

Detecting Depression in Youths

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DSI-SG-42
Project 3



Agenda

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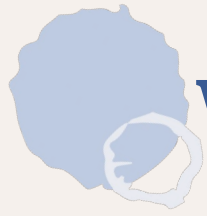
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01

Introduction



Who We Are

Mental Health Researchers

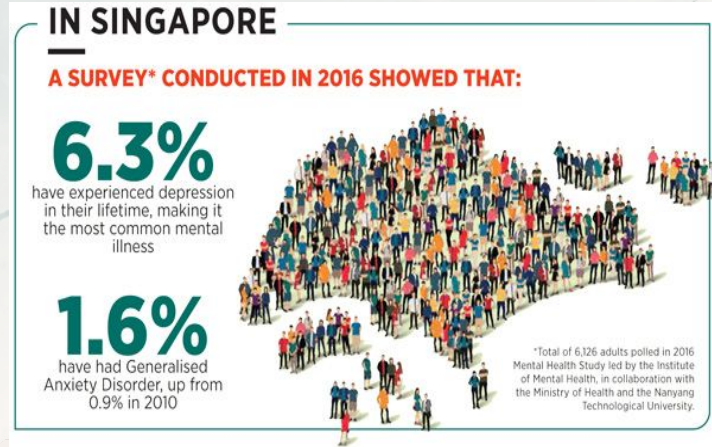


Who You Are

Social Media Companies



Depression in SG

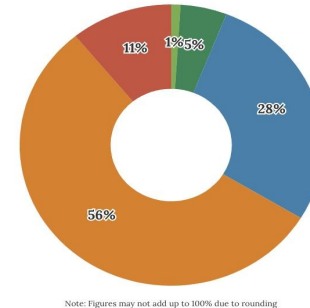


Source: [HealthXchange.sg](https://www.healthxchange.sg)

How concerned are you about the stigma that society attaches to the articulation of mental health problems in the country or territory you live in?

All Japan South Korea Hong Kong **Singapore** Malaysia Indonesia

■ Not at all concerned ■ Somewhat not concerned ■ Neither ■ Somewhat concerned ■ Extremely concerned



Source: [Wellnex Jan 2023](#)

External Stigma:

"The most difficult part was the loneliness of the journey and not understanding the seriousness of what I was going through," said Rae, who was often **misunderstood** by her teachers as being lazy whenever she tried to recover from chest pains by taking deep breaths and putting her head on her desk to rest.

Internal Stigma:

"It's not just about burdening others, but (the idea that) my problem is not big enough. Or if I even open my mouth to admit that I need some form of help, I've failed myself"

Why Youths?



THE STRAITS TIMES

SINGAPORE

16 out of 1,000 primary school pupils required mental health support in 2021, number stable over five years

Source : The Strait Times Oct 2022

Another study made by the National University of Singapore confirmed that about one in three youth in Singapore has reported internalising mental health symptoms such as sadness, anxiety and loneliness, a national study has found.

Those aged 14 to 16 had more serious symptoms.

The good news is that more Singaporeans keen to learn about mental health and seek help. A survey done by Chanel News Asia found that 66 per cent of respondents in Singapore were concerned about the stigma surrounding mental health. Although things are improving on the awareness front, misconceptions remain, the experts said.

Source: Wellnex Jan 2023

MORE YOUTHS DIAGNOSED WITH DEPRESSION

One study published last year (2021) revealed, the number of those aged 10 to 24 diagnosed with depression at one healthcare group grew four-fold between 2013 and 2018 – a more rapid increase than for any other age group.

Writing in the ASEAN Journal of Psychiatry, the study's authors referred to other research that has shown how "compared to adult-onset depression, adolescent-onset depression has been found to be associated with greater psychosocial impairment, physical health problems, psychiatric comorbidity, and suicidality".

"Early interventions are critical," they added.

During the pandemic, in the second half of 2020, 52 per cent of young respondents in National Youth Council polls said mental well-being was a challenge.

Source: CNA, May 2022

S'pore 'redoubling efforts' to better understand mental health issues youths face, says DPM Wong



Source: CNA February 2024

Key Factor:

Heavy social media usage

- pressure to present positive image online
- cyberbullying
- sleep deprivation, reduced physical exercise, fewer real live interactions

Persona - Xiao Ming, 30

- Moderator of social media company
- Engaged by Inter Agency Taskforce on Mental Health and Well-Being (MOH) to step up efforts to support youths' mental health
- Wants to adopt a more proactive approach in supporting those who might have depression
- Current moderation measures only covers abusive comments and cyberbullying
- No system in place to identify those with mental illness online



Problem Statement 02

Problem Statement

How might we detect whether
Youths are at **risk of**
depression based on their
online posts?

Predictive Model

- Natural Language Processing (NLP)
- Predict by classifying text whether author is at risk of suffering from depression
- Analyse online posts and comments on social media app
- Early identification of at risk youths, thereby enable proactive supportive actions to be undertaken

03

Analysis & Modelling

Process

Reddit Scraping

1. Subreddits: Happy, Depression
2. New, Hot
3. Title, Body, Comments

Data Cleaning

1. Dropping of Duplicates
2. Null Values Removal
3. Merging into 1 Dataframe

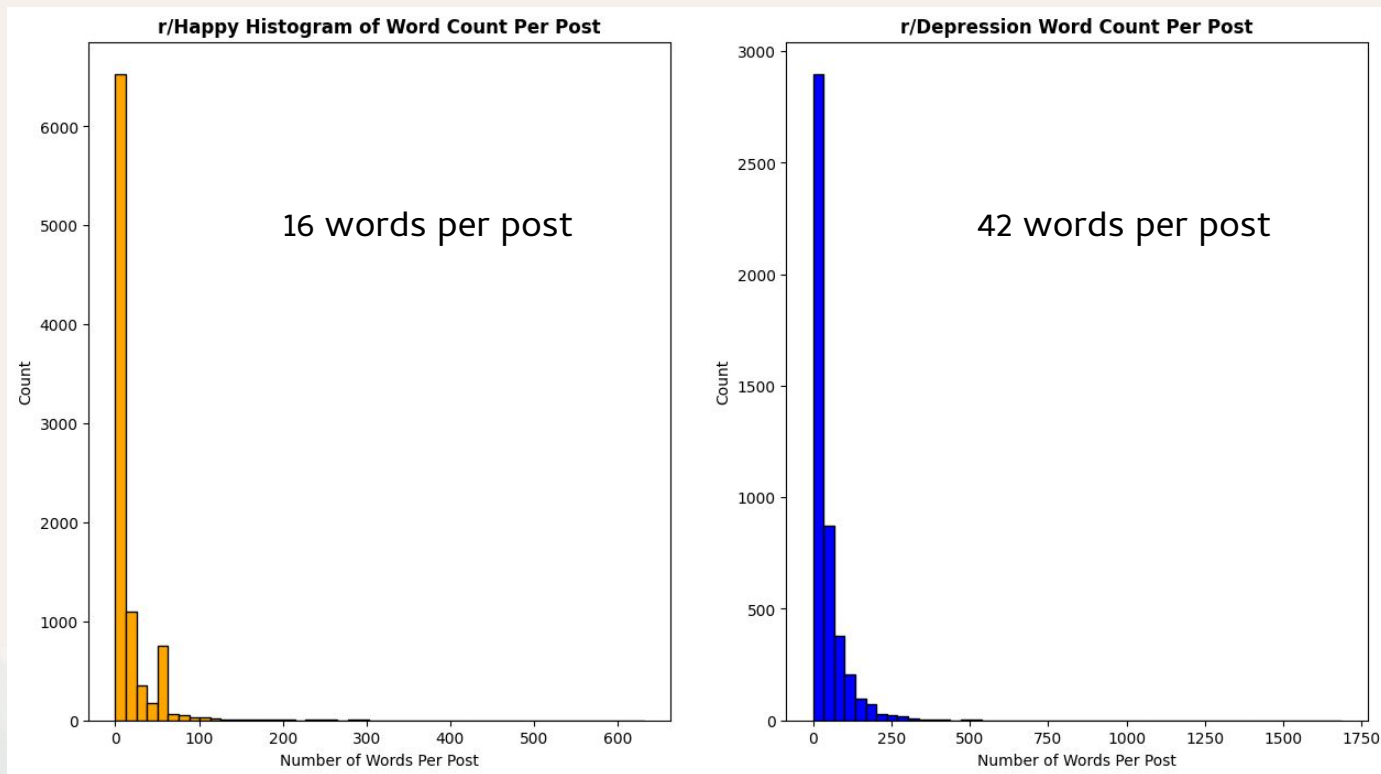
Text Preprocessing

1. Stopwords Removal
2. Tokenizing
3. Lemmatization
4. 2-gram

Modelling

1. CountVectorizer - Naive Bayes Multinomial
2. CountVectorizer - Logistic Regression
3. CountVectorizer - KNearestNeighbor
4. TF-IDF - Naive Bayes
5. TF-IDF - Logistic Regression
6. TF-IDF - KNearest Neighbor

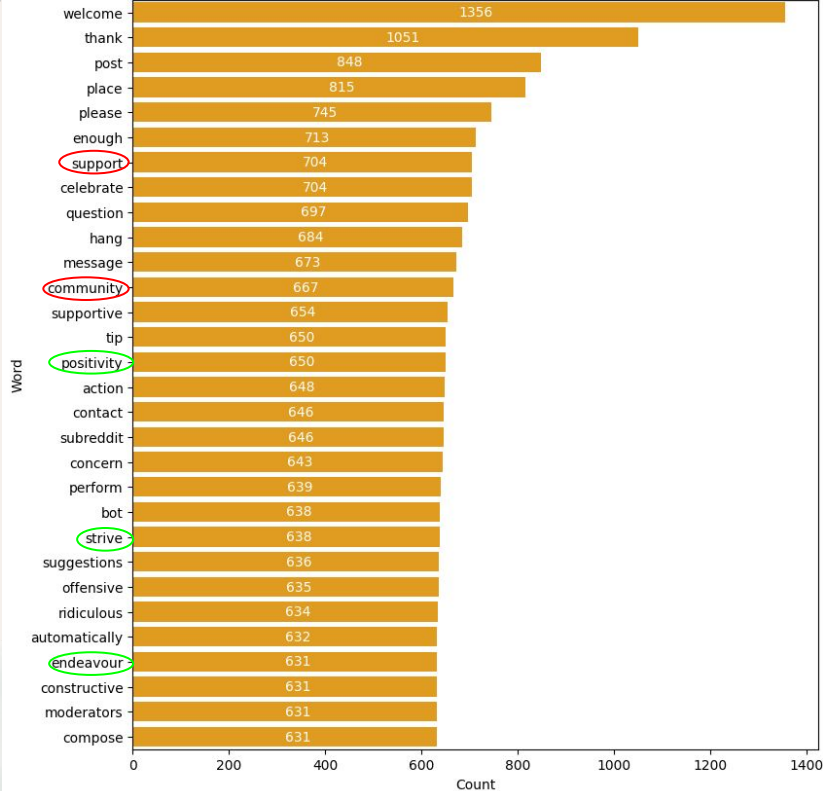
Datasets Details



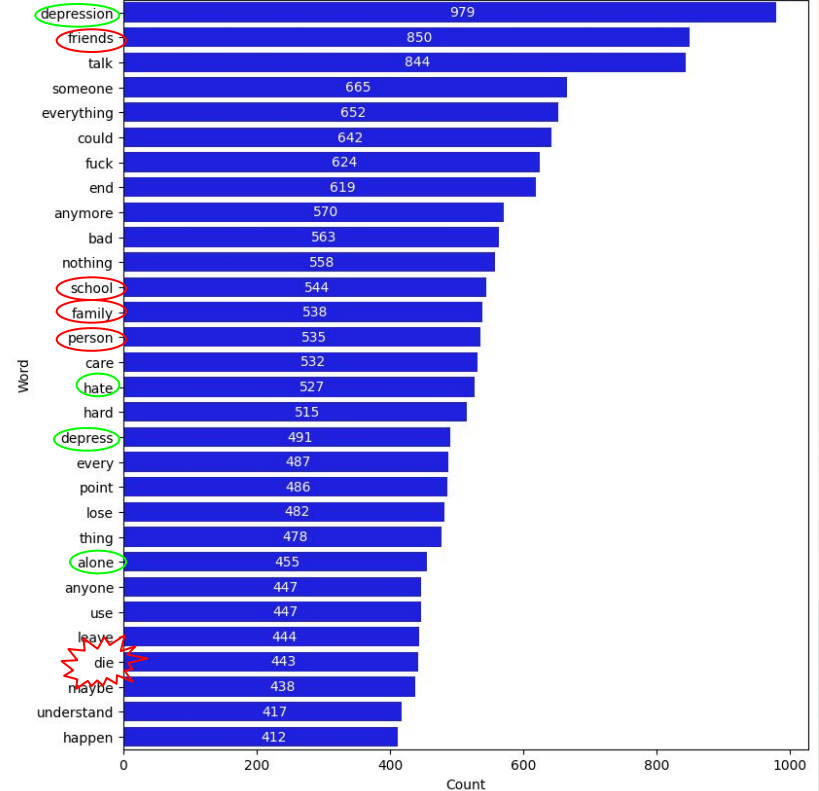


Top 20 Words

r/happy Top Word Frequencies

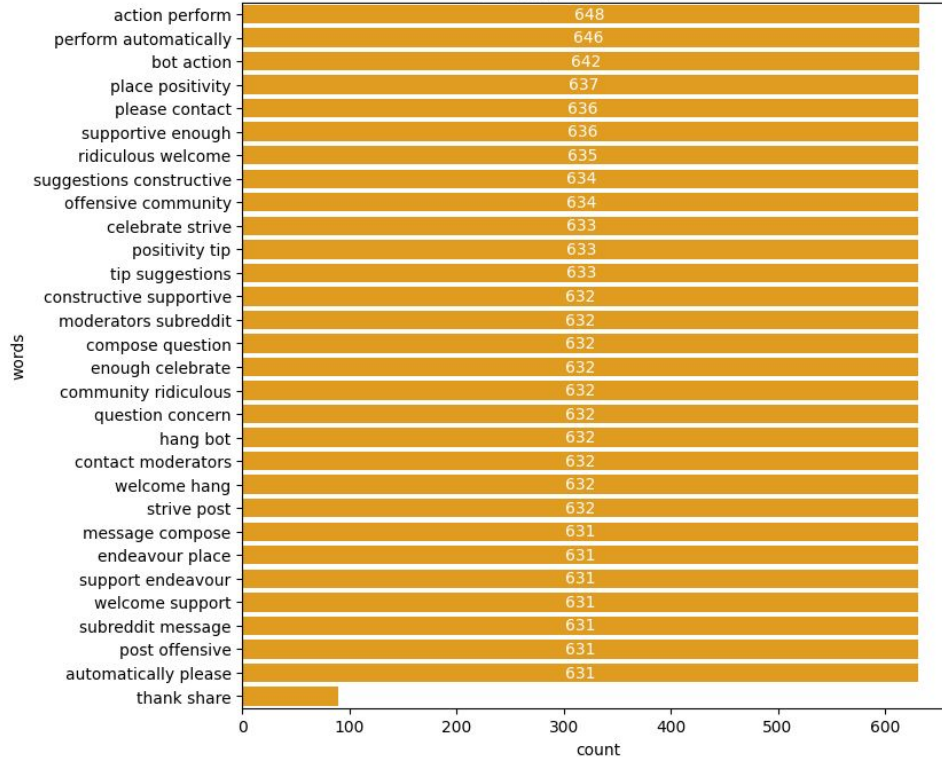


r/depression Top Word Frequencies

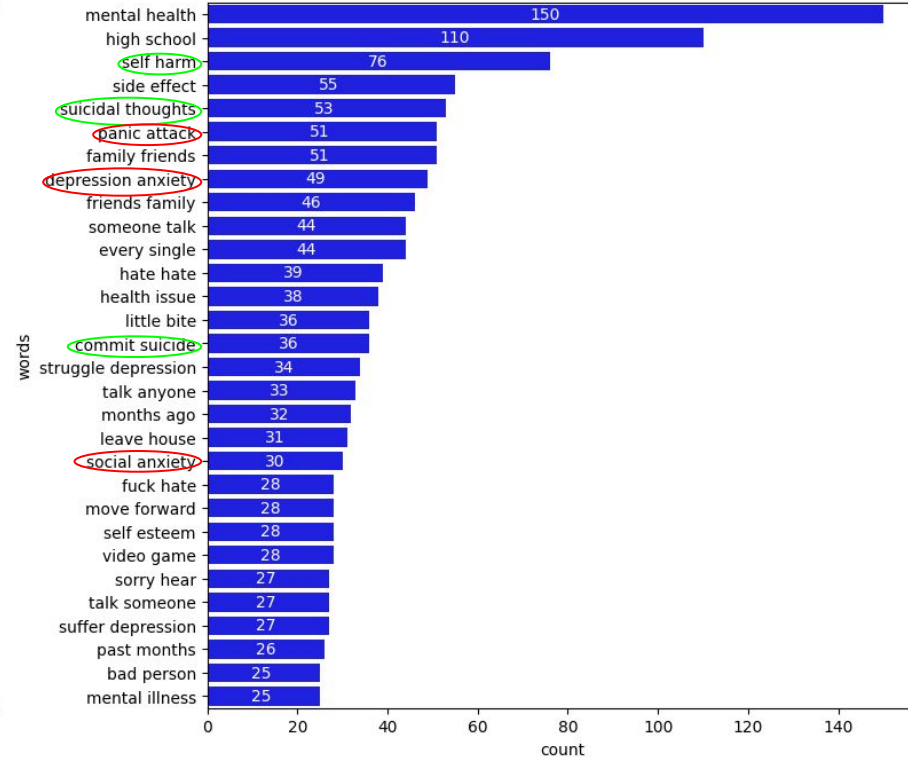


Top 20 2-Grams

r/Happy Top 20 2-Grams

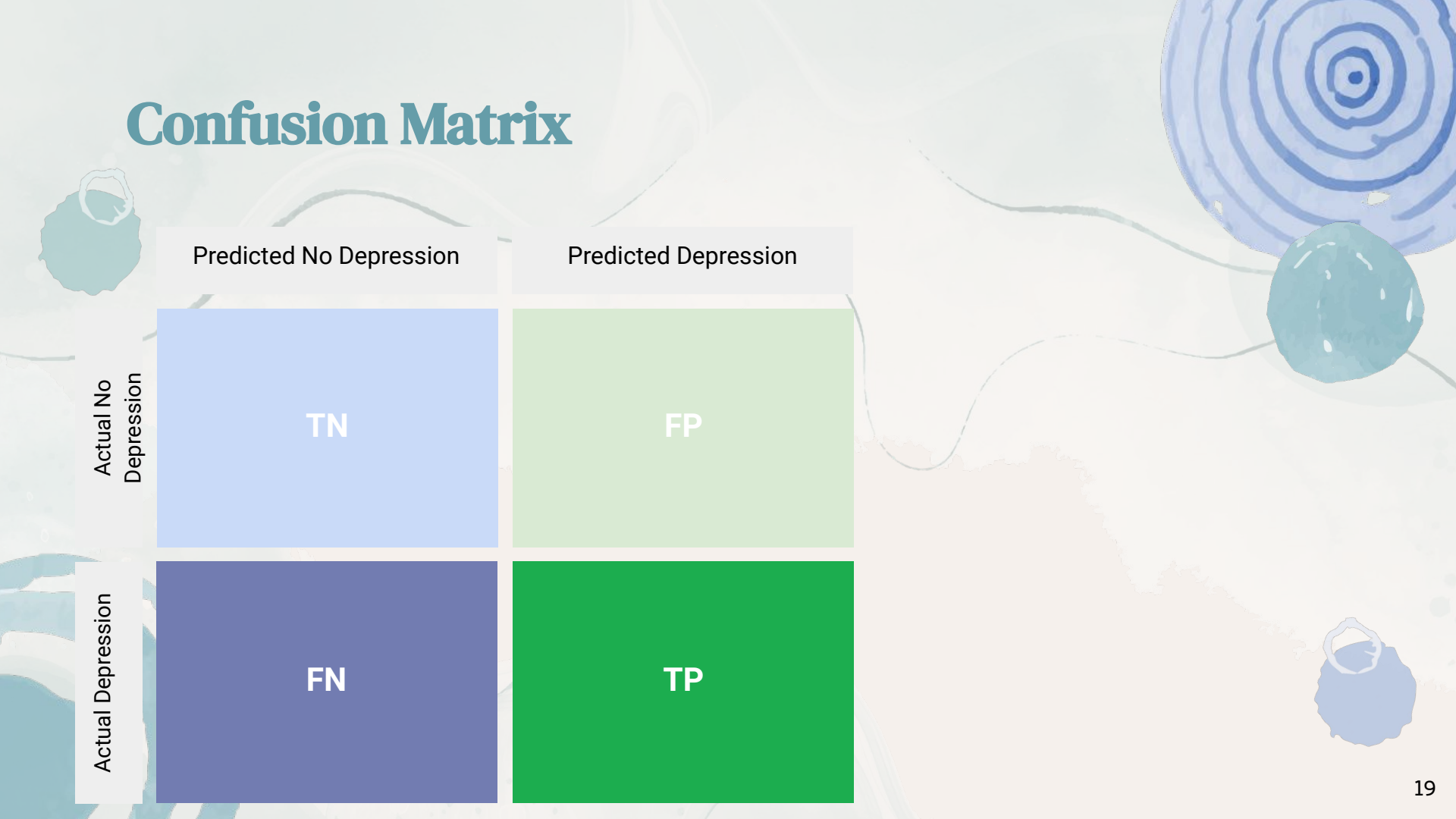


r/Depression Top 20 2-Grams



Modelling

Confusion Matrix



	Predicted No Depression	Predicted Depression
Actual No Depression	TN	FP
Actual Depression	FN	TP

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Actual: have depression

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Selection of Model - Sensitivity

From all of those who are **actually having depression**, how many are predicted correctly?

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Baseline Model Sensitivity Score

	Naive Bayes	Logistic Regression	K Nearest Neighbor
CounterVectorizer	95.51%	89.13%	73.34%
TF-IDF	95.6%	84.56.%	5.09%

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- Selected Naive Bayes with TF-IDF

Optimizing Model

From all of those who are **actually having depression**, how many are **predicted correctly**?

Naive Bayes with TF-IDF

	Baseline	Hypertuned
Train Score	85.36%	83.99%
Test Score	79.99%	80.70%
Sensitivity	95.6%	92.41%

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Model Simulation

How does our model predict an online post?



18

r/mentalhealth • 23 hr. ago
Whole-Mirror-535

18 NSFW

My ex said I sexually assaulted her

Content Warning: Sexual Assault

So the incident happened a few months ago, me and my girlfriend at the time were getting intimate and she asked me if she could suck it so I said well you could sit on it and she obliged. During the sex (she was ontop) she said she was tired to I asked her to keep going and she did, eventually she got off and looked upset so I asked her about what was up and she said I didn't listen to her and what not and I felt a great deal of guilt. Anyway we spoke about it more and I asked her if I held her down or did I rape her or did I sexually assault her and she said I didn't to all of that. So we split up earlier this month and she came up to me today saying how I did this that and the other and that incident came up, she said I held my hands on her hips which I didn't and she said I sexually assaulted her, she also said she wants nothing to do with me. Closer to the time of the incident she spoke to one of our mutuals about it who at first was angry but then when I spoke to them about it and said what happened in more detail about the incident they said I shouldn't feel guilty but right now I feel so shit about the whole thing. She's adding things that didn't happen to the story yes but something still happened and I just don't know what to do



18

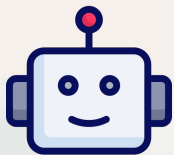
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You are at risk of depression



r/Positivity • 18 hr. ago
accidntlypusilanime



life is so cool

just sat down to have a snack and got ran over by a feeling of gratefulness and contentment when i looked down at the cup of coffee and grilled cheese i made life is so cool dude

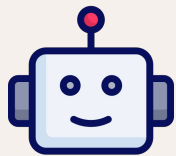


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You are not at risk

04

Conclusion & Recommendations

Conclusion

1. We might identify youth at risk of depression by detecting words that indicate depression
2. The most indicative of Depression: depression, f*ck, anymore

Conclusion

1. We might identify youth at risk of depression by detecting words that indicate depression
2. The most indicative of Depression: depression, f*ck, anymore
3. Depression is a serious and prevalent in our society issue that needs to be addressed at a young age
4. Instead of waiting for youths to seek help, with our model, we can be more proactive in identifying those at risk of depression through observing their language.

Recommendations

1. Social Media companies can apply our predictive model when youths post online
2. Those who are then identified by our model to be at risk of suffering from depression can then be referred to support organisations (eg. Care Corner, Tinkle Friend)

Future Plans

1. Work with MOE and apply our model to their database of students' termly check in surveys so that schools can also take action to support the student
2. Incorporate our model into the social media platform, similar to autocorrect function
3. Explore possible partnerships with search engines to do predictions based on their searches

Model Limitation

1. Model may not be able to detect words in short-form or slang, which are distinct to their own countries
2. Model may falsely detect sarcastic posts

Thank you!

Q&A