree, you're still either male or female.
There is outcry because jk agrees with science. Women are being called transphobic, for pointing out a trans woman is still biologically Male.



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Total tweets: 5360

Total labeled: 1032

Total liberal: 948

Total conservative: 85



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SuzyQ @SuzyQ

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Additional conservatives: 84

Remove duplicate users: -169

Final dataset: 781/166



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G. K. Chesterton @GKCdaily

Replying to @jk_rowling

"We shall soon be in a world in which a man may be howled down for saying that two and two make four, in which people will persecute the heresy of calling a triangle a three-sided figure, and hang a man for maddening a mob with the news that grass is green."

—G. K. Chesterton

@jk_rowling

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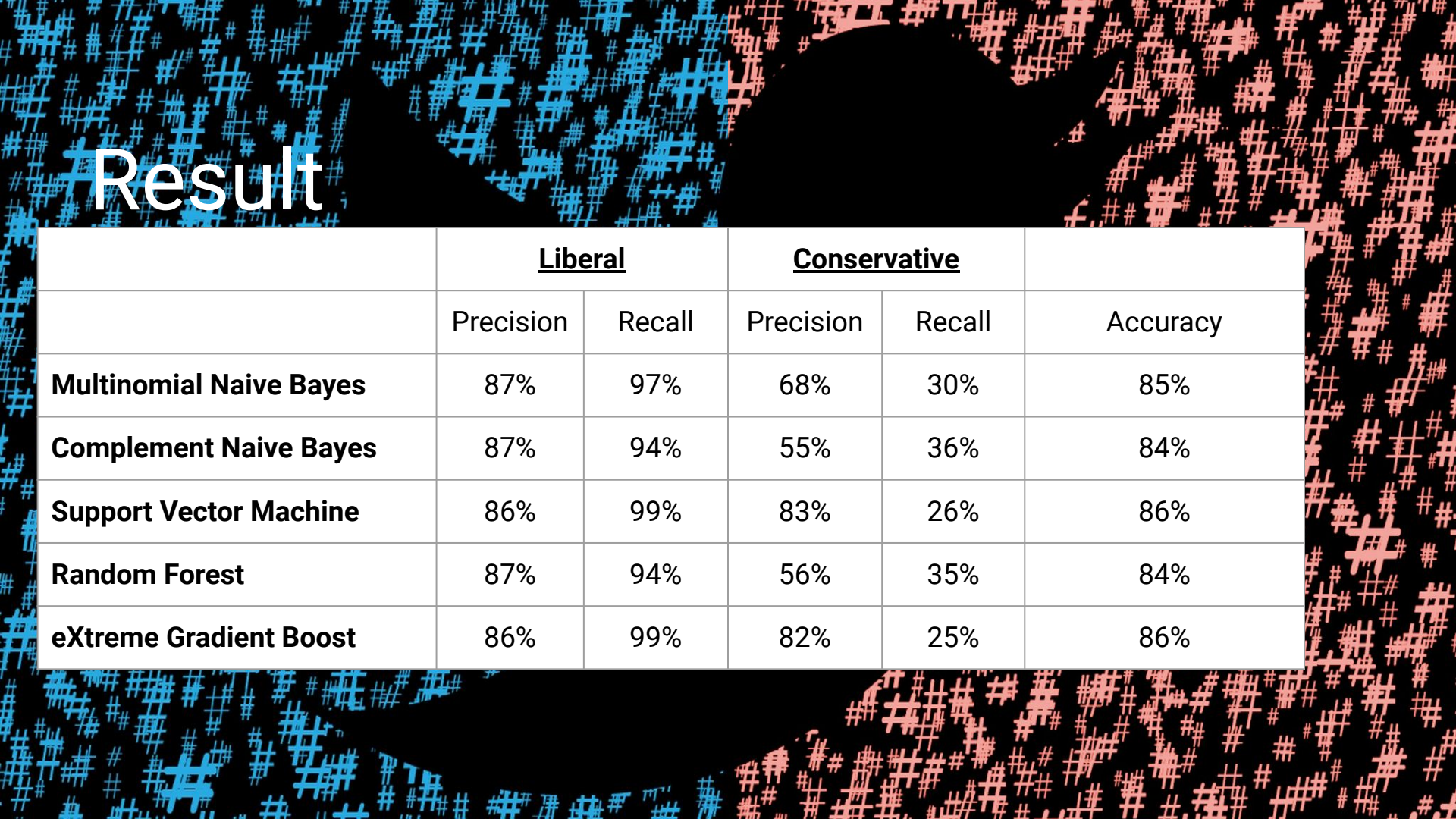
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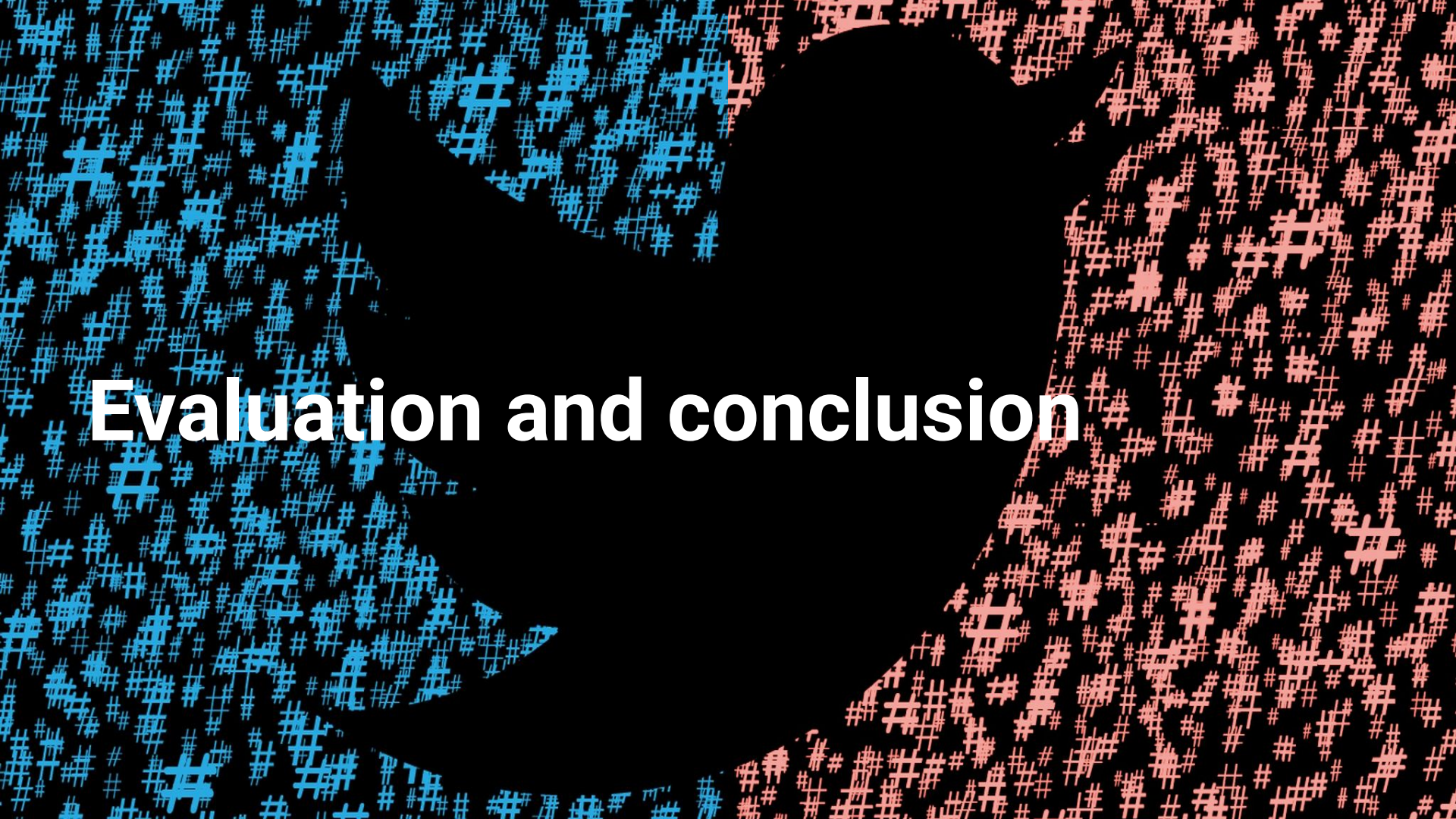
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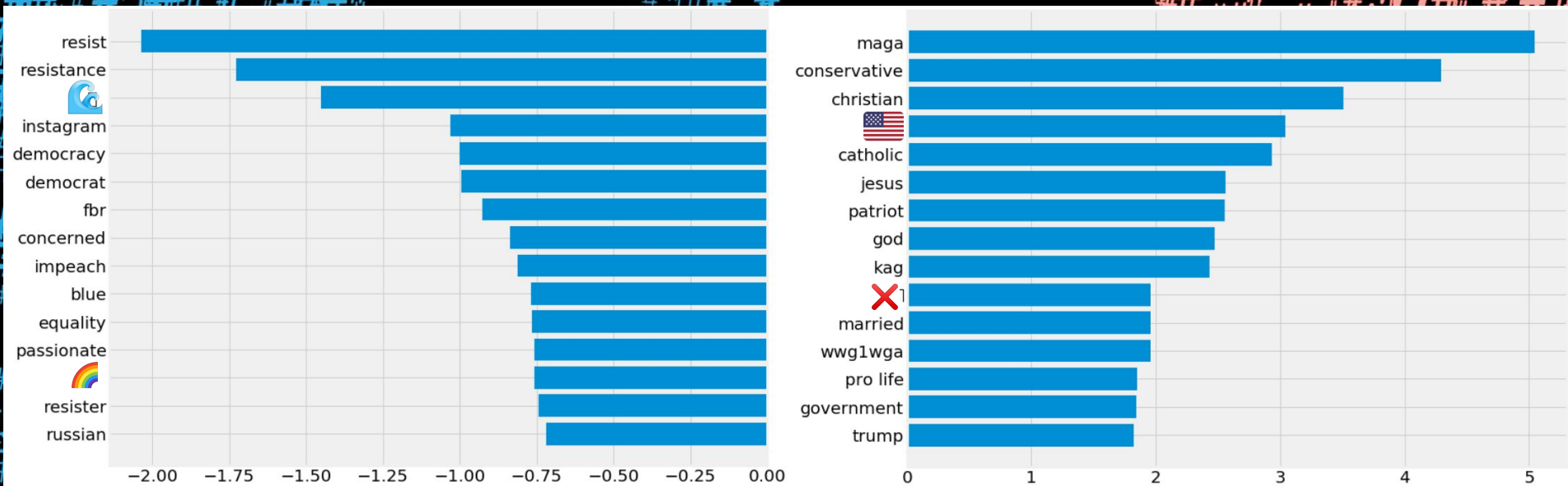
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Complement Naive Bayes	87%	94%	55%	36%	84%
Support Vector Machine	86%	99%	83%	26%	86%
Random Forest	87%	94%	56%	35%	84%
eXtreme Gradient Boost	86%	99%	82%	25%	86%



Evaluation and conclusion

Under the hood





Conclusion

- The models proved was reasonably accurate in predicting a person's political leaning using their description and user name with an accuracy of over 80% on the test and validation datasets.
- As the goal here to amplify the voice of a twitter minority, models with high precision on the minority group are preferred.
- However, many of the features the model used to predict a person's political leaning are mainly applicable to the USA, showing that the model ought to be trained on more diverse datasets.
- The approach to gathering data and solving this problem can be applied to similar issues, such as trying to deduce the sex of a twitter user, and multiple models can be stacked to identify more niche groups. For instance, if one wants to know what conservative + women think.

#ThankYouForListening 😊