# ANALYZING TWEETS AND PREDICTING SUICIDE IDEATION
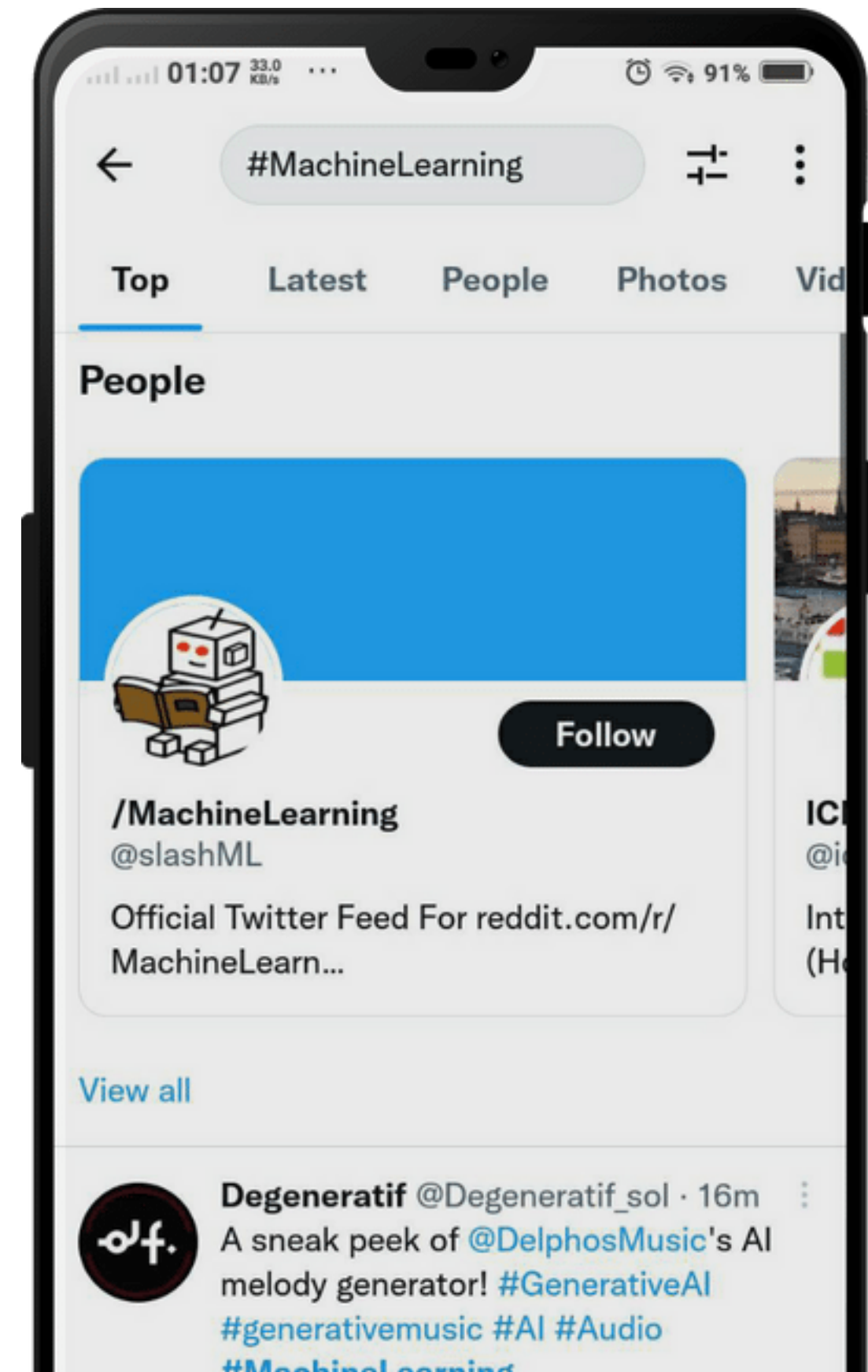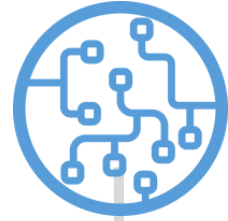
BY CASTRO, DAVOCOL, FACULTAD
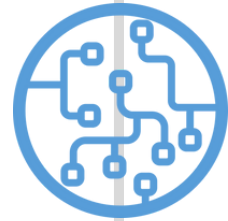
START

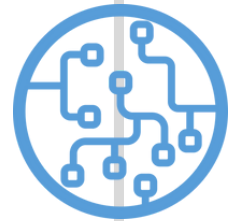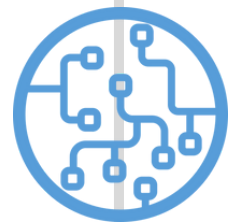# Outline

Introduction

Methodology

Results and Discussion

Conclusion

**Suicide** is defined as death induced by intentionally harming one's self to end their life

According to Centers for Disease Control and Prevention (n.d), in 2019 alone, 9 person out of 100,000 died by suicide worldwide.

Between 2000 and 2018, the suicide rate soared by 30%, then it fell in 2019 and 2020. In the same year, an estimated 12.2 million American individuals seriously considered suicide, 3.2 million planned suicide attempts, and 1.2 million attempted suicide.

Today, social media platforms are rapidly being utilized by a lot of people to convey signs of emotional distress and suicidal tendencies.

According to Twitter data, suicidal ideation is often linked to negative feelings such as shame and despair, as well as a number of regional and ecological characteristics (Morese et al., 2022).

By being able to detect suicidal ideation through the use of data from social media platforms such as Twitter, proper care and help can immediately be done in order to check up on those individuals and give them the proper care and potentially save a life
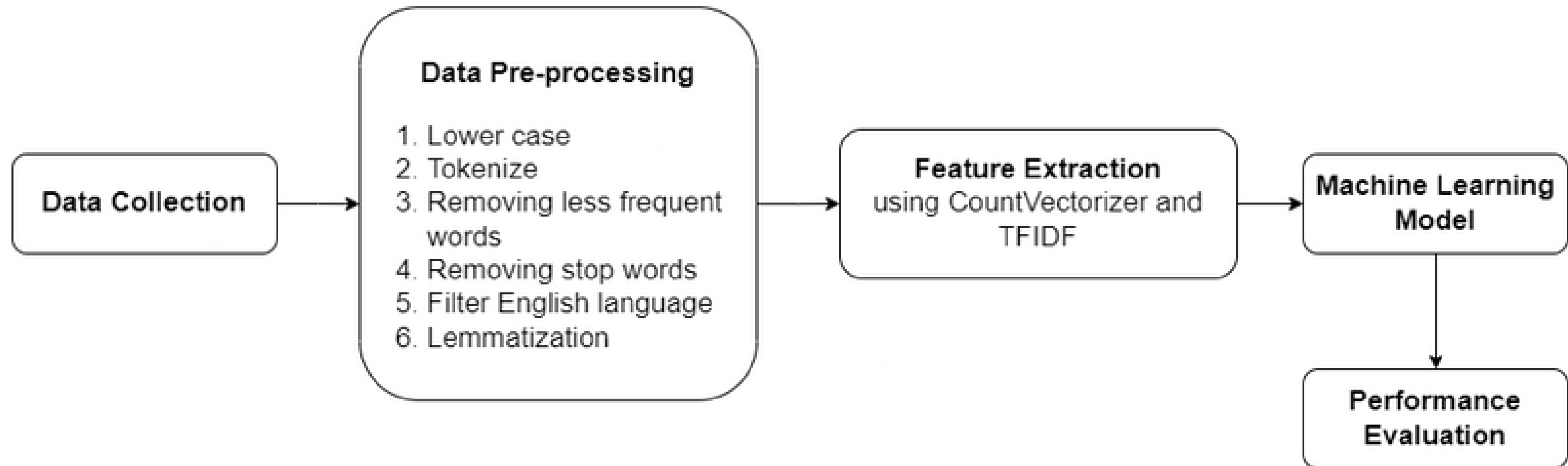
**Objectives**

- Evaluate Term Frequency-Inverse Document Frequency as a feature extraction method and evaluate its performance metrics on different classification models.

- Evaluate performance metrics of the Gaussian Naïve Bayes, Bernoulli Naïve Bayes, Random Forest and Logistic Regression in predicting tweet with suicide ideation and no intention.

- Determine the classification algorithm that can best predict the tweets with suicide intention and tweets with no suicide intention.

**Data Collection** → **Data Pre-processing**

1. Lower case
2. Tokenize
3. Removing less frequent words
4. Removing stop words
5. Filter English language
6. Lemmatization

→ **Feature Extraction** using CountVectorizer and TFIDF

→ **Machine Learning Model**

→ **Performance Evaluation**

**Dataset** | Feature Extraction | Algorithms & Models | Evaluation Metrics | Tools & Packages

**The dataset was obtained from** "twitter-suicidal-intention-dataset" repository at GitHub by Laxmi Kant.

# 9119
raw observations

# 2 categories / intention

## 1 (suicidal)
*anxiety, depression, hopelessness, wanting to die, suicide attempt*

## 0 (non-sucidal)
*hate messages, expression of negative feelings (it don't express suicide ideation*

```python
### Load the data
df = pd.read_csv("twitter-suicidal_data.csv")
print("Size of the data:", df.shape)
df.head()
```

Size of the data: (9119, 2)

Out[3]:

| | tweet | intention |
|---|---|---|
| 0 | my life is meaningless i just want to end my l... | 1 |
| 1 | muttering i wanna die to myself daily for a fe... | 1 |
| 2 | work slave i really feel like my only purpose ... | 1 |
| 3 | i did something on the 2 of october i overdose... | 1 |
| 4 | i feel like no one cares i just want to die ma... | 1 |

Dataset | **Feature Extraction** | Algorithms & Models | Evaluation Metrics | Tools & Packages

- **COUNT VECTORIZER**

- **TFIDFTRANSFORMER**

```
count_vector = CountVectorizer()
tfidf_transformer = TfidfTransformer(norm='l2',sublinear_tf=True)

x_train_count = count_vector.fit_transform(x_train)
X_train = tfidf_transformer.fit_transform(x_train_count)

x_test_count = count_vector.transform(x_test)
X_test = tfidf_transformer.fit_transform(x_test_count)
```
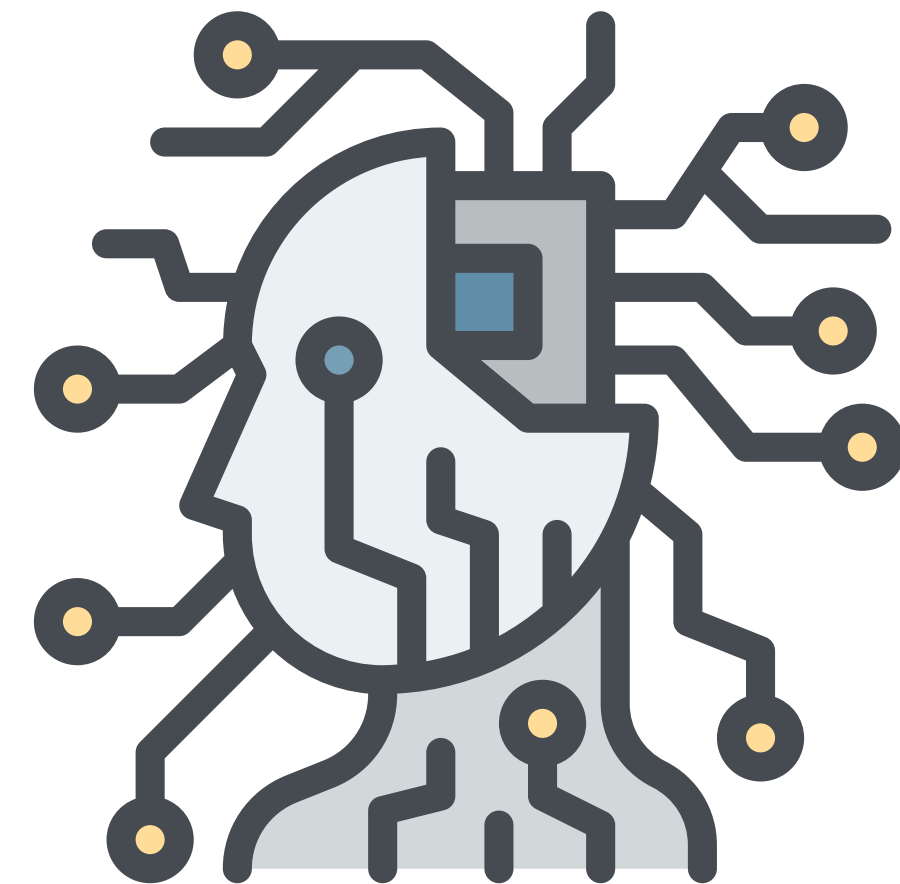
- **NAÏVE BAYES ALGORITHM**
  - GAUSSIAN NAIVE BAYES
  - BERNOULLI NAIVE BAYES

- **RANDOM FOREST (N_EST = 400, 100)**
- **LOGISTIC REGRESSION ALGORITHM**

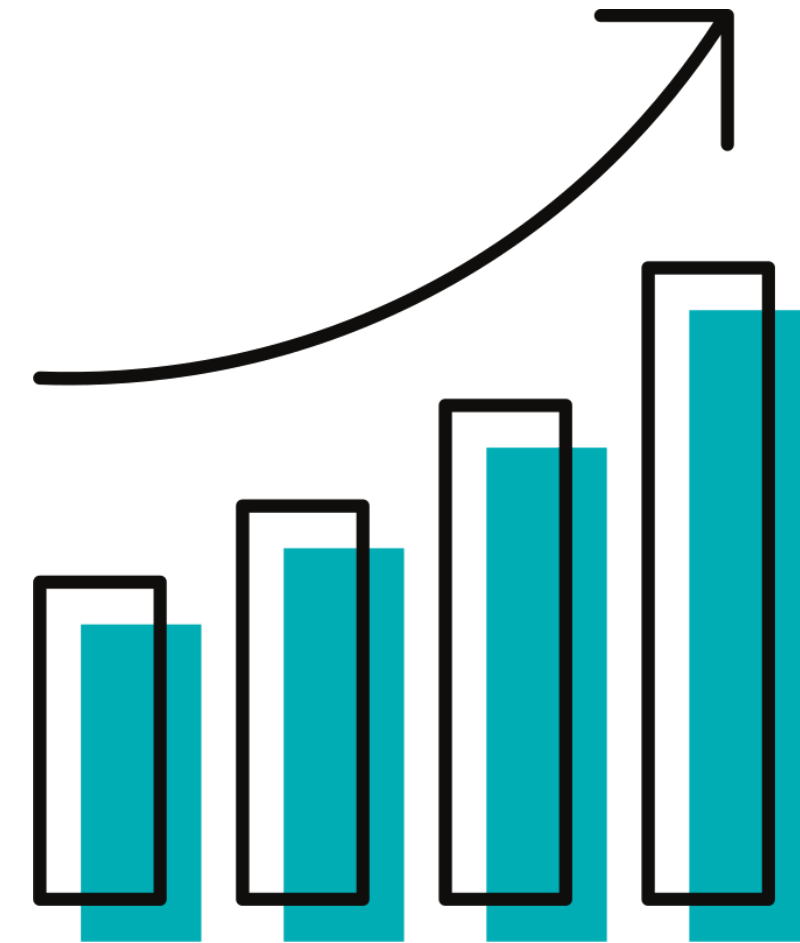Dataset | Feature Extraction | Algorithms & Models | **Evaluation Metrics** | Tools & Packages

- CONFUSION MATRIX
- ACCURACY
- PRECISION
- RECALL
- F1-SCORE

- ANACONDA NAVIGATOR
- PYTHON JUPYTER NOTEBBOOK
- PANDAS
- NUMPY
- SEABORN
- MATPLOTLIB
- SKLEARN
- SKLEARN.MODEL_SELECTION
- SKLEARN.METRICS
- SKLEARN.LINEAR_MODEL
- RE
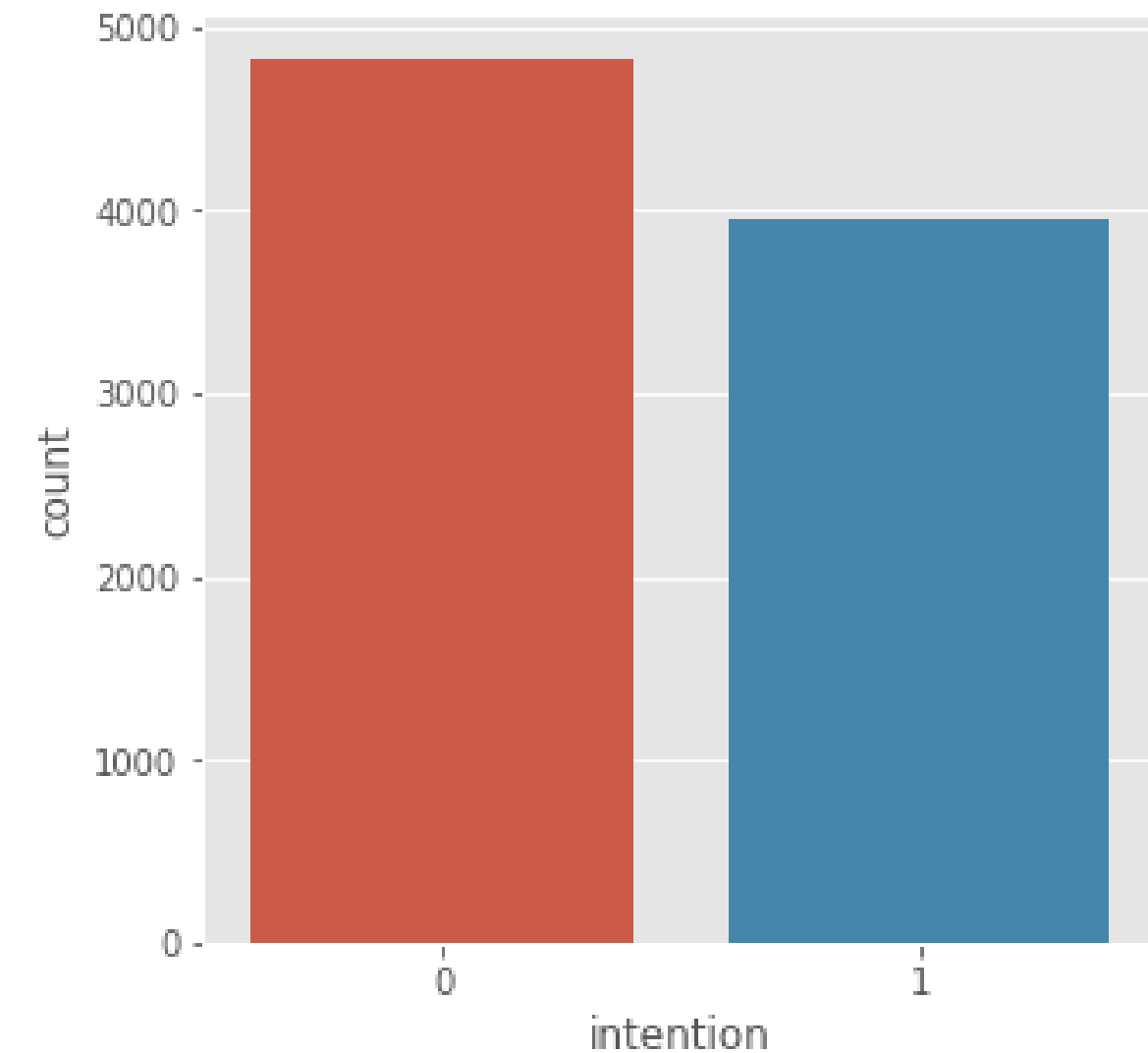- COLLECTIONS
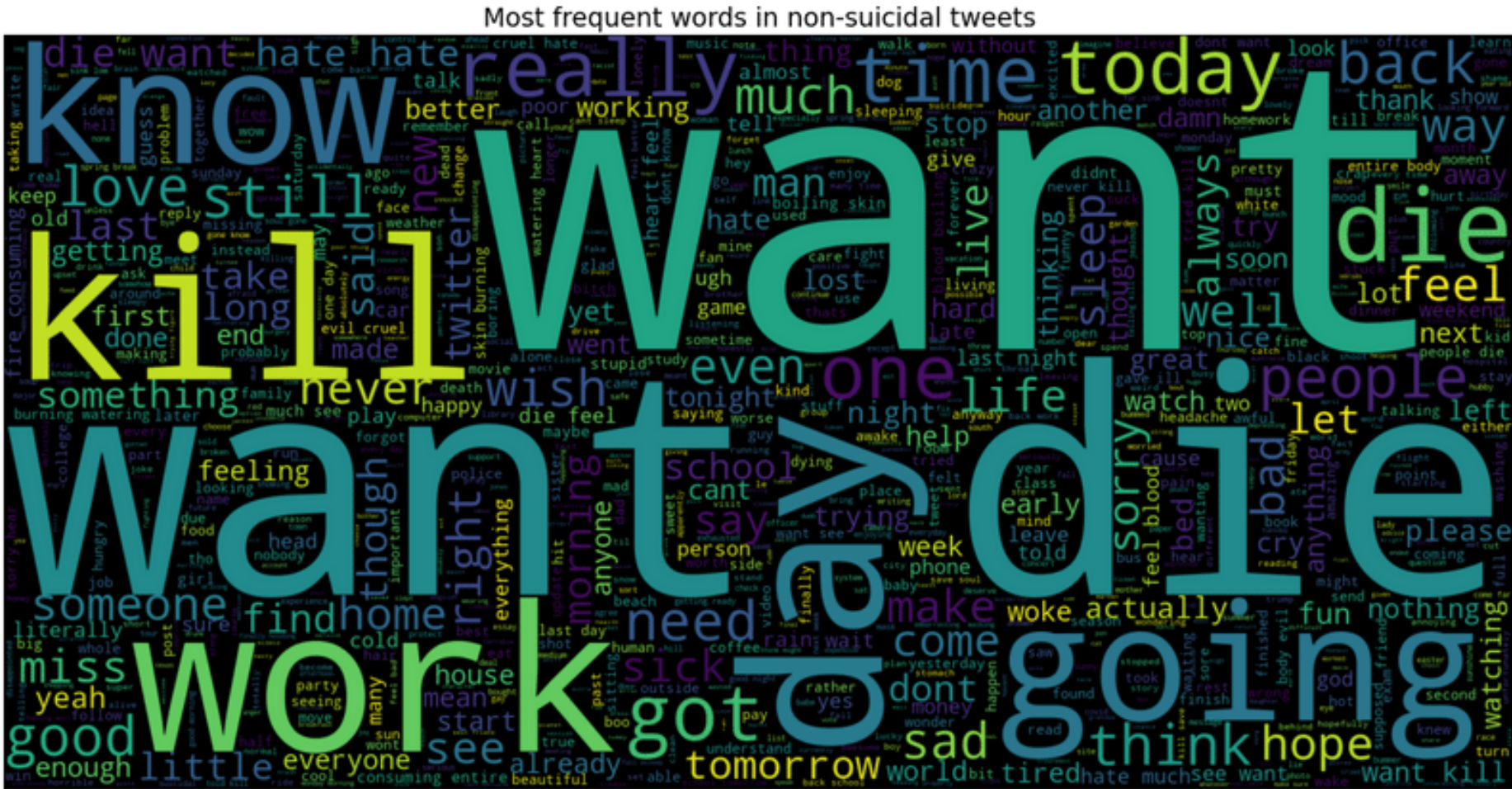- NLTK
- TEXTBLOB
- WORDCLOUD

After data pre-processing, the total number of tweets left were 8,786.

About 55.0% (4,828) of the tweets are non-suicidal and 45.0% are suicidal tweets.

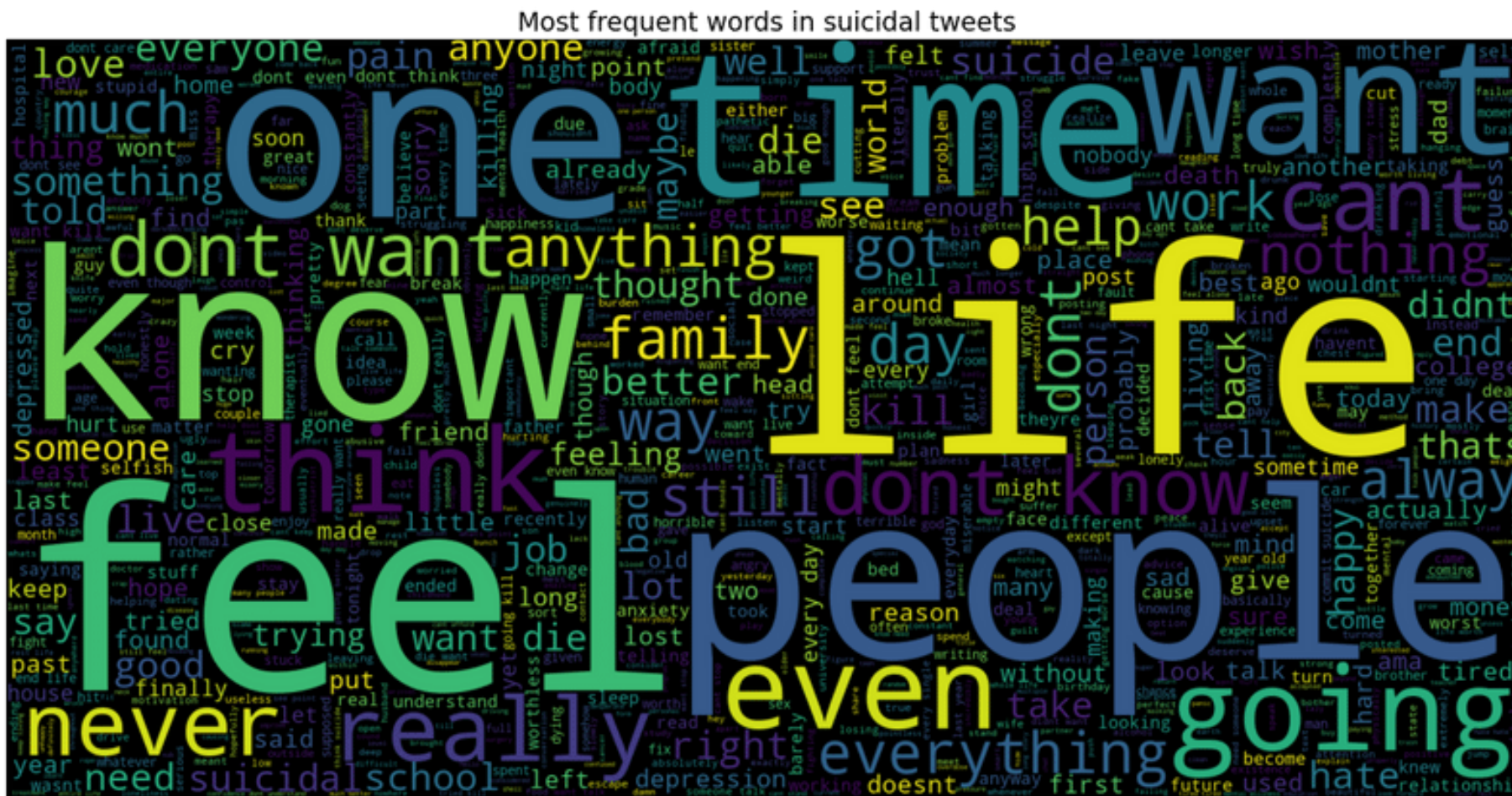# WORD FREQUENCY #TRENDING

Most frequent words in non-suicidal tweets



## Non-suicidal Top Words

1 **want**
913

2 **die**
687

3 **like**
420

4 **kill**
378

5 **get**
316

6 **day**
315

7 **work**
300

8 **hate**
265

9 **know**
263

10 **feel**
246

# WORD FREQUENCY  #TRENDING



Most frequent words in suicidal tweets

## Suicidal Top Words

1 **dont**
4,321

2 **want**
3,815

3 **like**
3,288

4 **feel**
3,055

5 **life**
3,029

6 **know**
2,863

7 **cant**
2,273

8 **get**
2,263

9 **time**
2,197

10 **even**
1,984

## COMPARISON TABLE FOR ALL MACHINE LEARNING MODELS

| | GaussianNB | BernoulliNB | RandomForest(n_est=400) | RandomForest(n_est=100) | LogesticRegression |
|---|---|---|---|---|---|
| Accuracy | 77.302632 | 86.567982 | 91.557018 | 91.063596 | 89.967105 |
| F1_score | 77.020801 | 85.701556 | 91.331815 | 90.823565 | 85.701556 |
| Recall | 75.031056 | 70.186335 | 85.465839 | 84.844720 | 70.186335 |
| Precision | 73.929009 | 99.122807 | 94.896552 | 94.337017 | 99.122807 |
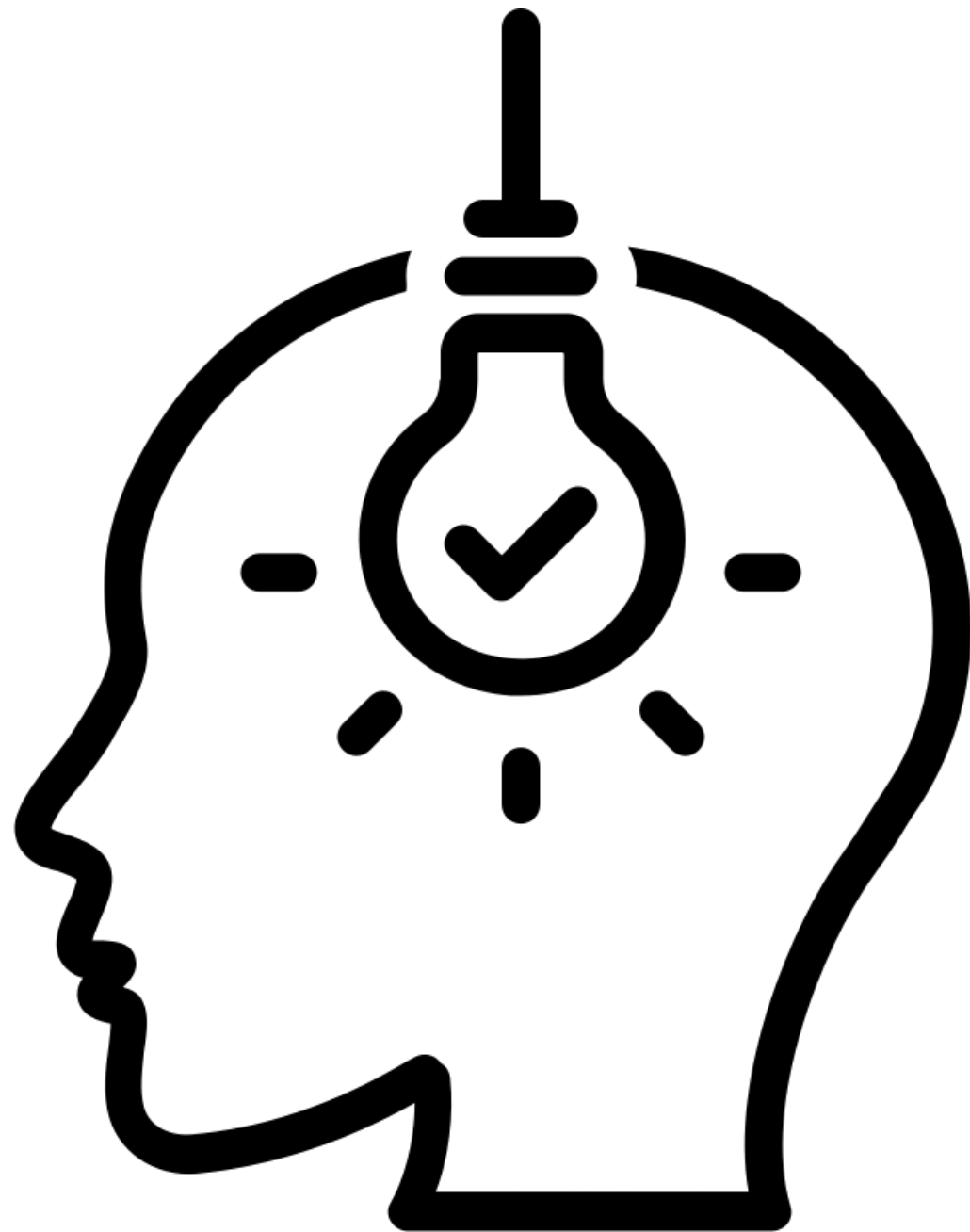
THE EXPERIMENT'S FINDINGS INDICATED THAT OUT OF ALL THE CLASSIFIERS UTILIZED, RANDOM FOREST (N_EST = 400) HAD THE MOST REMARKABLE PERFORMANCE WITH AN F1 MEASURE VALUE OF 91.33%. COUNTVECTORIZER AND TF-IDF ALSO GAVE EVERY CLASSIFICATION APPROACH A GOOD F1 SCORE.

IN FUTURE STUDIES, RESEARCHERS CAN INVESTIGATE IF ENSEMBLE AND WORD2VEC FEATURE EXTRACTION APPROACHES IMPROVE THE CLASSIFICATION MODEL'S ABILITY TO IDENTIFY TWEETS WITH SUICIDE INTENT.

# Any questions?
# Any comments?

You may reach us through our email addresses:

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**END**