Emotion(s) prediction

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Project Flow

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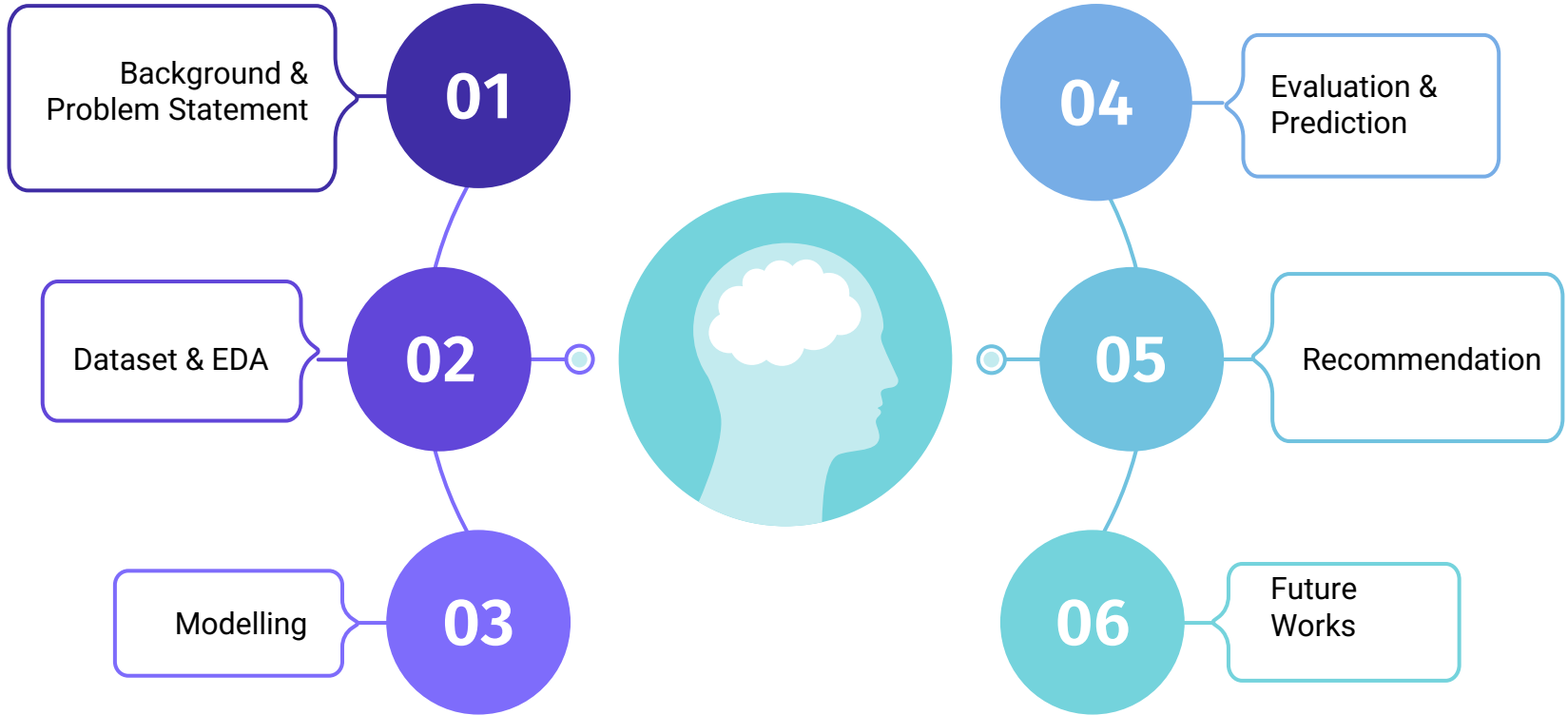
Background

Over the past few years living with the pandemic, all of us have had to **cut down** on **social gatherings** and **stayed home** way more than we used to.

Problem Statement

With most of our time spent within the confines of the same four walls, it is no surprise our **mental health** has **suffered**[1]. The **cost** of poor mental health is **absenteeism** and **low productivity**.

1) https://www.channelnewsasia.com/singapore/singapore-mental-health-awareness-stigma-conditions-depression-1973166
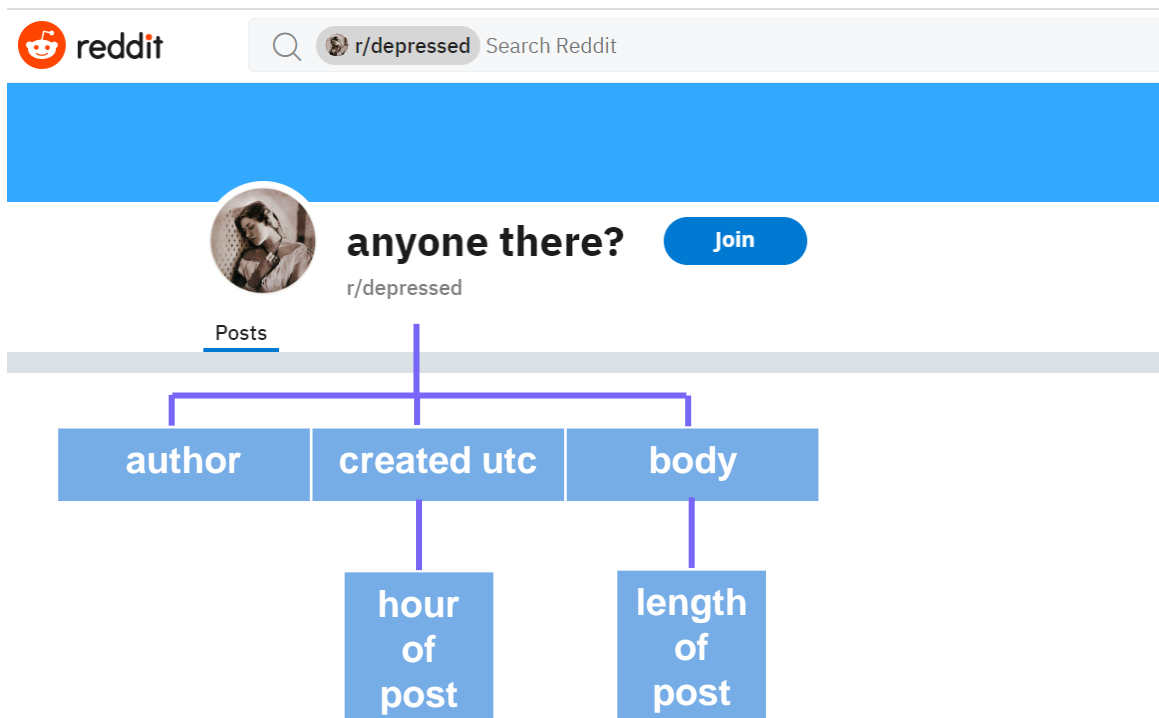
Problem Statement

As a natural consequence of the extended time spent at home, our **presence** on **virtual** platforms has **increased** sharply[2].

A department in the **Mental Health Institute** is looking into **tapping** on **social media platforms** to **reach out** to the **public**.
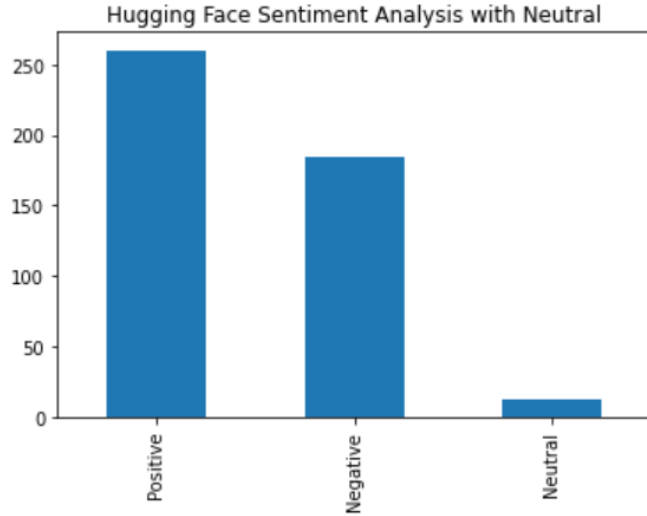
Goal: To construct a **model** that can **detect** the **emotion(s)** in comments.

Dataset

EDA – Tweet Sentiment Analyzer[3]

Hugging Face Sentiment Analysis with Neutral

| Body	Tweet Sentiment Analyzer by Adam Chell
Maybe the new therapist will be more helpful, you should at least give it a go. You don't know until you at least meet the new person. I'm sorry you feel so bad	Negative
Your mother is not overprotective, she is restrictive	Positive

3) https://huggingface.co/adam-chell/tweet-sentiment-analyzer

EDA – T5 Emotion Recognition[4]

Emotions	%
Joy	46
Sadness	31
Anger	14
Fear	6
Love	2

Body	T5 Emotion Recognition
Maybe the new therapist will be more helpful, you should at least give it a go. You don't know until you at least meet the new person. I'm sorry you feel so bad	Sadness
Your mother is not overprotective, she is restrictive	Fear

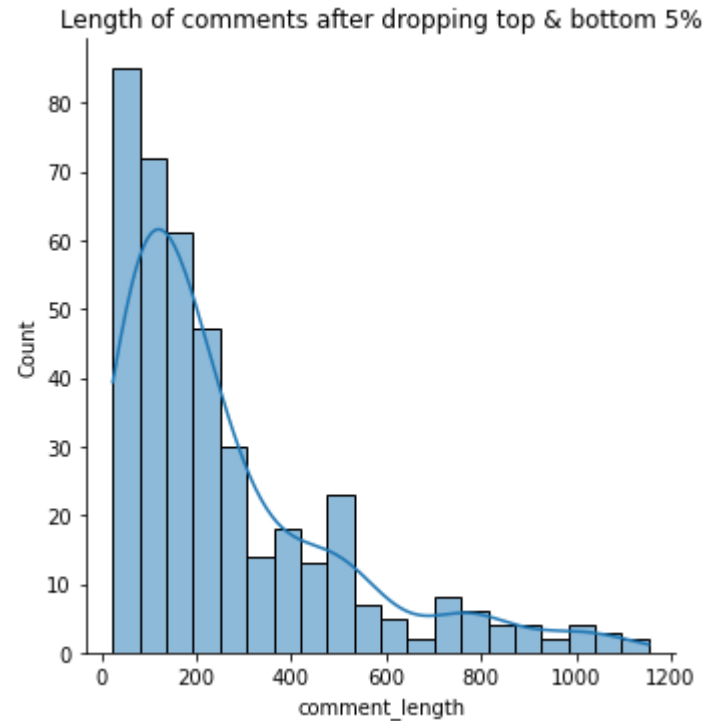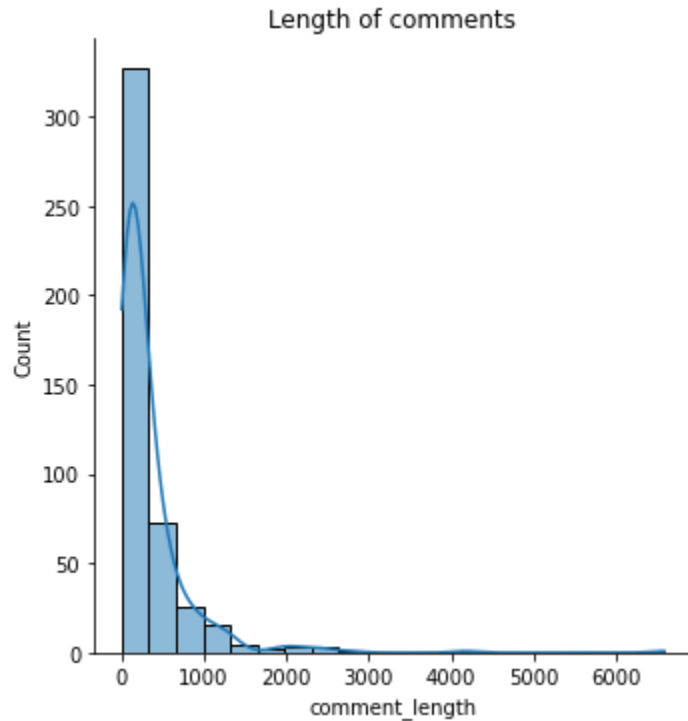4) https://huggingface.co/mrm8488/t5-small-finetuned-emotion

EDA – Time of comments
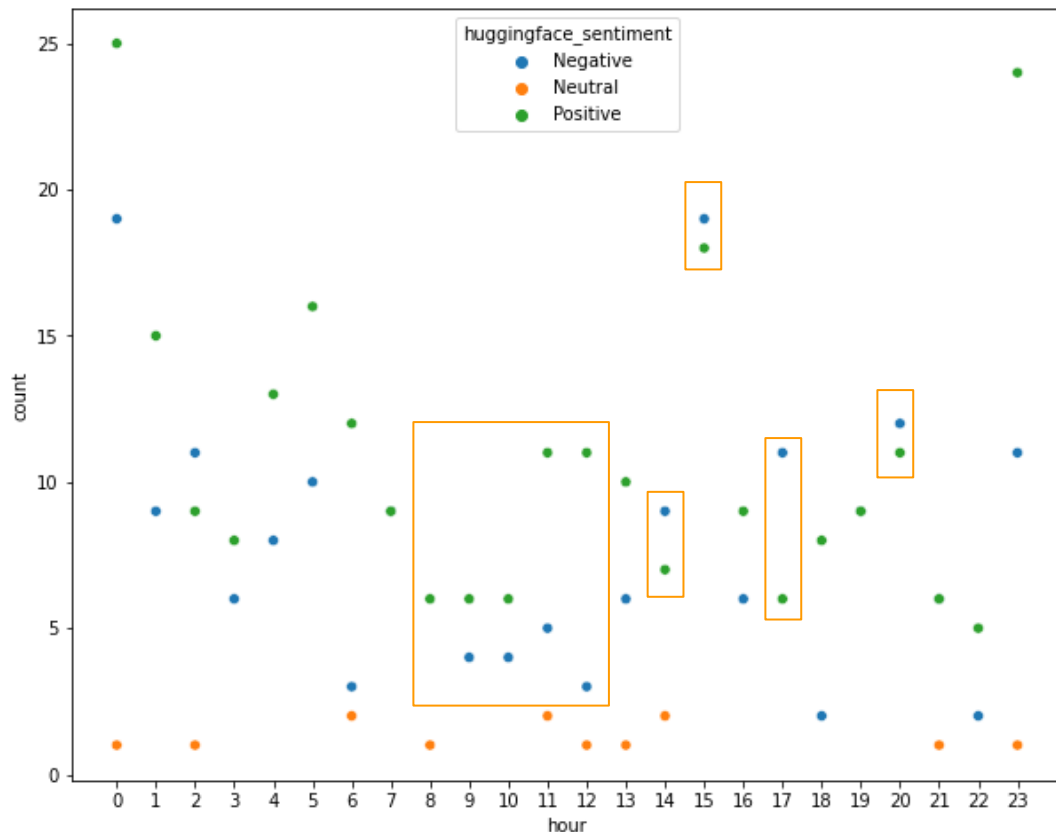
- negative comments > positive from the midday mark at 1400

- positive comments > negative in the morning hours

- medical article[5] - most people feel **upbeat** and **energetic** around **noon** but tend to have more **negative** feelings during the **early afternoon** or **evening**

5) https://www.webmd.com/bipolar-disorder/are-my-mood-swings-normal#:~:text=Many%20things%20can%20affect%20how,symptom%20of%20a%20mental%20illness

EDA - Length of comments

EDA - Authors

Most Active Authors:

General-Weather-9644	20
undercurrents	15
IAMSADGGG	14

r/depressed · Posted by u/undercurrents 7 years ago

My Massive List of Depression Resources- part 2

PART 1

for people concerned about money, check out these sites:

http://www.healthcentral.com/depression/c/84292/70431/money-insurance

http://www.dbsalliance.org/site/PageServer?pagename=home

http://www.nami.org/

www.freeclinics.us

http://www.nafcclinics.org/

https://www.freeblacktherapy.org/ - Black therapists for Black people

https://www.humanisinglives.com/pro-bono-therapy/ - Free online pro bono counseling and psychotherapy

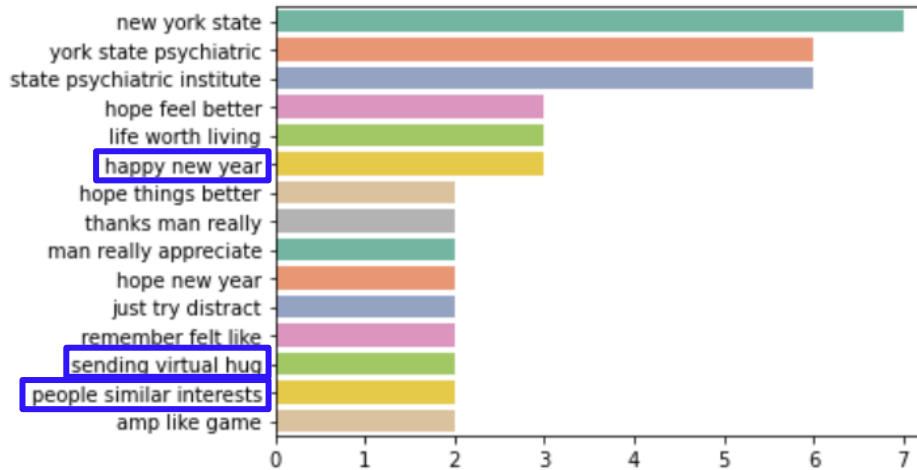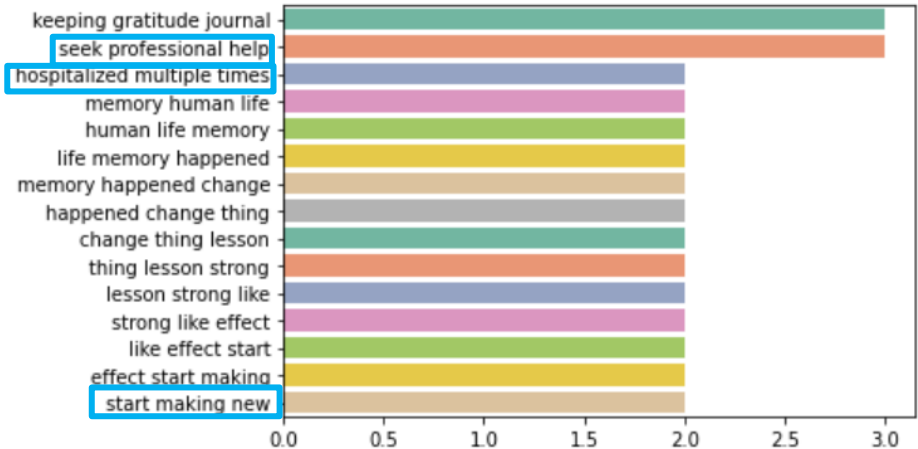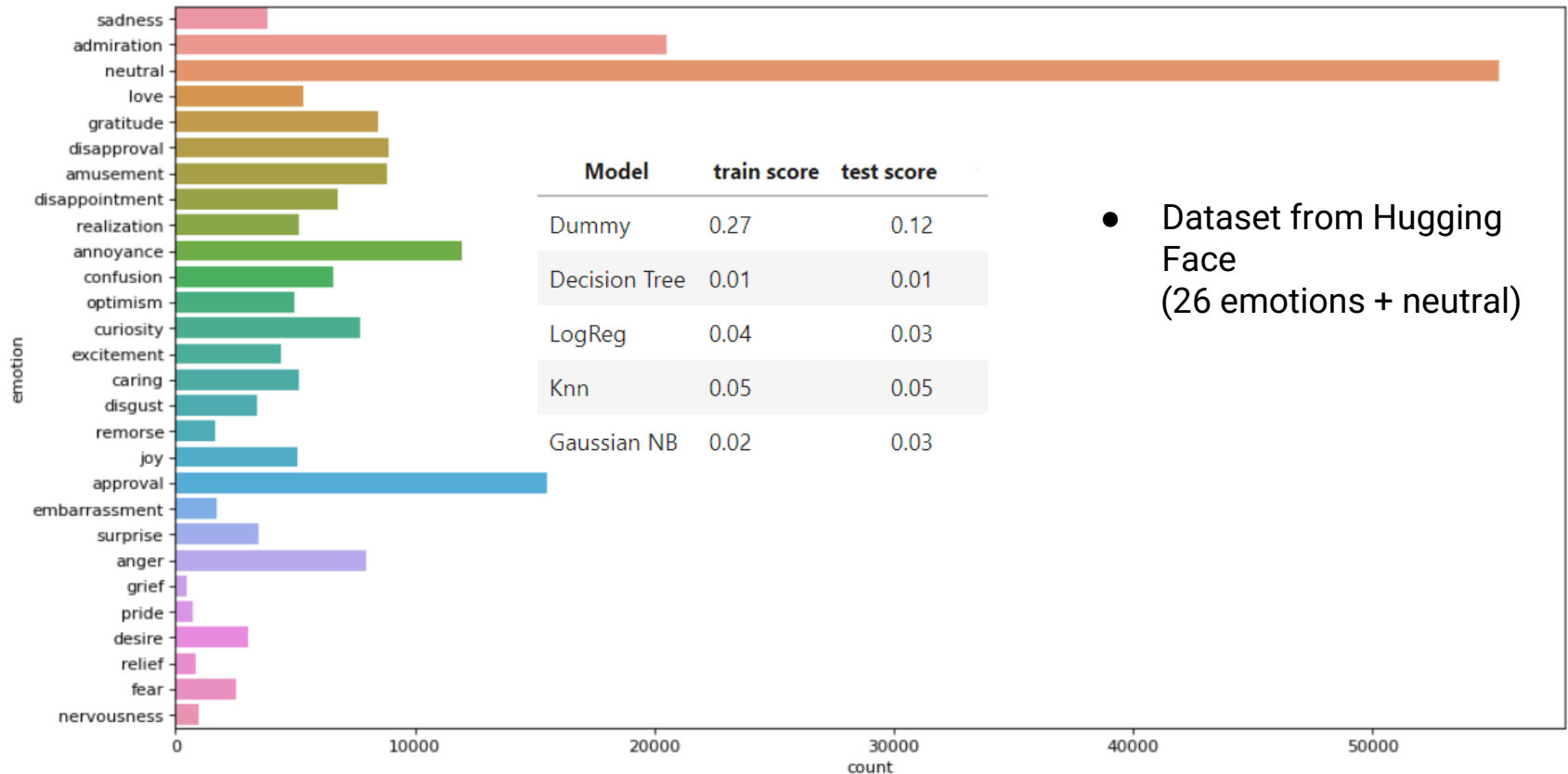|	
I think this is just a guy thing, I'm not very sociable either. Most of the time I just don't bother with people, less trouble that way.	Joy
Yeh it looks like it's mainly psychological, "Perhaps the most dangerous is intense depression, which can lead to an increased suicide risk." Your probably going to need some help with this one. Do you have any mates you can count on?	Anger

EDA - trigrams

Positive

Negative

Modelling – Feature Engineering
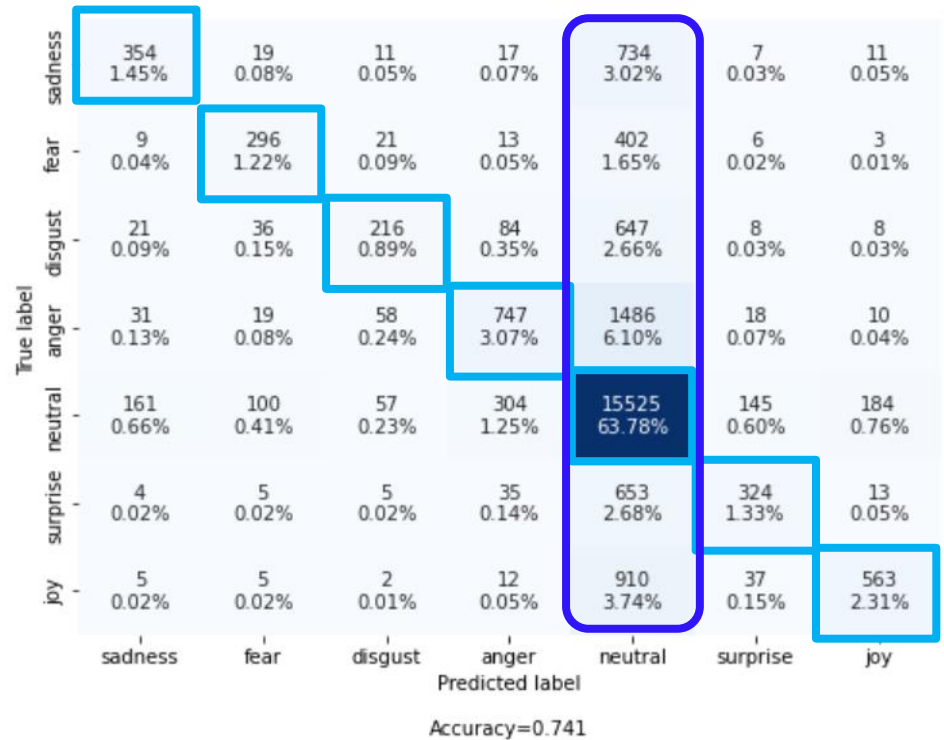

Model	train score	test score
Dummy	0.27	0.12
Decision Tree	0.01	0.01
LogReg	0.04	0.03
Knn	0.05	0.05
Gaussian NB	0.02	0.03

- Dataset from Hugging Face
  (26 emotions + neutral)

Modelling – Feature Engineering

Emotions	%	Class weights
Neutral	68	0.2
Anger	10	1.5
Joy	6	2.7
Sadness	5	3.0
Surprise	4	3.3
Disgust	4	3.4
Fear	3	4.6

- Narrowed down to basic 6 emotions + neutral

- Imbalanced data

- Class_weights = 'balanced'

Model Evaluation

Model	train score	test score
MultinomialNB	0.70	0.70
Random Forest	0.68	0.68
LogReg	0.51	0.48
AdaBoost	0.70	0.70
Voting Classifier	0.76	0.74
SVC	0.79	0.74

Accuracy=0.741

Multilabel Classification - OneVsRest Classifier (SVC)

Tvec_max_features	[1000, 3000, 5000]
Tvec_ngram_range	[(1,1), (1,2), (1,3)]
Train score	0.75
Test score	0.63

	precision	recall	f1-score	support
neutral	0.84	0.81	0.82	16366
fear	0.43	0.50	0.46	789
anger	0.44	0.57	0.49	2421
joy	0.48	0.59	0.53	1606
sadness	0.41	0.52	0.46	1280
surprise	0.37	0.52	0.43	1123
disgust	0.28	0.40	0.33	1131
micro avg	0.66	0.72	0.69	24716
macro avg	0.46	0.56	0.50	24716
weighted avg	0.69	0.72	0.70	24716
samples avg	0.68	0.72	0.69	24716

Pycaret

	Model	Accuracy	AUC
rf	Random Forest Classifier	0.5720	0.6833

RandomForestClassifier Confusion Matrix

	Model	Accuracy	AUC
et	Extra Trees Classifier	0.2433	0.6086

ExtraTreesClassifier Confusion Matrix

Pycaret

| Fix imbalance=True | Fix imbalance method = RandomUnderSampler |
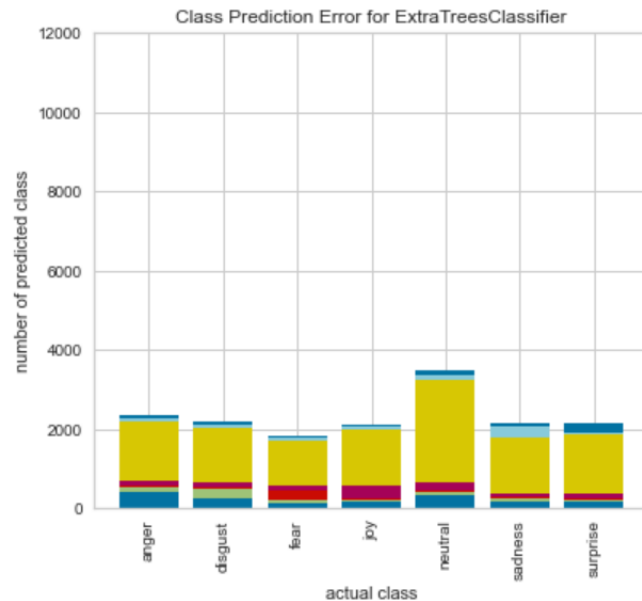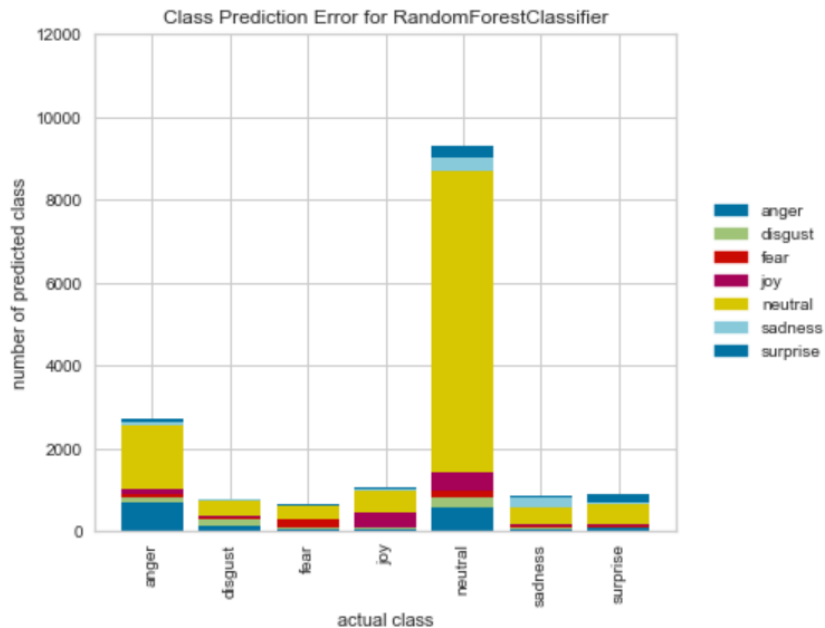
Prediction – multiclass classification

Body	Predicted class
I'm sorry you feel like that . Have you tried therapy ?	Sadness
Thanks man I really do appreciate it . Glad everything worked out for you , and hopefully soon for me too .	Joy
Wow . I have never read such an accurate description of how I feel about myself . I hate being perceived and I hate acknowledging my own existence . You are not alone.	Anger
You sound exactly like me . I wonder how you are right now ? Did you manage to beat the brain fog and get your studies done ?	Surprise
Sounds horrible . I am truly sorry . Hope you find genuine happiness and peace in life.	Fear

Prediction – multilabel classification

Body	Predicted emotions
Thank you so much and me too	Joy, Surprise
You ' re not a bad person ! Bad people can ' t even see that they are being bad , I know how you feel but you ' re not alone I promise	Disgust, Sadness
Damn what shitty friends and girlfriend . Sorry they made you feel worse . Hope someone comes along and genuinely shows you what a real friend is .	Anger, Sadness
I'm so sorry you had that , I'm always scared of being that guy and it's made me so self conscious I never complement people on looks .	Fear, Sadness

Recommendation

User A

Recent ~50 comments

Comments made this week

Detect emotion(s)

Identify main emotion(s)

Negative

Positive

Mildly negative

Moderately negative

Severely negative

Activate chatbot

Send encouragement quote/ message

Provide resources

Link up with professional help

Send affirmation quote/ message
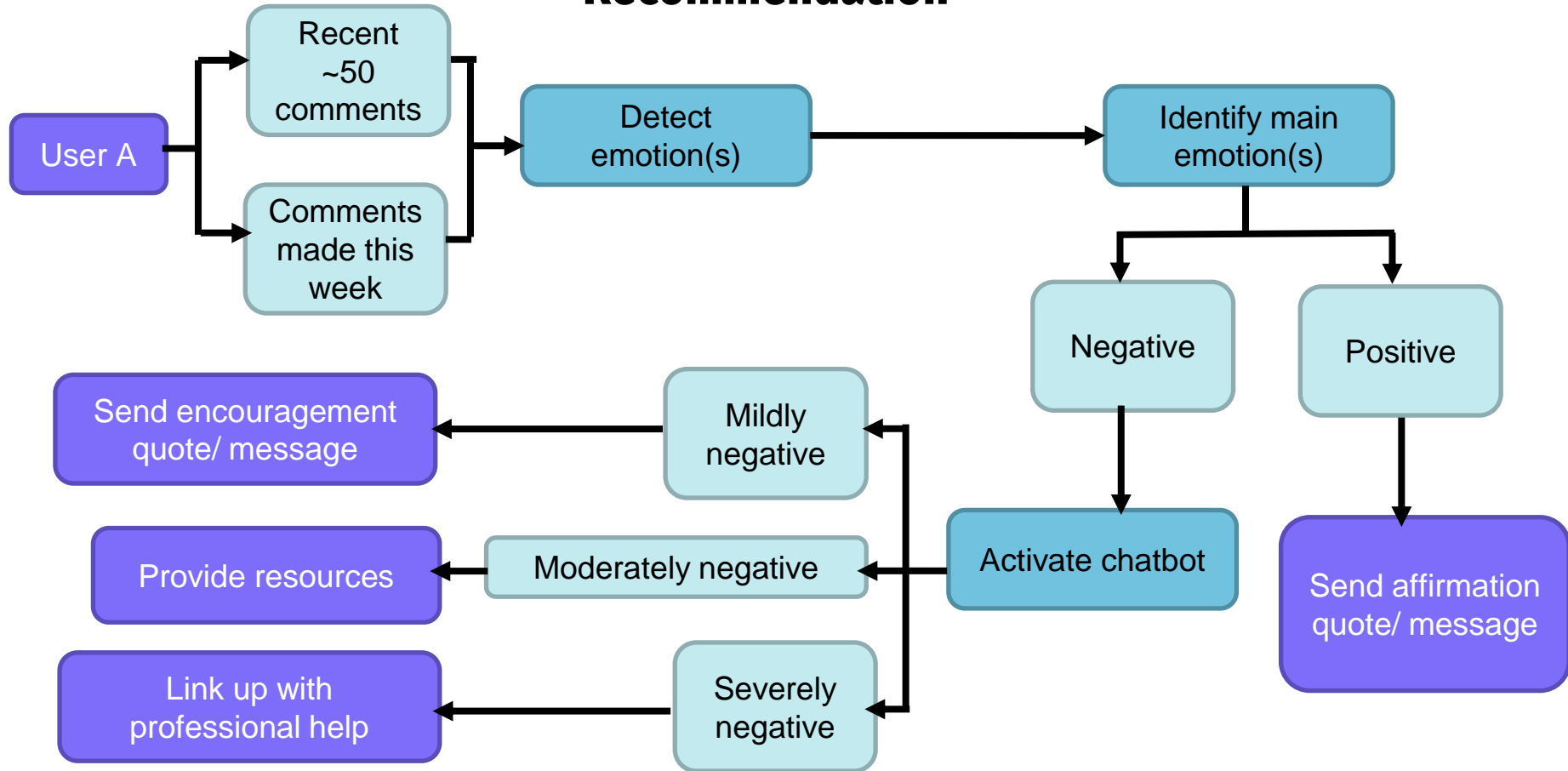
Future Works

Model prediction	Deployment	Further refinements
Regularly **train** using **new comments** for updated topics of discussion/ economical trends	Study **month** when **negativity peaks**	Wider **range** of **emotions**
Drop 'neutral' class	Send **positive messages** in the **morning**	User-initiated application for **self-check**
Take **comments** of a specified **length**	Send **encouragement messages** in the **evening**	**Multilabel** classification by **percentage**
	Build up **resources**	Cater to **different age** groups

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