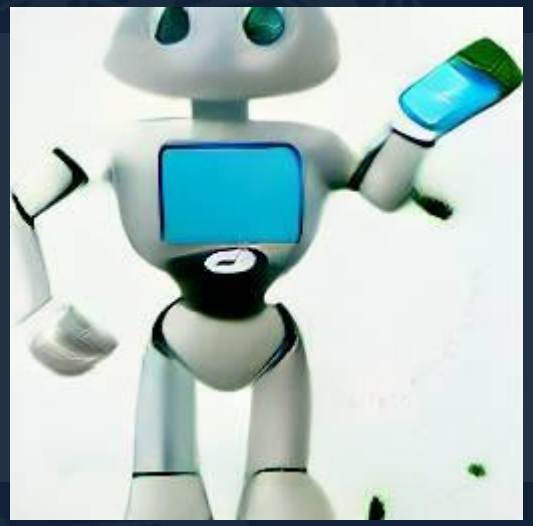
PsychNLP

A BERT-based NLP neural network as a screening tool to help classify the risks of depression and suicide.



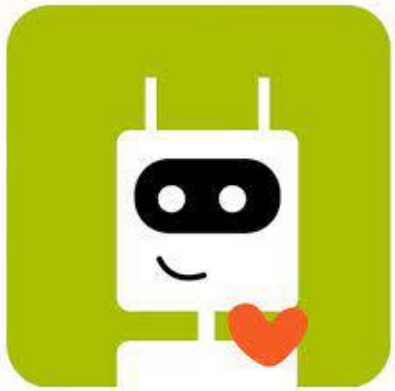
Generated by DALL-E mini

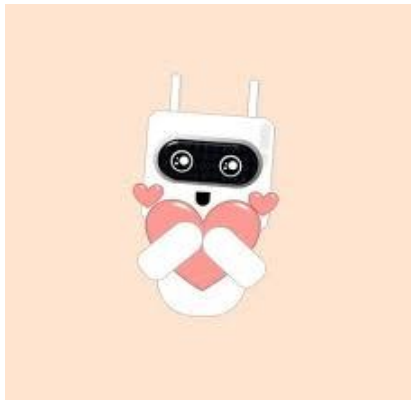
Pollakrit Satasin

AI Builders 2022

Problem Statement

- Depression and suicide





- Jubjai and Psyjai, chatbots to detect depression

Problem Statement

- Dataset

Problem Statement

- Dataset

- Just scrape our own data!

Metrics & Baselines

Everything.

Compared with TF-IDF

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}$$

$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$F1\text{-}score = \frac{2 \times \text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

Data collection

Python Reddit API Wrapper (PRAW)
Wrapped by PushShift (PSAW)

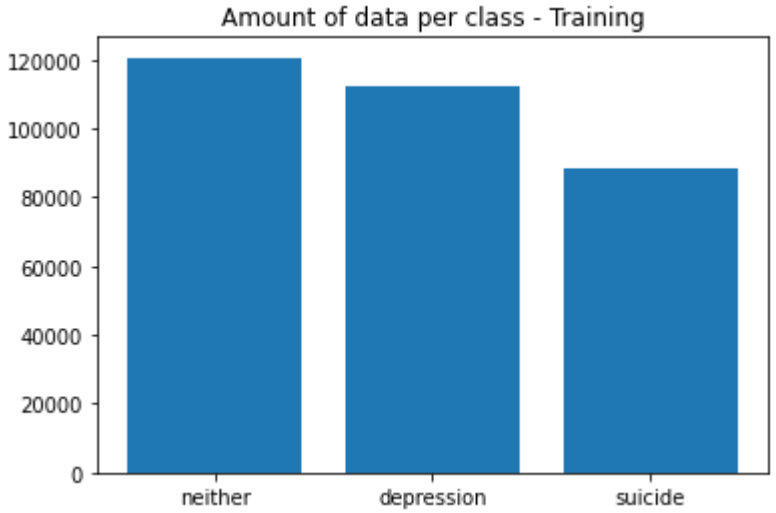
-> 100,000 submissions per subreddit.

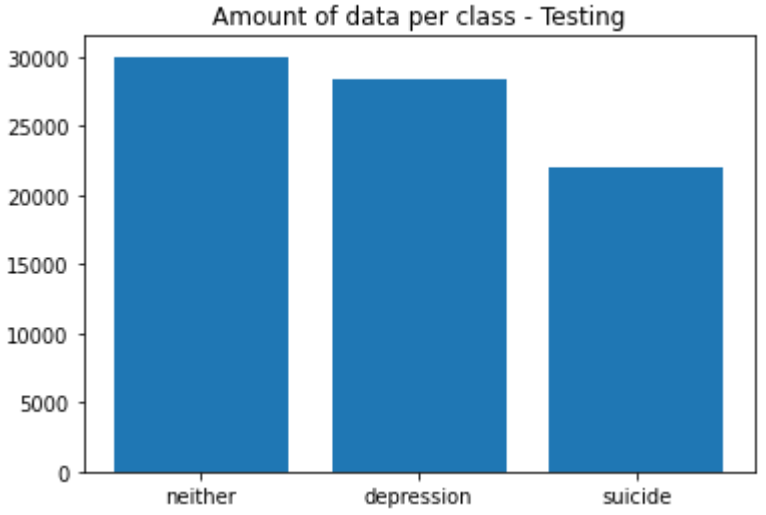
Data cleaning

Text

-> remove punctuations, numbers, emojis
-> remove special characters
-> lowercase
-> cleaned text

Exploratory data analysis





Model Building

Batch size is 16

Input IDs, Attention mask (1 x 128)

↓

BERT layer (1 x 768)

↓

Dropout (0.3)

↓

Linear (1 x 768)

↓

Softmax (1 x 3)

Model Building

```
print(model(input_ids, attention_mask))
```

```
tensor([[0.3507, 0.1614, 0.4879],
        [0.4702, 0.1782, 0.3516],
        [0.3597, 0.1398, 0.5006],
        [0.1798, 0.1332, 0.6870],
        [0.5382, 0.0962, 0.3657],
        [0.2933, 0.1032, 0.6035],
        [0.3749, 0.1600, 0.4651],
        [0.4038, 0.1869, 0.4093],
        [0.3127, 0.1852, 0.5021],
        [0.2407, 0.1954, 0.5639],
        [0.3236, 0.1079, 0.5685],
        [0.3244, 0.1253, 0.5503],
        [0.2656, 0.2507, 0.4837],
        [0.2885, 0.1047, 0.6068],
        [0.3733, 0.0753, 0.5514],
        [0.3227, 0.2286, 0.4486]], device='cuda:0', grad_fn=<SoftmaxBackward0>)
```

Untrained output (batch of 16)

Training epoch

Prints loss
and accuracy

Training step (20275 batches)
↓
Validation step (2510 batches)

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Prints loss
and accuracy

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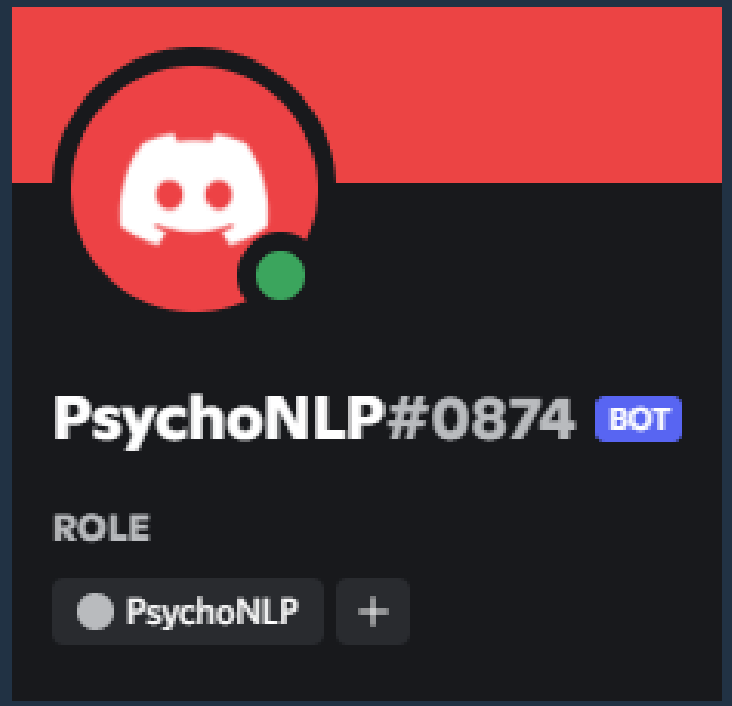
Deployment

Discord bot.
Prefix is $classify

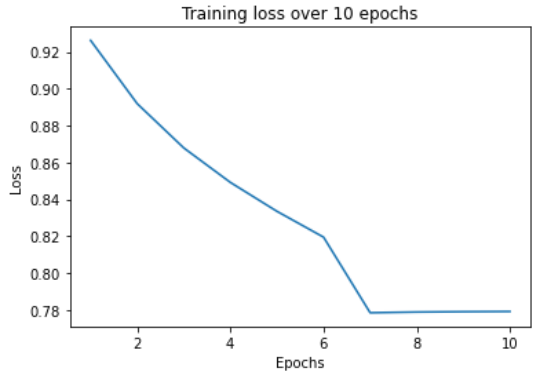
PsychoNLP

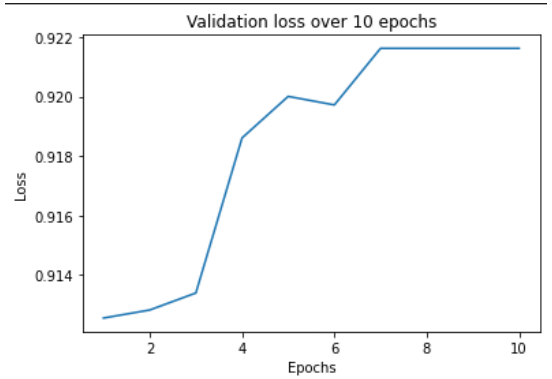


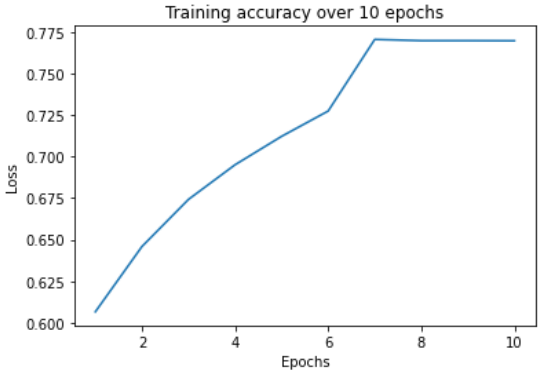
Results

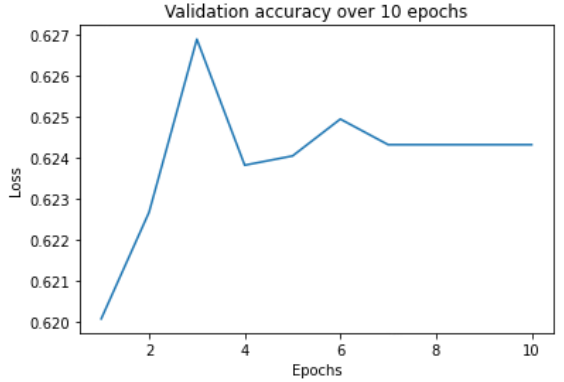
Testing accuracy

62.74%









Results

PsychNLP (BERT)
Accuracy = 0.6274
Precision = 0.6666
F-1 score = 0.5476

Baselines (TF-IDF)
Accuracy = 0.5881
Precision = 0.5847
F-1 score = 0.5837

Error Analysis

BERT model is doing OK
Data is abundant

But...

Error Analysis

Data is almost indistinguishable,
Even with human eyes.

Prevalence of Depression to Suicide.
Most of the confusion is classifying Depression from Suicide data.

Error Resolution

- Get better data
- Having better ways to label data

PsychNLP

A BERT-based NLP neural network as a screening tool to help classify the risks of depression and suicide.

Pollakrit Satasin – Mysterious Hedgehogs

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Special thanks to AI Builders and everyone in the Mysterious Hedgehogs team!