ARE YOU FEELING ANXIOUS RIGHT NOW?

Anxiety detection on social media text

Ihza Gonzales, Azin Faghihi and Suelem Lee

19%
Of adults have an anxiety disorder (Anxiety disorders, 2017)

40 MILLION
People in the US with anxiety

The need to be addressed

4 Ways That Untreated Anxiety Impacts Physical Health

1. Symptoms almost resembles a heart attack
2. Increased risk of Heart Attack
3. More Stress hormones
4. Insomnia and its effects

source

But also because:

1. Help avoid Sleepless nights
2. Missed opportunities
3. Avoid getting sick
4. Make you feel like your full self.

HOW DO WE KNOW WHEN TO SEEK TREATMENT?

Anxiety that interferes with:

      day-to-day functioning

      affects work

      school

      social life

source

Available apps today:

Best anxiety apps

FUTURE IPHONES COULD DIAGNOSE YOU WITH DEPRESSION IF TOO MANY TYPOS DETECTED

YOU'RE DEPRESSED DARLING

rt ✓ Cancel your psychiatrist sessions and speak with Siri instead; #Apple is working on technology to detect depression, #anxiety and cognitive decline.

The new research by the tech company is looking into the possibility of mental wellness tracking by monitoring your personal data such as 'typing behaviour, sleeping patterns, physical activity', and more.

If the technology comes to fruition, the depressing reality of having too-fat thumbs for ever-decreasing interfaces, or the anxiety-inducing typo you made in that vital work email could be even more clinical than you first thought.

5,918 likes

4 DAYS AGO

Add a comment...   Post

Problem statement

From anxiety subreddit can we classify them into varying degrees of anxiety and provide tailored messages to address anxiety with a Chatbot response system?
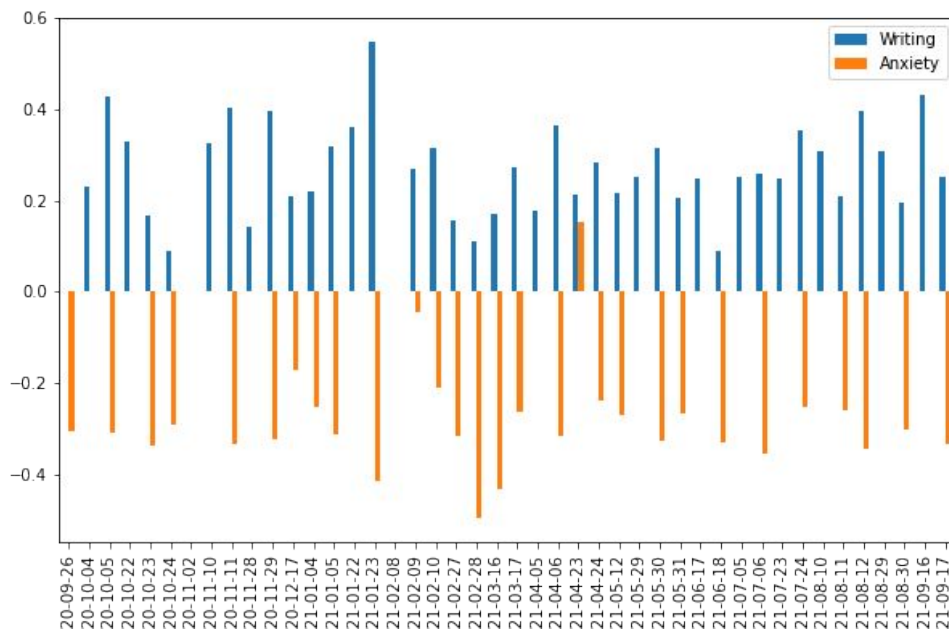
Methodology

1. EDA
2. Modeling for anxiety Classification
3. Sentiment analysis to further classify severity of anxiety
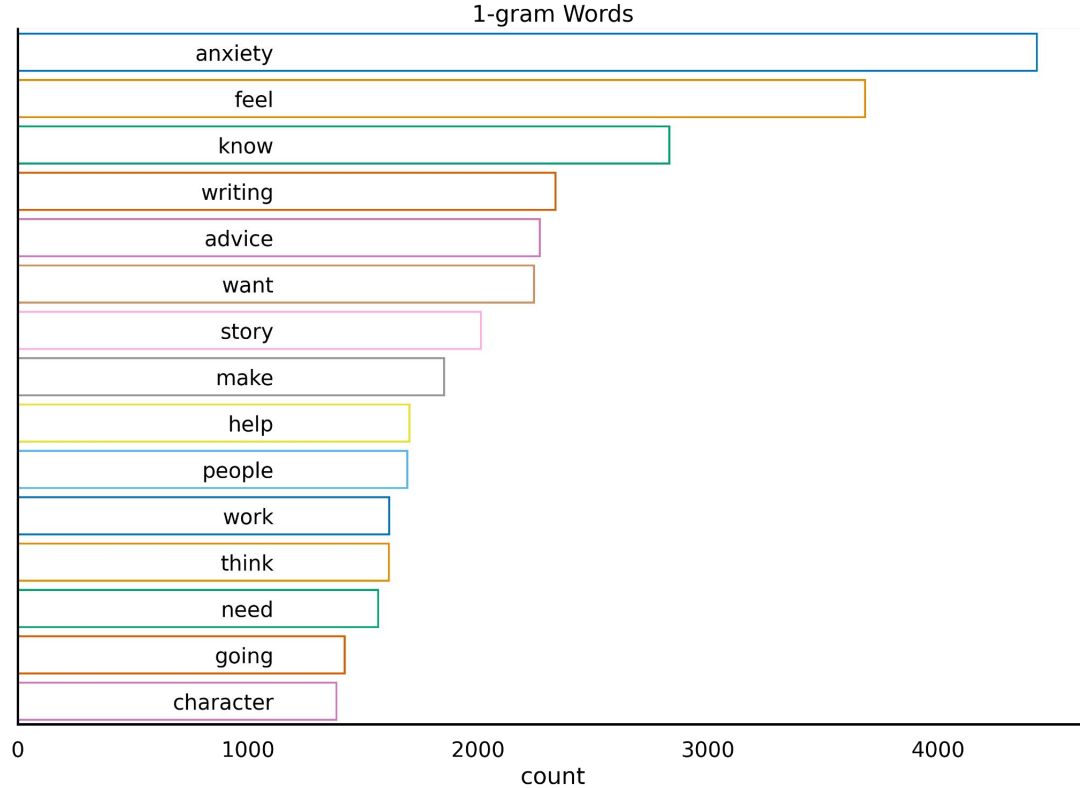4. Chatbot for immediate response

Data:

Posts evaluated from anxiety vs writing as a neutral sentiment subreddit:
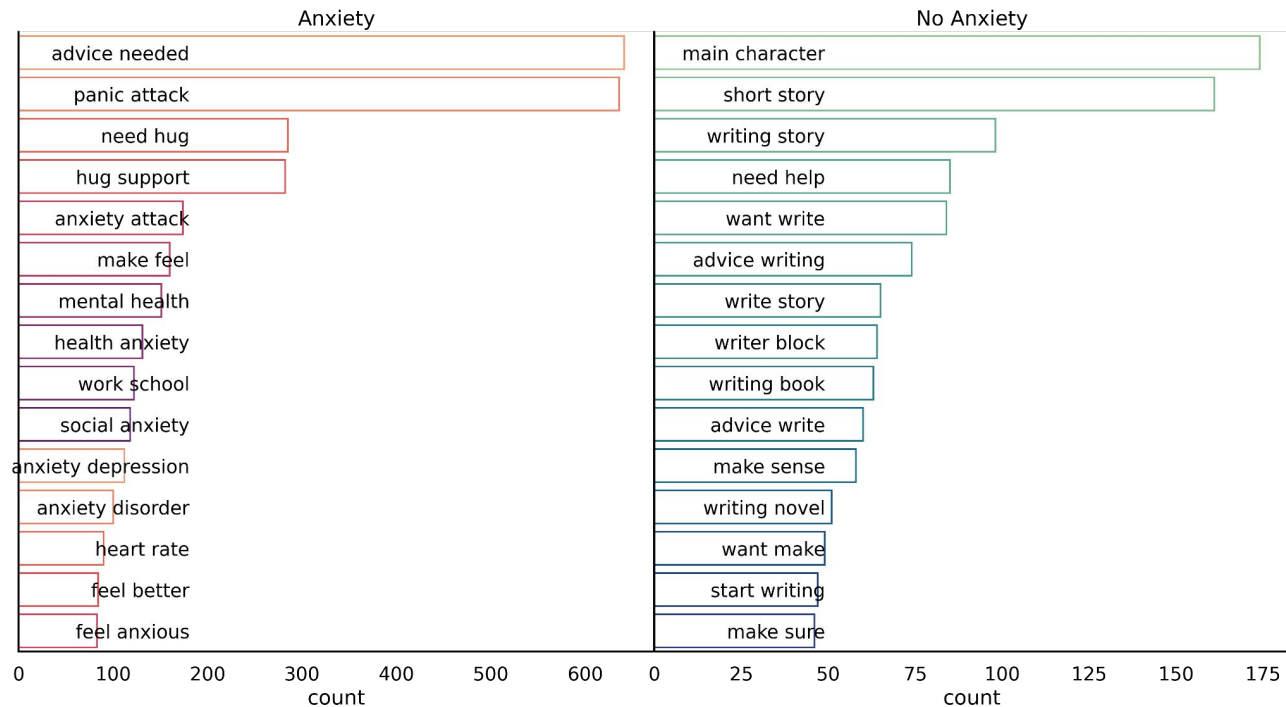
Raw data:

Word Count

1-gram Words

Word	
anxiety	
feel	
know	
writing	
advice	
want	
story	
make	
help	
people	
work	
think	
need	
going	
character	

count

Bigrams

2-gram Words

Anxiety	No Anxiety
advice needed	main character
panic attack	short story
need hug	writing story
hug support	need help
anxiety attack	want write
make feel	advice writing
mental health	write story
health anxiety	writer block
work school	writing book
social anxiety	advice write
anxiety depression	make sense
anxiety disorder	writing novel
heart rate	want make
feel better	start writing
feel anxious	make sure

Adjusted term weights on vader sentiment analysis:

WOOOOORRRRIED vs WORRIED

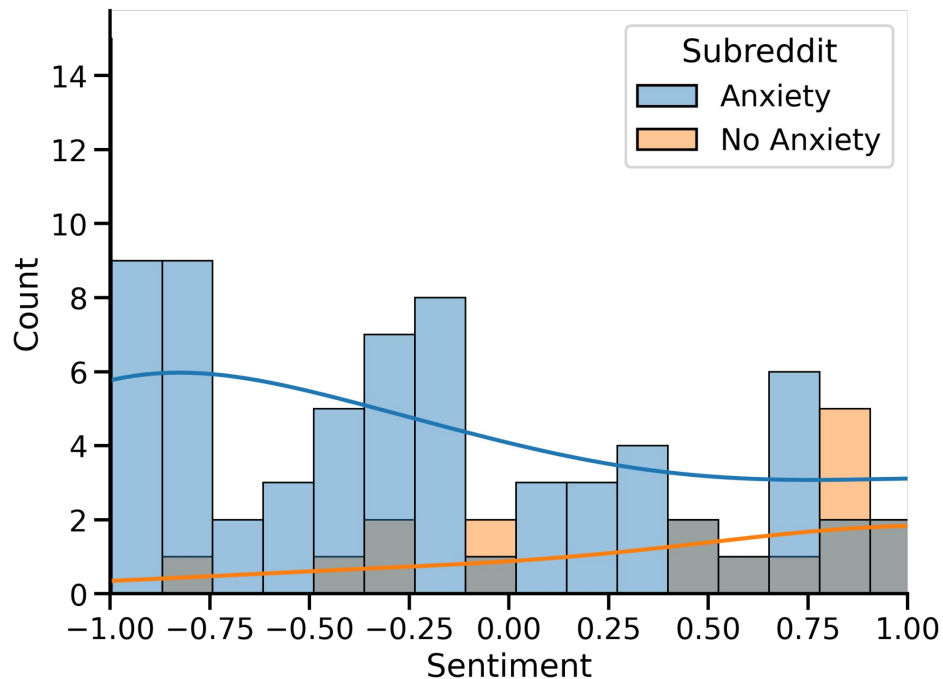## ???? AND ?!?!? AND !!!!

👍🥰😆😡😮😢❤️

Emojis: Sentiment Scores

Char	Unicode	Occurrences [5-max]	Position [0-1]	Neg [0-1]
😂	0x1f602	14622	0.805	0.247
❤	0x2764	8050	0.747	0.044
♥	0x2665	7144	0.754	0.035
😍	0x1f60d	6359	0.765	0.052
😭	0x1f62d	5526	0.803	0.436
😘	0x1f618	3648	0.854	0.053
😊	0x1f60a	3186	0.813	0.06
👌	0x1f44c	2925	0.805	0.094
💕	0x1f495	2400	0.766	0.042
👏	0x1f44f	2336	0.787	0.104
😁	0x1f601	2189	0.796	0.127
☺	0x263a	2062	0.799	0.062
♡	0x2661	1975	0.764	0.052
👍	0x1f44d	1854	0.812	0.115
😩	0x1f629	1808	0.826	0.591
🙏	0x1f64f	1539	0.794	0.081

Overall Sentiment Scores
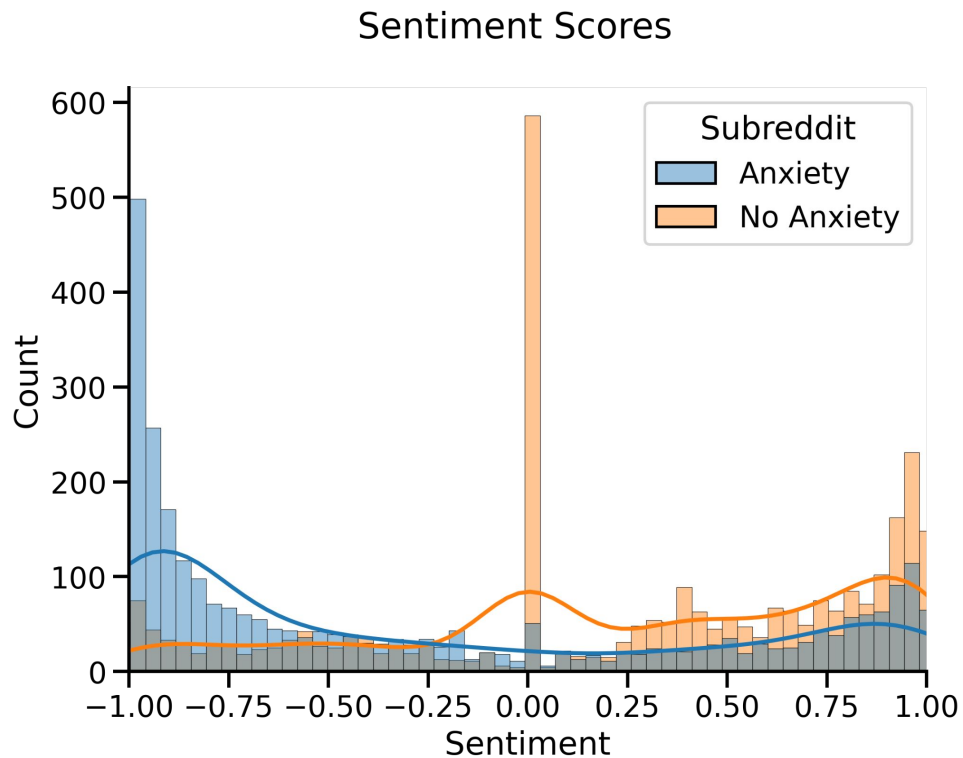
Sentiment Scores

Emoji Usage

Sentiment Scores for Posts with Emojis

Punctuation Usage

Use of Punctuations
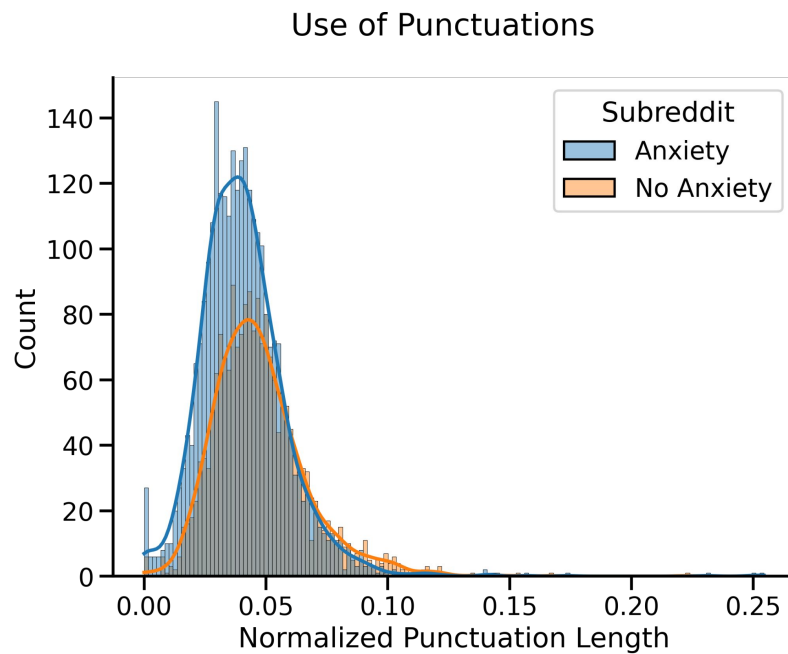
Modeling

Multinomial Naive Bayes

Confusion Matrix
Transformer: "CountVectorizer"
Estimator: "MultinomialNB"
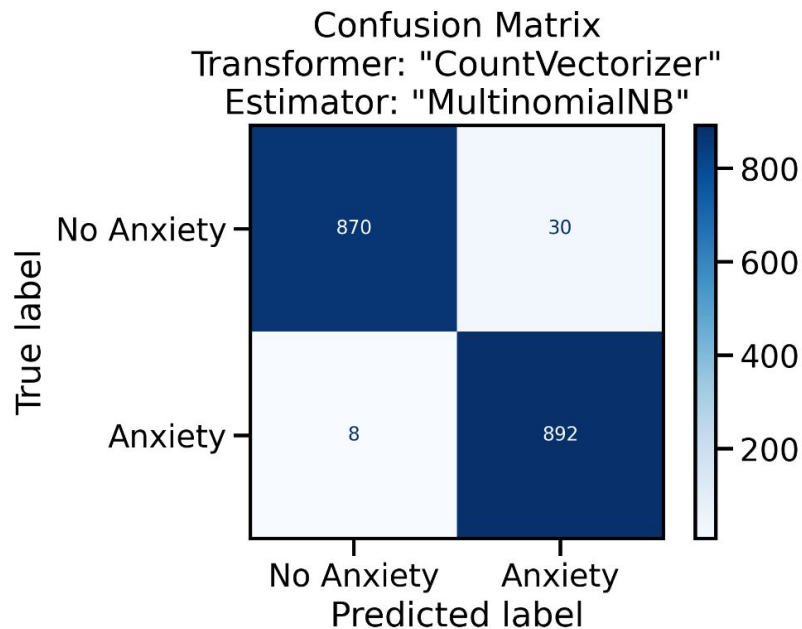
Accuracy: 98%

Precision: 97%

F1 - score: 98%

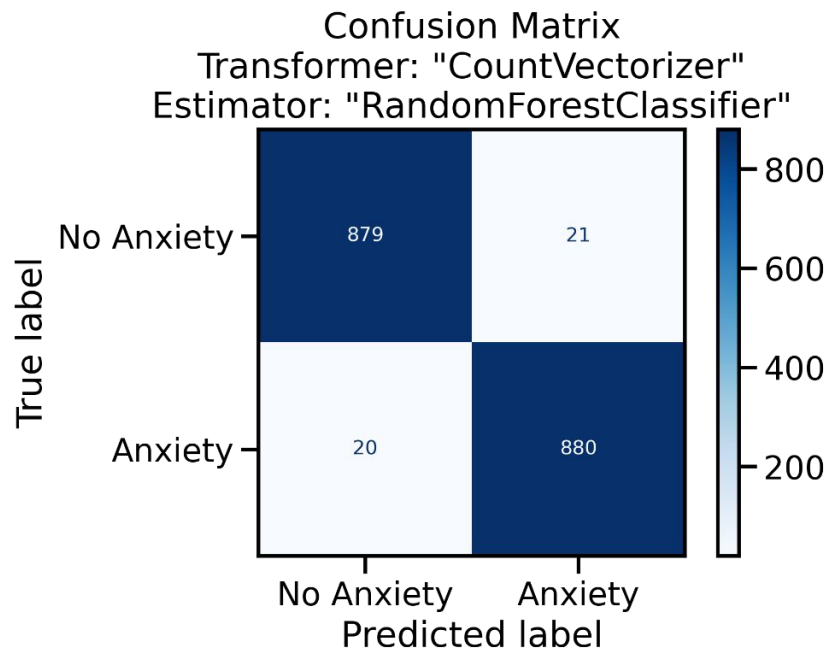Recall (Sensitivity): 99%

Specificity (True Negative Rate): 97%

max_df: 0.92

max_features: 4000

min_df: 4

ngram_range: (1, 2)

Random Forest

Confusion Matrix
Transformer: "CountVectorizer"
Estimator: "RandomForestClassifier"

Accuracy: 98%

Precision: 98%

F1 - score: 98%

Recall (Sensitivity): 98%

Specificity (True Negative Rate): 98%

max_df: 0.92

min_df: 4

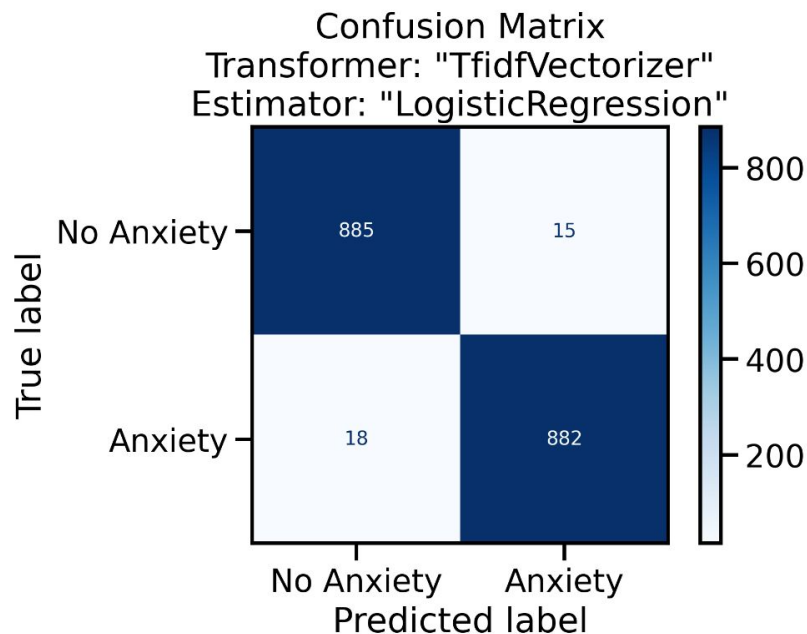ngram_range: (1, 2)

max_depth: None

max_features: sqrt

n_estimators: 150

Logistic Regression

Confusion Matrix
Transformer: "TfidfVectorizer"
Estimator: "LogisticRegression"
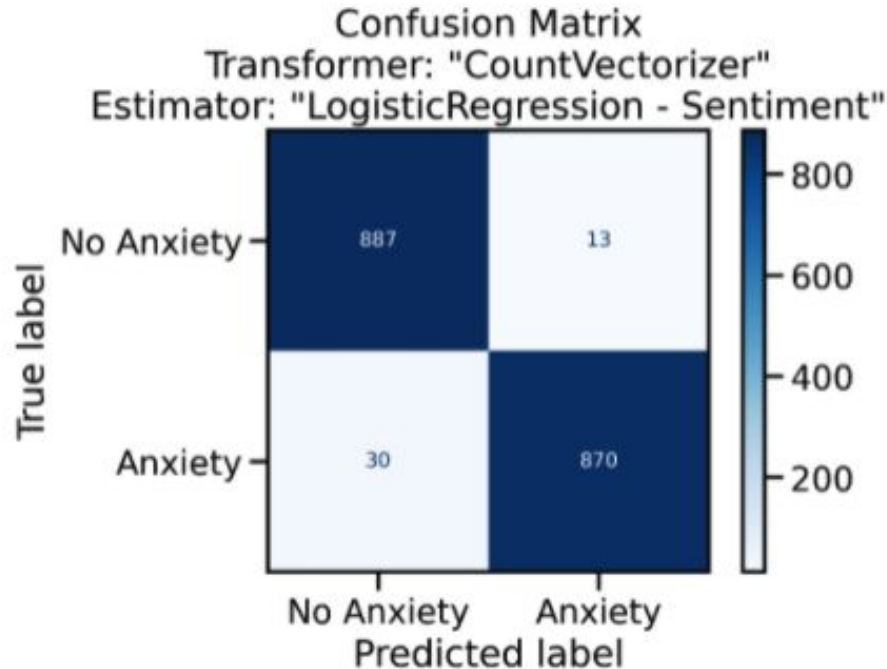
Accuracy: 98%

Precision: 98%

F1 - score: 98%

Recall (Sensitivity): 98%

Specificity (True Negative Rate): 98%

max_features: 3000

ngram_range: (1, 2)

Logistic Regression - with Sentiment Scores

Confusion Matrix
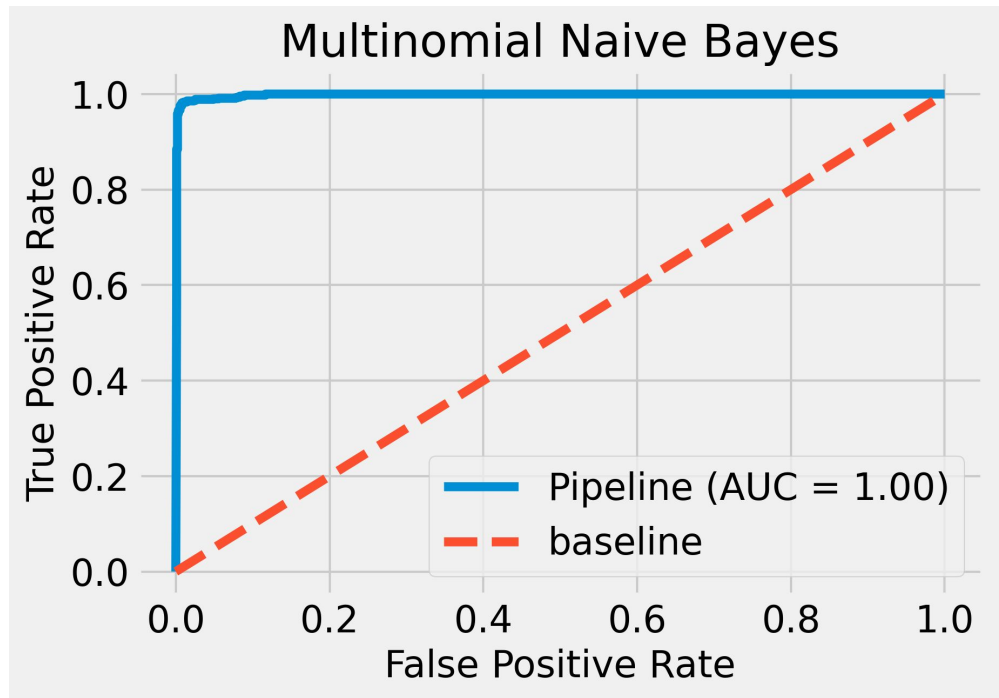Transformer: "CountVectorizer"
Estimator: "LogisticRegression - Sentiment"

	No Anxiety	Anxiety
No Anxiety	887	13
Anxiety	30	870

True label / Predicted label

Accuracy: 98%

Precision: 99%

F1 - score: 98%

Recall (Sensitivity): 97%

Specificity (True Negative Rate): 99%

ROC Curve

Multinomial Naive Bayes — ROC curve plotting True Positive Rate against False Positive Rate. Pipeline (AUC = 1.00), baseline.

Recall-Precision Curve
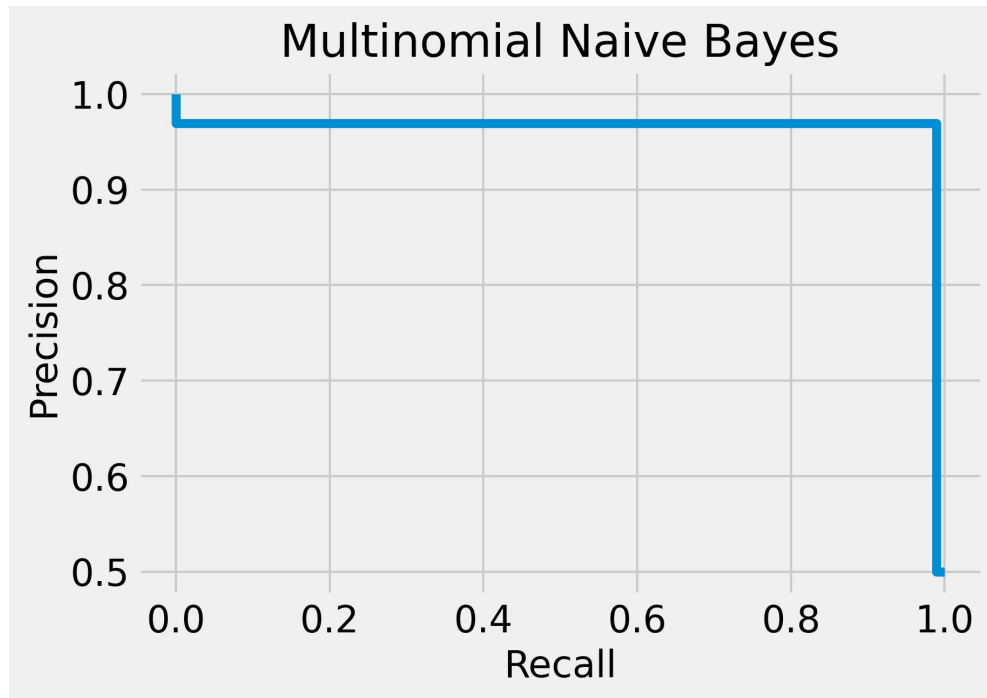
Modeling Results

	Train Score	Test Score	F1 - score	Recall	Specificity	Precision	Accuracy
MultinomialNB	0.982	0.979	0.979	0.991	0.967	0.967	0.979
LogisticRegression	0.99	0.982	0.982	0.98	0.983	0.983	0.982
RandomForestClassifier	1.0	0.977	0.977	0.978	0.977	0.977	0.977
Logistic Regression with Sentiments	0.998	0.976	0.976	0.967	0.986	0.985	0.976

Coefficients

Transformer: "CountVectorizer"
Estimator: "LogisticRegression"
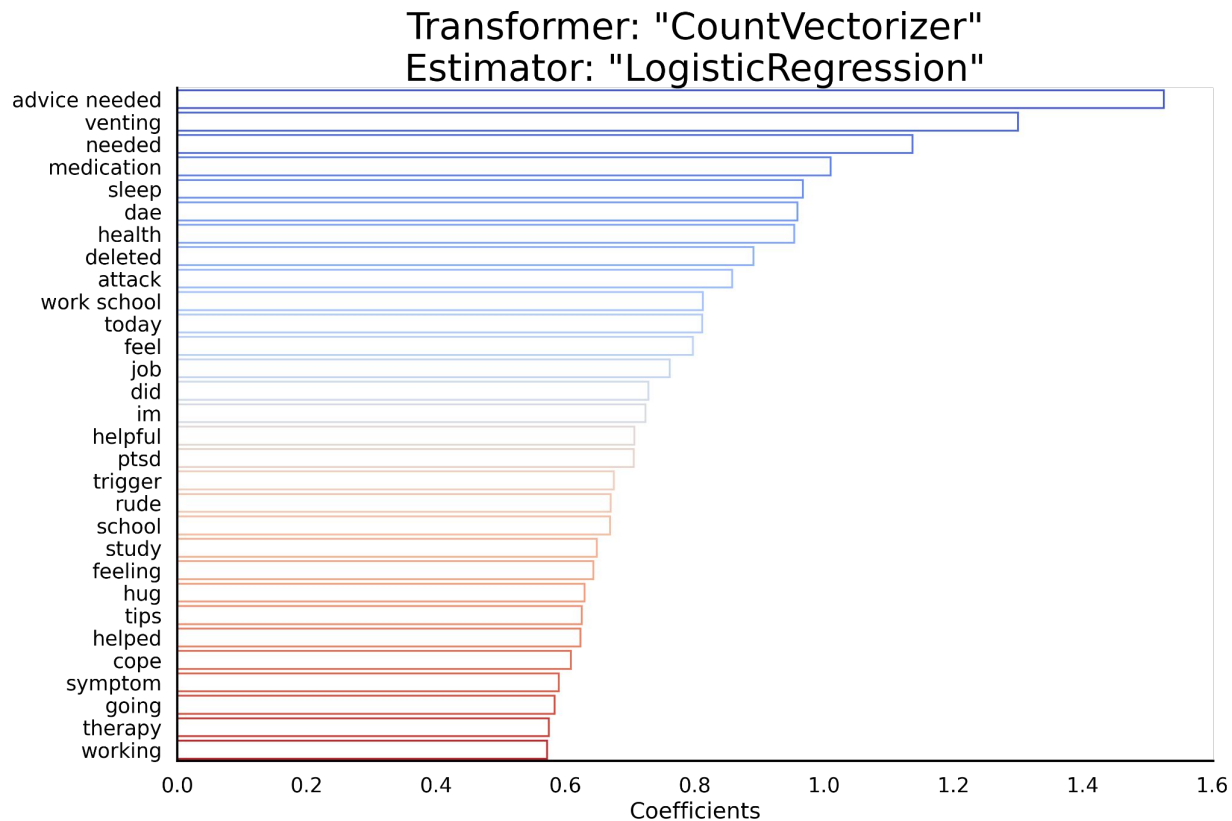
Classifying users messaging anxiety levels:

Threshold for severity of Anxiety
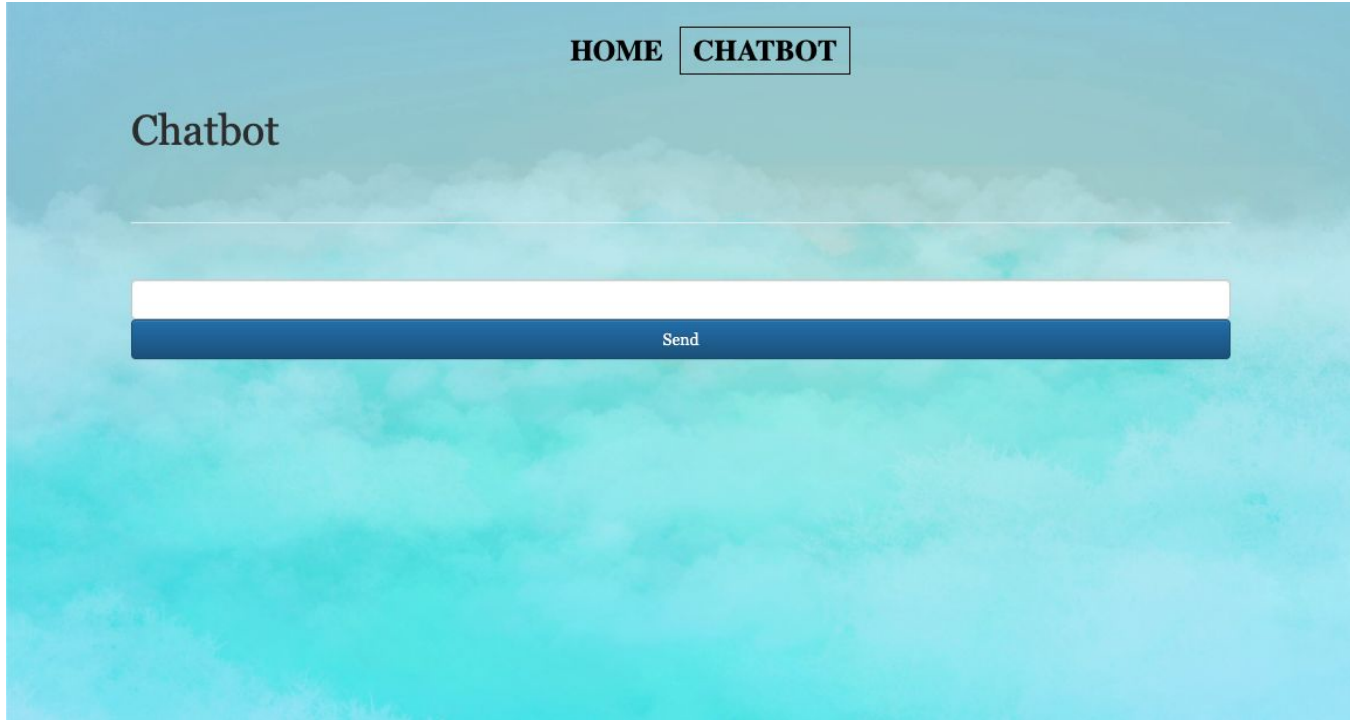
|	mean
Subreddit	
Anxiety	-0.282417
No Anxiety	0.267053

Sentiment Scores
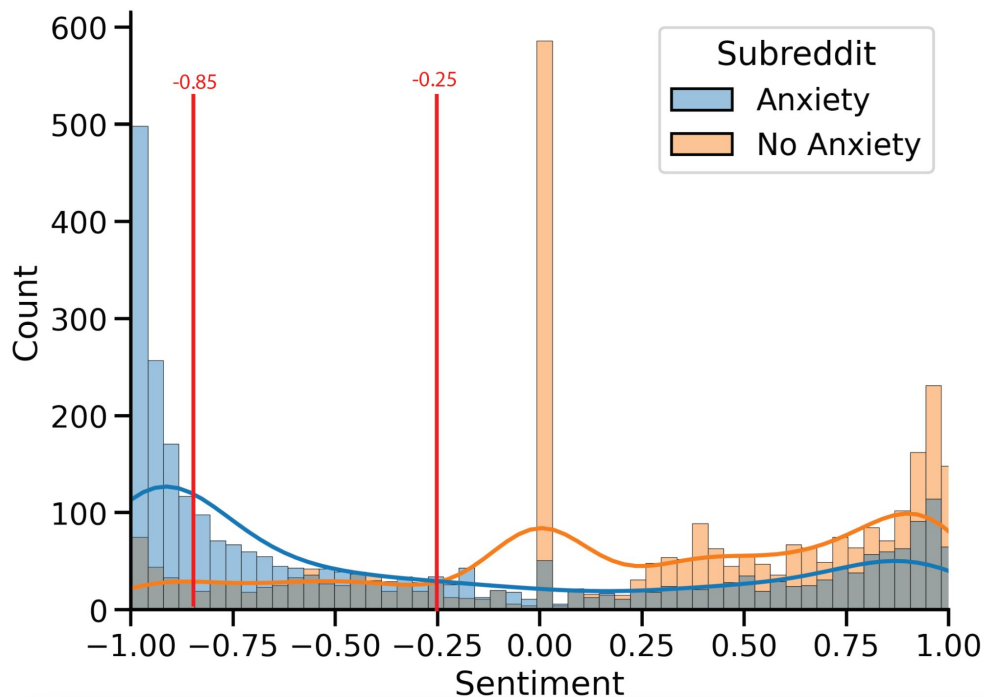
Chatbot

Anxiety disorder Prevention

- Take care of your body by eating a well-balanced diet

- Limit alcohol, caffeine, and sugar consumption.

- Take time out for yourself every day.

- Trim a hectic schedule to its most essential items.

- **Keep an anxiety journal.** Rank your anxiety on a 1-to-10 scale. Noting the events during which you felt anxious and the thoughts going through your mind before and during the anxiety. Keep track of things that make you more anxious or less anxious.

Prototype UI
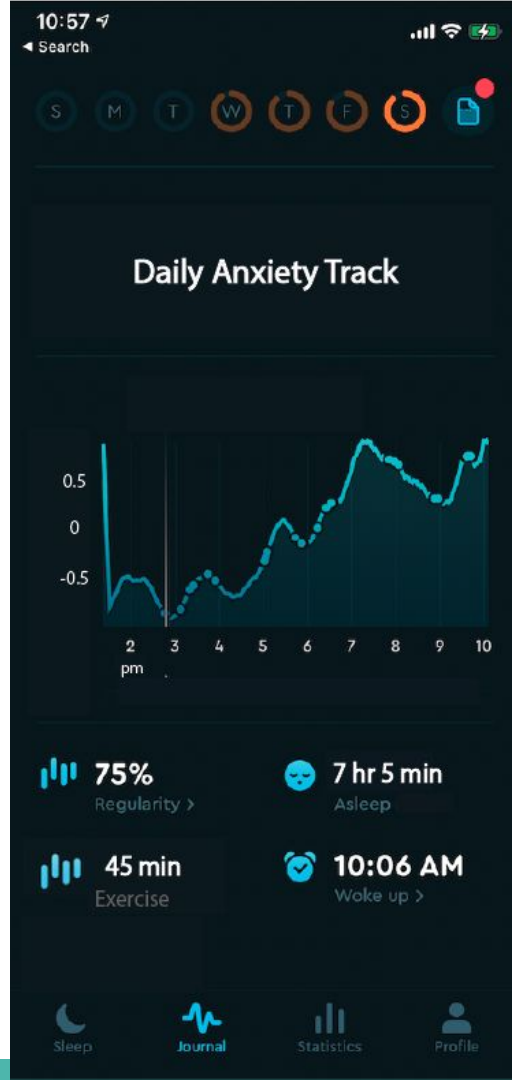
Next Steps

1. Analyse expressions such as **sarcasm**.
2. Further analyse **events, perceptions or experiences** that can cause anxiety or expressed on texts.
3. Physically classify anxiety levels through cellphone cameras and touchscreens, detecting **bodily responses**, like sweat, heart rate, flushed skin tone, tremblings and breathings.
4. Further analyse **long term** health related anxiety or **short-term** anxiety.
5. Identify trends and maybe even **predict future occurrences,** of panic attack or anxiety break.

Soooo...
do you think you have anxiety?

Thank you for listening,
Any questions?