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by Arsalan Javed

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DE-40 (DCE)

NUST COLLEGE OF ELECTRICAL AND MECHANICAL ENGINEERING

Anti-state Comment Detection on Social Media using Natural Language Processing

PROJECT REPORT

DE-40 (DCE)

Submitted by

PC ARSALAN JAVED

GC RAAZ KHAN

NC ARSAL SANA

NC DANIYAL AZFAR

BACHELOR'S IN

COMPUTER ENGINEERING

YEAR 2022

PROJECT SUPERVISOR

DR. WASI HAIDER BUTT

COLLEGE OF

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PESHAWAR ROAD, RAWALPINDI

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ABSTRACT

"Anti-state Comment Detector" aims to take a step towards the betterment of social media in Pakistan. It is the step to introduce AI in the social media domain to beneath fit public and organizations.

With increase in use of Internet and the step into digital world, various applications have been developed to make the life the people more comfortable.

The increased use of social media platform has changed the look of the way people communicate and interact physically and digitally. On social platforms discussions are done which makes the trending topics and gives the bird eye view of events that are occurring around the globe in real-time.

"Anti-state Comment detector" plays the role in current identifying the users of Twitter that mislead the mass audience with their negative thoughts and comments against the country and spread negativity. The project uses a classifier that automatically detect hate tweets using the content of tweets made. It also extracts the data of tweets containing hate speech and the user who made the tweet.

CHAPTER 1:

INTRODUCTION

CHAPTER 1

1.1 INTRODUCTION

Over the decades, comprehensive articles have been published about how social media has impact on the participation of politics. The argument here is made that almost all social media platforms encourage online and offline participation of political trends and talk.

Pakistan's political parties are actively sing social platforms and social media and it has result in huge change of how politics work in Pakistan. .[1]
Other than political parties' common masses also indulge in political discussion using tweets and comments to follow the current ongoing trends.
Twitter's advertising resources indicated that Twitter had 3.40 million users in Pakistan in early survey of 2022.[2]

Figure 1-Social media Statistics of Pakistan April 2022

Twitter, a widely used social media platform, produces large amount of text that contains the political information also, this information can be mined and extracted to analyze people's point of view regarding the hot trending topics going around the state and globe.

1.2 Motivation

We have chosen to work with Twitter as is widely used platform of public emotion than regular online website and blogs. The reason is that the amount of relevant data that can be scanned and extracted is much larger on Twitter, compared to traditional website blogs. The response of people on Twitter post and trends is very fast and common as many people prefer using Twitter rather than blogging to express their point of views. The use of social media has seen dramatic growth in recent s. With the use of only 140 characters on Twitter, people can express their opinions on any topic.

Pakistan being a democratic state allows the freedom of expression and speech to the citizens in all contexts including politics under its constitution.[3] Social media is playing a in increasing the violence and extremism of emotional people , and the government is designing application and ways to detect, understand the impact of extremism on social media and other internet social platforms.

Recently Government of Pakistan has passed a law that any person who defames the country or passes anti-state comments on social media is liable to prison for up to 5 years and will be fined heavily.[4]

Our “Anti-state Comment Detection System” motivation is to help our government in this regard. The project will detect the anti-state comments using sentiment analysis. So every time a person violates the law authorities can be notified through it.

1.3 Objectives

Objectives or deliverables of our Final Year Project that we have worked on are as follows:

- Checking every tweet in in-the country domain
- Detection of an anti-state tweet or comment the by user using machine learning AI, NLP
- The detected user making a hate comment or tweet will be blacklisted for authorities to take further action according to law

1.4 Aim and Working

The "Anti-State Comment Detector" aims to take a step toward better control and implementation of media law. It helps the concerned authorities to keep check and balance of people and data being uploaded on social media against defamation of any institute, person, and above all our state Pakistan.

The social media platform has opened gates to new ideas for gathering and exchange of information. Moreover, it also gives ample opportunity for people to raise their words and voices in public and spread their thoughts to masses. Due to the dangerous nature of the social media platform, some stories are rapidly spreading, are getting highlighted, and need careful investigation to have a clear picture. With the development in the digital and internet world, various applications have been developed to make the life of people more comfortable and keep country security and respect safe and sound.

"Anti-State Comment Detector" targets the users of Twitter that try to defame or spread hate among groups using social media Twitter platform to defame the country, it identifies such users and shows the tweet or comment made by them with their account username and other data. The tweets were fed into the system a from file right now and they predict the sentiment of tweet as "Anti-State" or "Non-Anti-State". Further it can be implemented using Twitter API keys for real-time tweet analysis.

Social media warfare can be defined as the use of social media as a form of weapon with the intention of causing serious permanent damage to reputation of certain actors such as governments or corporations. Various strategies and techniques and techniques are used to advance the political, economic, social, or cultural agenda.

1.5 Development Environment

The development phase was divided into two:

- Backend Development
- Frontend Development

Backend Development:

The main working of the system and algorithm are included in backend development

Coding Language: Python
Coding Environment: PyCharm IDE and command terminal
Packages used: Python libraries of machine learning and naturallanguage processing

Figure 2-Tools for Backend Development

Frontend Development:

The front end of the web application was made using:

Coding Language: Python,HTML,CSS

Coding Environment: Pycharm, Jupyter notebook
Servers: Flask
Databases: SQLite3

Figure 3-Tools for Frontend Development

1.6 Structure of Report

- Chapter 1 deals with the Introduction. It includes the motivation behind doing project, objectives covered and aim and working.

- Chapter 2 mainly deals with Literature Review. It includes the research which has already been done in natural language processing by modern technologies and Twitter Sentiment Analysis

- Chapter 3 covers the objectives. It enlists the details of objectives being covered in our project and its working.

- Chapter 4 covers the Software part including the front-end application being used. Its features and working are mentioned.

- Chapter 5 covers the references used in report

CHAPTER 2:

LITERATURE REVIEW

Chapter 2

2.1 LITERATURE REVIEW

Looking in past, sentimental analysis has been an area of interest for many professional fields including psychologists, neurologists, computer scientists, and linguists.
Various methods of researching various topics especially analyzing social networking websites such as Twitter, Facebook, and Instagram are increasingly in demand and use by people nowadays. The data available on these social media sites made it easy to research and analyze what are the feelings and opinions of people around the globe or state. An analysis of these expressions made publicly on these platforms can help in finding the faces of user that may help in different decision making process.

Existing Solution in Pakistan:

Sentiment Analysis on Imran Khan's Tweet is a research paper done by Air University students in which they study and analyzed the sentiment of tweets made by Imran Khan in one year of spam. In this research they read and analyze the emotions of Imran Khan's tweets in year's spam [5]

Sentiment Analysis for Urdu News Tweets Using Decision Tree is a research paper done by EME, a NUST University student in which they make sentiment analysis which is done in Urdu news tweets. The proposed approach has two steps. In the first step the data processing is done as the hashtag tag removal and suspension name removal is done. The vector feature of the second step is designed. The Vector feature is created by identifying several encouraging words, opposing words, and the presence of denials and the use of POS tags. After constructing the element vector, the decision tree is used as the division algorithm. The decision tree classifies tweet as positive, negative, and neutral. [6]

Sentiment Analysis of Pakistani Twitter is a research done by Farooq Yousaf,

based in Australia having Ph.D in Politics, he has made Pakistani Twitter comments about the response of those affected by the coronavirus crisis in the country, and the findings are interesting. Due to Twitter's restrictions on data extraction, a person may be able to extract a certain number of tweets in each time. Therefore, the following emotional analysis is based on 500-1000 randomly entered tweets for all three participants. This analysis is designed to measure Pakistan's typical Twitter feelings about how we react to various major stakeholders in the country.[7]

CHAPTER 3:

MODULE WORKING

Chapter 3

3.1 Sentiment Analysis for Anti-State Tweet Detection

Introduction:

The increase in growth of internet users and the emerging power of online review and freedom of expression on social media platforms have provided the platform to start Sentiment analysis. Sentimental analysis comes under the work that includes text mining to test the opinions of people who talk about a particular product, topic and commentary on social media posts and the review site which also raises difficulties in digging ideas. Figures published on Twitter advertising services show that Twitter has 3.40 million users in Pakistan by early 2022. This figure means that access to Twitter ads in Pakistan was equivalent to 1.5 percent of the population at the time. [8]

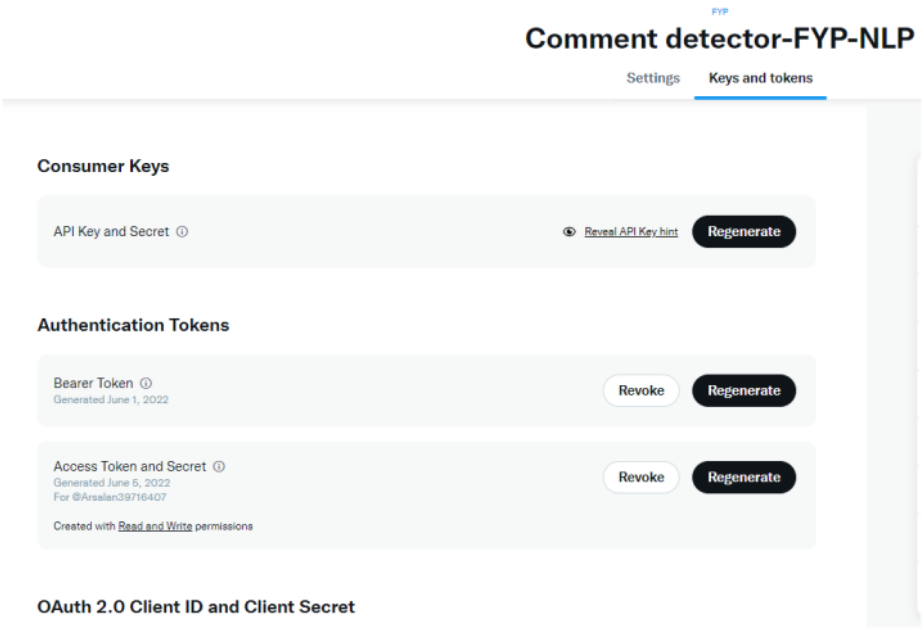
The objective of Anti-State Tweet Detection in our Final Year Project is to present a way to provide a solution to manage or control the problem of defamation and spreading of hate against any person or country on public platform like Twitter.

Dataset:

The collection of datasets for this project was not a simple task. We applied several
attempts for obtaining Twitter API keys from the Twitter developer account but every time Twitter got it denied due to unknown reasons. After many attempts we were able to get the keys, those keys were for Essential Twitter API v2 which gives limited access to collect tweets. We

were not in success for obtaining Elevated Twitter API v1 keys. This very reason made the task difficult as manual extraction of dataset is very difficult. Due to, this fact we collected some tweets using v2 API but after that we shift to a non-API-based i.e., Twint. Twint is a high-level Twitter tool written in Python that allows for scanning and extracting of Tweets from profiles of Twitter users without having access to developer account Twitter's API.

```
F:\8th semester\FYP(6)\FYP-FINAL\twint>twint -s PTIofficial -o file.json --json
1533891352152395776 2022-06-07 00:19:31 +0500 <SulihaShujaat> @PTIofficial @FaisalJavedKhan #[illegible]
1533891339657564162 2022-06-07 00:19:28 +0500 <muawiz_khan> @PTIofficial [illegible]
 [illegible]    https://t.co/eW90kYCaOr
1533891287966883840 2022-06-07 00:19:16 +0500 <trendingmnister> @_amumair @chowdaryvishru @PTIofficial U create memes &a
mp; we created this [illegible]   https://t.co/KwU2vGUCqF
1533891261521854466 2022-06-07 00:19:09 +0500 <muawiz_khan> @PTIofficial [illegible]
 [illegible]    https://t.co/eW90kYCaOr
1533891194765205504 2022-06-07 00:18:53 +0500 <CumminsPopa> @ATabbusam @Salamhaider37 @PTIofficial Ye gandu vahi h na Jo
 kutte ki maut mara tha Isliye tum bhi samajh jao aukaat se bahar jaoge to koi aise hi kutte ki tarah pel dega tumhe
1533891192336928768 2022-06-07 00:18:53 +0500 <Muhibbaan> @PTIofficial @javiqbal09 @ImranKhanPTI @AbrarUlHaqPK [illegible]
[illegible]
1533891182874566663 2022-06-07 00:18:50 +0500 <Farooq8703> [illegible]  @ImranKhanPTI  @PTIofficial  @FarooquiJamee
l  https://t.co/kqon07fmGK
1533891173823090688 2022-06-07 00:18:48 +0500 <sarah__khan_> @PTIofficial #[illegible]
1533891100053733377 2022-06-07 00:18:31 +0500 <Mishii_afzal> @BOLNETWORK @PTIofficial @MuradSaeedPTI [illegible]
[illegible]
1533891097486692352 2022-06-07 00:18:30 +0500 <mafzalbh> @saudbuttpmln007 @MaryamNSharif @ZeshanMalick @Atifrauf79 [illegible]
[illegible] @PTIofficial [illegible]
1533891008693510145 2022-06-07 00:18:09 +0500 <Mishii_afzal> @BOLNETWORK @MuradSaeedPTI @PTIofficial [illegible]
[illegible]
1533890991165526018 2022-06-07 00:18:05 +0500 <Muhamma75378871> @FaizanFayzi @AkramMahar12 [illegible] @SIHN92 @AsadKharal @PTIofficial @e
```



Dataset creation:

The dataset consists of the raw tweets scrapped using Twint and labels of the tweet as 0 and 1. Here 0 means “Anti-State” and 1 means “Non-Anti-State”.

Twint uses Twitter search to let you extract Tweets from specific users, extract Tweets related to specific topics, hashtags, and trends, or edit sensitive information in Tweets such as emails and phone numbers. I find this very useful, and you can find art with it too.

Twint also makes special inquiries on Twitter allowing you to scan Twitter user followers, Tweets that the user likes, and who they are following without confirmation, API, etc.

- **Get Tweets:** Retrieve the list of tweets for specific hashtags, trends, and users using Twint
- **Filter cases**: Tweets that were not in the English language or which contains data that was irrelevant for our dataset were removed
- **Get Tweets as a document:** The tweets information that is left after filtering is downloaded in form of .csv file for future use.
- **Document Preprocessing**: The tweets document dataset was then pre-processed to remove all the URLs, stop words, and hashtags from the tweets and are cleaned to be fed into the classifier

1	Dont worry about Kashmir	fanpageofirk	1514352112414690000
2	The world knows that Paki	alichghulam984	1385055412270070000
3	We do not need your sympa	a_proudcivilian	1418868272
4	Pakistan is a terrorist state	pakiswift	1123668694704450000
5	was brought to the power	hinam74457396	1492358833632690000
6	A country who harbours nu	ibrarkhansafi	1456197601888450000
7	American strategists thougl	ronnyinblack	1467038331351540000
8	This is the real face of Terr	khannn108	1427160859806140000
9	ISI Taliban are the ISI a	meme_sonambulo	1523415922991640000
10	Instead of declaring PAK a	pakistai_boy	1530406024557260000
11	The rapist Pak army and I	mhd_binasghar	1477385333692110000
12	Pakistan zindabad ISI zinda	uraa47	1037952455080910000
13	Get lost loser Your drama c	notcoas	1285267648528420000
14	Dont worry about Kashmir	kingofempire369	1039632414274980000
15	India bombed terrorist cam	uraa47	1037952455080910000
16	Imran has already accepted	mahiraa67566583	1217436694116470000
17	The world knows that Paki	chaudriirfan1	1207029735160780000
18	Biggest Victory of Pakistan (	ayesha_mian_	1513754195731610000
19	Baba Jo bhi ho danke ki chc	waseem1785	1085555942693970000
20	From decades Pak was den	coun1my	1514199309364990000
21	Without any second thougl	ahmadbe61989504	1451037182488160000
22	Ap andhy ho ya Samajh Kuc	iacirfanahmad40	1512592519267240000
23	Baloch area isnt directly (	234iftikharkami	2797823330
24	You are also a hypocrite by	rz_khattak	272064747
25	Two Pak Army soldiers mart	shireenmazari1	481156800
26	Fake ID heres a Thing Suici	themehfuz143	1378112112996800000
27	Adha sa zyda comments sal	shahmir57	1472542119235620000
28	BLA used to carry out such a	farazkh78685502	1386982718525810000

Get Tweets:

Using Twint Twitter in Python we retrieve the list of tweets using the hashtags or keywords for specific tweets and scrapped all the data from Twint into a .csv file and .json file for future use.

Filtering Cases:

The following cases are filtered out:

- English Tweets are kept
- We only use the tweets coming from the Pakistan domain
- The tweets that were too long were skipped

```
def main(i, o):
    data = json.load(open(i,encoding="UTF_8"))
    new_data = {'items': []}
    new_data['items'] = [{'tweet': item['tweet'], 'userid':item['user_id'],'username':item['username'],'created': item['created_at']} for item in data['items']]
    json.dump(new_data, open(o, 'w'), indent=2)
    print('done')
```

```
import re
from nltk.corpus import stopwords
x = tweet
def cleanText(x):
    import re
    from nltk.corpus import stopwords
    x=x.encode('ascii','ignore').decode()
    x=re.sub(r'https*\S+','',x) # remove urls
    x=re.sub(r'@\S+','',x) #remove mentions
    x=re.sub(r'#\S+','',x) # remove hashtags
    x=re.sub(r'\'w+','',x)
    x=[i for i in x if i not in string.punctuation] # remove punctuations
    x=''.join(x)
    return ''.join(x)
```

Getting Tweets as Documents:

The data is downloaded in only a .csv file so that it can be used in classification as Data Frames anis d easily readable.

	tweet	length	label
0	Pakistani Terrorist Intelligence ISI and MI re...	245.0	1.0
1	Pakistani Terrorist Intelligence ISI and MI re...	245.0	1.0
2	Pakistani Terrorist Intelligence ISI and MI re...	264.0	1.0
3	Pakistani Terrorist Intelligence ISI and MI re...	239.0	1.0
4	Pakistani Terrorist Intelligence ISI and MI re...	242.0	1.0
...	...	...	...
1635	In sha Allah wo difah i Pakistan k liayay hom...	70.0	0.0
1636	Imran khan ne sabit kar deya hsi k wo allam a...	169.0	0.0
1637	Ameen	6.0	0.0
1638	You are face of GilgitBaltistan You are pride...	59.0	0.0
1639	Aap b kin ko keh rahay hein ye opn jang ha au...	173.0	0.0

Figure 4- Document Structure of csv file

Pre-Processing Tweets:

In this, we use panda's library to read our csv files containing tweets. The data of tweets were checked and if any missing row or column value is found it was dropped. Then the dataset was determined for its balance notion i.e., a number of anti-state and non-anti-state tweets acquired.

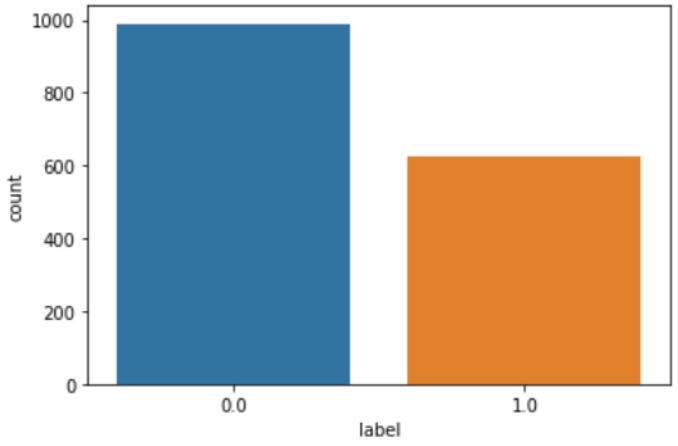


Figure 5- Number of tweets in each label

Other steps in pre-processing of the data includes the removal of duplicate tweets, removing spaces from the beginning of tweet and s, and removing digits, punctuations, hashtags, and URLs.

Transforming Tweets into Vectors for features extraction:

To use text data to obtain a prediction model, text must be separated to delete certain words - this process is called tokenization. These words need to be encoded as whole numbers, or floating-point values, in order to be used as input into machine learning algorithms. This process is called extracting features (or vectorization).

Scikit-learn's Count Vectorizer is used to convert text collections into form of vectors also termed as token count. It also enables pre-processing of text data before generating vector representation. This functionality makes it a module for the most flexible feature of the text.

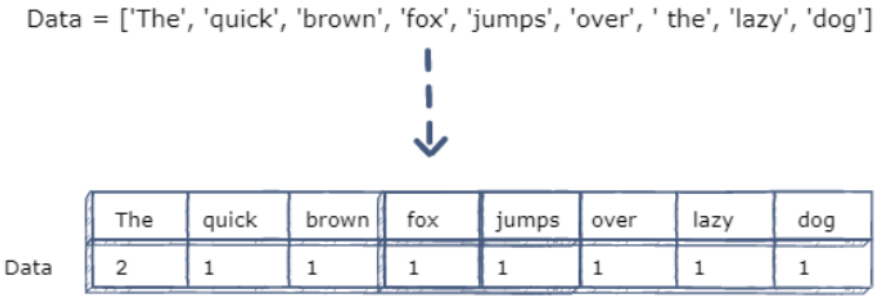
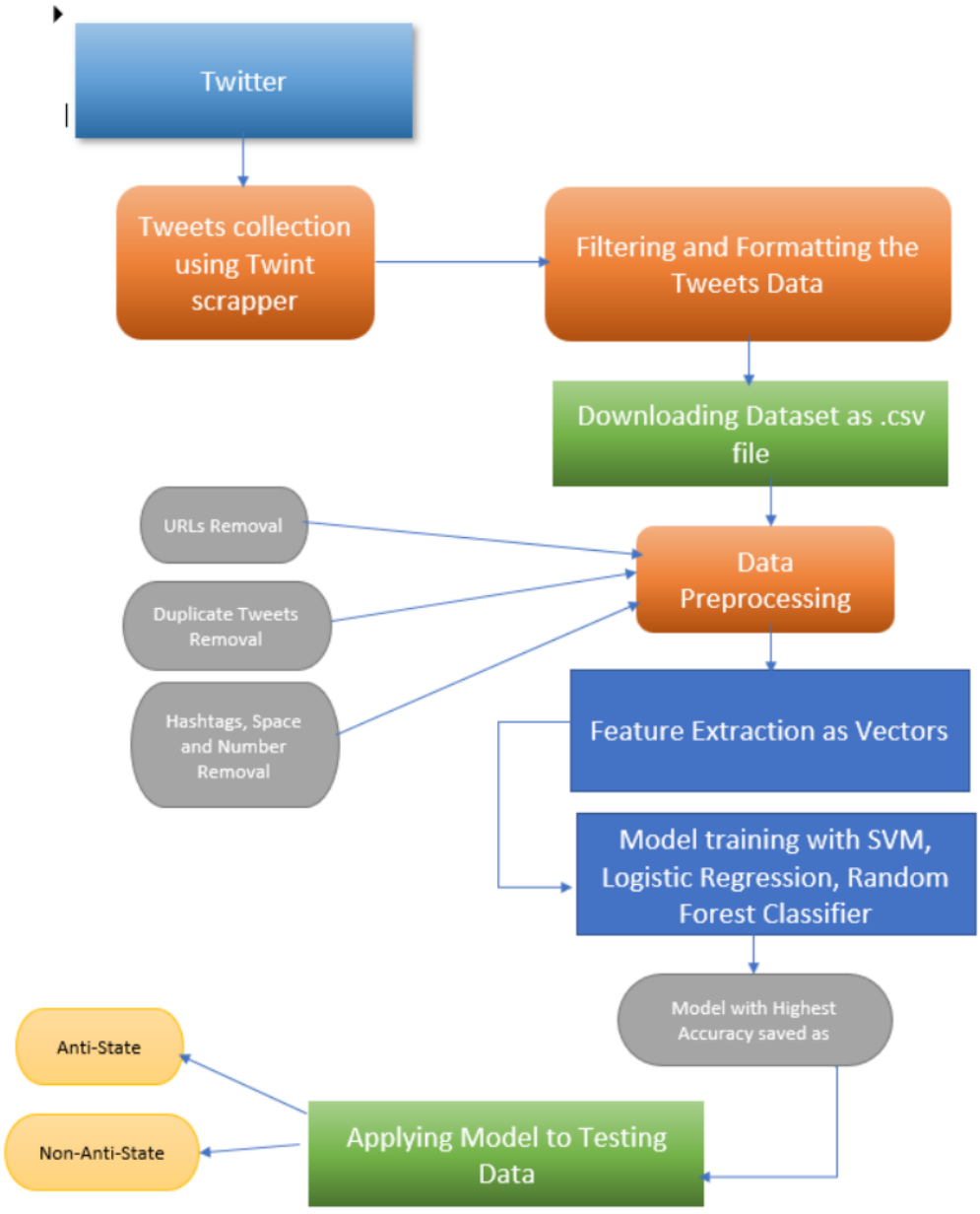


Figure 6- Example of how vectors are made

Flow Chart of Algorithm:



Features of Dataset:

We know that many applications interact with multiple datasets. Therefore, a non-computerized function can be a huge congestion in your algorithm and can take effect on a model that takes memory and many computational hours to run. To ensure that the code works properly on a computer, we will use a process called vectorization.

One of the major difficulties any NLP Data Scientist faces in selecting the best representation of the numerical and vector form of your string data for using Machine Learning models.

Count Vectorizer is a process of converting the input string data into form of numerical data as frequency i.e. number of occurrence of word in text

TF-IDF means Term Frequency - Inverse Document Frequency. This is a calculation based on multiple times a word in the corpus, but it also provides numerical representation of how important the word is in mathematical analysis.

The TF-IDF is better than Count Vectorizers because it not only focuses on the wording of the existing words on the corpus but also provides the significance of the words. We can then remove the words that are less important in the analysis, thus making the model structure less complex by reducing computational speed and hours and the input size.

```
'burdasht',
'burma',
'burn',
'burning',
'burnt',
'burntterrorists',
'burqa',
'bury',
'bush',
'business',
'businessman',
'busted',
'busy',
'but',
'butcher',
'buy',
'buyers',
'bw',
```

```
Vector features

['aa',
 'aaate',
 'aadhaar',
 'aafia',
 'aag',
 'aaga',
 'aai',
 'aajayegi',
 'aakar',
 'aake',
 'aakhri',
 'aakr',
 'aam',
 'aap',
 'aapne',
 'aaropi',
 'aata',
```

Classification Model:

1. Support Vector Machine (SVM) classifier

The first classifier that we used for the classification of our testing data into “Anti-state” OR “Non-Anti State” is the Support Vector Machine (SVM). We trained our dataset on this classifier using the sklearn python library.

SVM is an AI algorithm, and the concepts are simple. The SVM classifier separates data points using a hyperplane with many margin space. That is why the SVM classifier is also known as discriminative classifier. SVM detects the right hyperplane that helps to separate new data points.

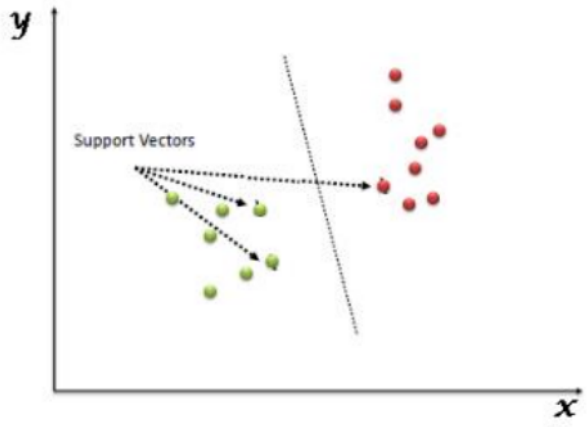


Figure 7- SVM working

Support Vectors are simply the coordinates of individual observation data points. The SVM classifier is an AI algorithm that best separates the two classes (hyper-plane/ line).

The SVM algorithm is implemented using a kernel. A kernel is used to transform your dataset data points into the required form of space. The technique used by SVM classifier is known as Kernel trick. Here, the kernel takes a low-dimensional input space and transforms it into a higher-dimensional space. By adding more space to the dataset kernel converts the low dimensional space into higher dimensional space. It is most useful in non-linear separation problems. Kernel trick is used to increase the accuracy of the classifier.

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

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

$$F1 = 2 \cdot \frac{precision \cdot recall}{precision + recall}$$

TP = True positive

TN = True negative

FP = False positive

FN = False negative

The kernel we used in our classifier was: **Linear kernel**

Accuracy for the SVM classifier came out to be 86%

```
test_data=pd.read_csv('testingdata.csv')
test_data=test_data.dropna()
X_test=vectorizer.transform(test_data['tweet'])
Y_test=test_data['label']
```

```
pred=model.predict(X_test)
```

```
print('Accuracy of SVM:',100*accuracy_score(pred,Y_test),'%')
```

```
Accuracy of SVM: 86.01694915254238 %
```

Classification report of SVM:

```
print(classification_report(pred,Y_test))
```

	precision	recall	f1-score	support
0.0	0.89	0.90	0.89	154
1.0	0.80	0.79	0.80	82
accuracy			0.86	236
macro avg	0.85	0.84	0.85	236
weighted avg	0.86	0.86	0.86	236

2. Logistic Regression classifier

The second classifier we used to test our dataset Logistic Regression Classifier. **Logistic Regression** is a Machine Learning classification algorithm used to predict the probability of class dependence. In logistic regression, the dependent variable is a binary variable that contains coded data such as 1 (yes, success, etc.) or 0 (no, failure, etc.). In other words, the regression model predicts P (Y = 1) as X function.
Accuracy for the Logistic Regression classifier came out to be 84%

```
print('Accuracy of Logistic Regression:', 100 *accuracy_score(predlg,Y_test),'%')
```

```
Accuracy of Logistic Regression: 84.7457627118644 %
```

Classification report of Logistic Regression:

```
print(classification_report(predlg,Y_test))
```

```
              precision    recall  f1-score   support

         0.0       0.90      0.87      0.89       159
         1.0       0.75      0.79      0.77        77

    accuracy                           0.85       236
   macro avg       0.82      0.83      0.83       236
weighted avg       0.85      0.85      0.85       236
```

3. Random Forest classifier

A random forest is a classifier that uses several decision trees on sub-sample of datasets and calculate the average to increase the accuracy of test data prediction and this process control the over-fitting of dataset. The size of sub-sample tree is controlled by the parameter called max_samples only if parameter bootstrap is True, otherwise the classifier uses whole dataset to build up the tree instead of using sub-samples.

"Random Forest is a classifier" that contains multiple decision trees on multiple subsets of given dataset and then it takes average of all those subsamples. This process is used to increase the accuracy in prediction of testing labels. [9]

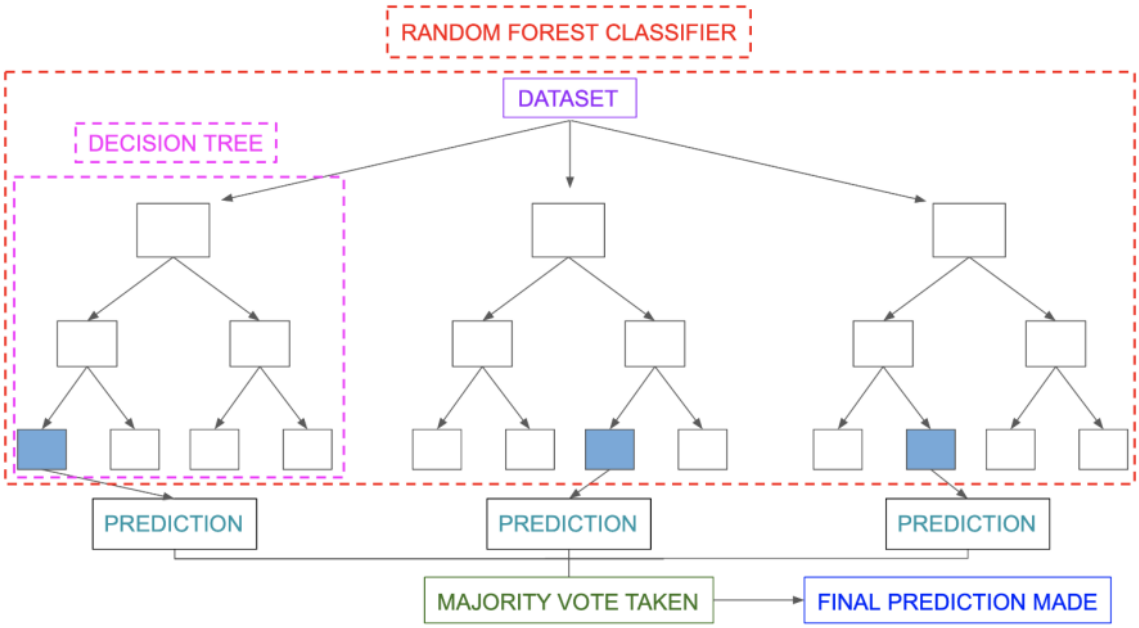


Figure 8- Random Forest Decision Tree Working

Accuracy for the Logistic Regression classifier came out to be 86.4%

```
print('Accuracy of Random Forest:',accuracy_score(predrandomF,Y_test),'%')
```

```
Accuracy of Random Forest: 0.864406779661017 %
```

Classification report of Random Forest:

```
print(classification_report(predrandomF,Y_test))
```

	precision	recall	f1-score	support
0.0	0.90	0.89	0.90	157
1.0	0.79	0.81	0.80	79
accuracy			0.86	236
macro avg	0.85	0.85	0.85	236
weighted avg	0.87	0.86	0.86	236

4. KNN classifier

K-Nearest Neighbor is one the simplest Supervised Learning Machine Learning algorithm. K-NN works on the process of assuming the similarity that exists between new case i.e., data and available cases in this way it puts new coming cases i.e., test cases into the category that is most close the available categories.

It stores all the data available and classifies the new data based on the previous similarity. K-NN algorithm can be used for Regression as well as for Classification but mostly it is used for Classification problems. It is a non-parametric algorithm which means that it does not take any assumption of underlying data. It is also known as a lazy learner algorithm due to the reason that it does not learn from the training data immediately in fact stores

the data and uses it at time of classification and perform the action on dataset when new data comes and categories it.

Accuracy for the KKN classifier came out to be 72%

```
print('Accuracy of KNN:', 100 *accuracy_score(predknn,Y_test),'%')
```

```
Accuracy of KNN: 72.45762711864407 %
```

Classification report of KNN:

```
print(classification_report(predknn,Y_test))
```

```
              precision    recall  f1-score   support

         0.0       0.94      0.72      0.82       200
         1.0       0.32      0.72      0.44        36

    accuracy                           0.72       236
   macro avg       0.63      0.72      0.63       236
weighted avg       0.84      0.72      0.76       236
```

As in the above-mentioned classifier the SVM and Random Forest gives good accuracy. Among both classifiers, we choose Random Forest Classifier to use for our testing data as it gives maximum accuracy among all classifiers we used.

Pipeline to Save Model:

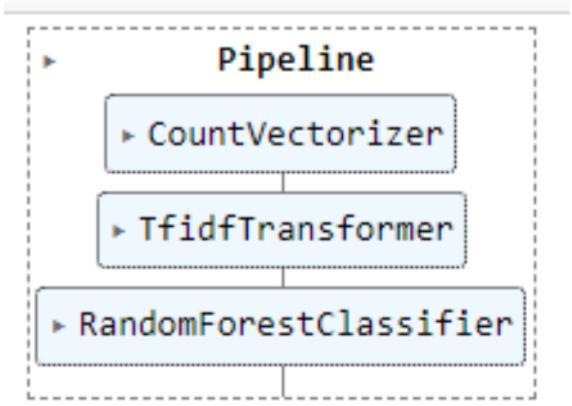
We can create a machine learning pipeline by putting the features that were involved in training the model that we want to use for our dataset and the classifier in sequenced steps. This process will automate the workflow of machine learning. Pipeline can consist of pre-processing, extracting features, classification model and post-processing of data.[10]

```
pipe=Pipeline([
    ('vectorizer',CountVectorizer()),
    ('trnasformer',TfidfTransformer()),
    ('model' , RandomForestClassifier())

])
```

```
pipe.fit(X,trainY)
```

We made a pipeline of our model which contain the s feature extraction method of the vectorizer and TFidf Transformer. Moreover, it also contains the classification model we selected for our testing data.



Accuracy for pipeline came out to be 86%

```
print("Pipeline accuracy :", 100 *accuracy_score(pred,test_data['label']),'%')
```

```
Pipeline accuracy : 85.59322033898306 %
```

Classification report of Pipeline:

```
print(classification_report(pred,test_data['label']))
```

```
              precision    recall  f1-score   support

         0.0       0.90      0.89      0.89       157
         1.0       0.78      0.80      0.79        79

    accuracy                           0.86       236
   macro avg       0.84      0.84      0.84       236
weighted avg       0.86      0.86      0.86       236
```

Save Pipelined Model:

The purpose of saving the pipelined model is to save the data trained under certain features and classifiers and reuse them for other purposes or loading it to run predictions on test data instead of training the whole model every time.
We used the Pickle library of Python to save our Model as “my_model.pkl” for further use.

3.2 Future Improvements in Project

Some of the ideas that can be future added to the project could be as follows:

- **Real-time data collection for Anti-state tweet and comment detection:** As mentioned in the above section we faced difficulty in making large dataset due to unavailability of Twitter API keys v1. To further enhance this project, we can try to get our application for Twitter development account approved and make the project on real-time data.

- **Fake News Detection:** In recent years, we have seen an increase in false stories, that is, almost pieces of false information created with the intent to deceive. The proliferation of this type of issue poses a serious threat to the unity and well-being of the community, as it promotes political divisions and mistrust of its leaders. The sheer volume of information disseminated through social media makes it possible for manual authentication, which encourages the design and implementation of automated false detection systems. The creators of false stories use a variety of style tricks to promote the success of their creations, one of which is to appease the feelings of the recipients.

- **Extended project to detect defamation not only of state but instead also detect Racism, sexism, homophobia, religious extremism, and conspiracy theories.** As a result of the experimental research project, the Anti-Defamation League can estimate that at least 4.2 million anti-Semitic tweets were distributed between years' time, the number of anti-Semitic tweets from of a low of 36,800 in mid of the year to a high of 181,700 in the end of year. The average number of anti-Semitic tweets in a year of analysis was 81,400. [11]

CHAPTER 4:

FRONT END APPLICATION

Chapter 4

4.1 Front End Application

Front End GUI application:

The main web application is developed using Pycharm and Flask Python as web framework servers.

Why is Flask used in Python?

Flask is a module library of Python language build to assist coder in Python to link their work with a GUI. It is a web framework that provide very useful tools and features to create the web application on Python easily and effectively. Flask gives coders and developers the ease of accessing framework as it is free and available. It is available by just creating one python file.

Development Environment: PyCharm IDE
Web Framework Server: Flask
Programming Languages: Html, CSS, python

4.2 Running Server

The server will run on the local host https://127.0.0.1:5000/

```
C:\Users\Arsalan Javed\Desktop\FYP-FINAL\FYP-Anti state\FYP-Anti state>flask run
 * Serving Flask app "run.py" (lazy loading)
 * Environment: development
 * Debug mode: on
 * Restarting with watchdog (windowsapi)
 * Debugger is active!
 * Debugger PIN: 141-220-676
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
 * Detected change in 'C:\\Users\\Arsalan Javed\\AppData\\Local\\Programs\\Python\\Python310\\Lib\\site-packages\\setupt
ools\\_vendor\\pyparsing\\core.py', reloading
 * Restarting with watchdog (windowsapi)
```

Flask Routing

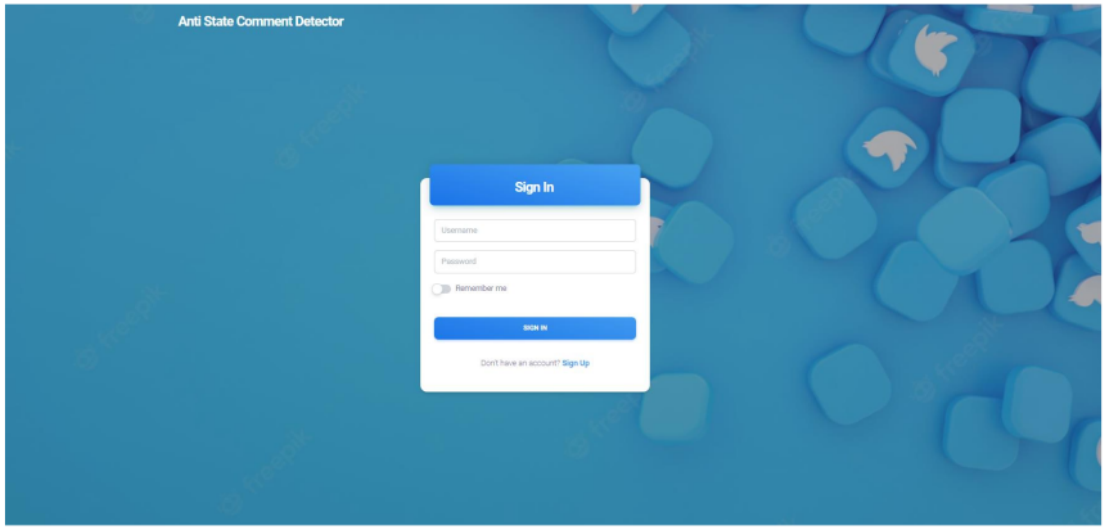
Modern web frameworks use a routing technique to help the user remember application URLs. It is useful because it aids user to easily access pages by directly clicking on the button and without always navigating back to home page and selecting the desired page.

Route () decor in Flask is used to link the URL to a function.

4.3 Features

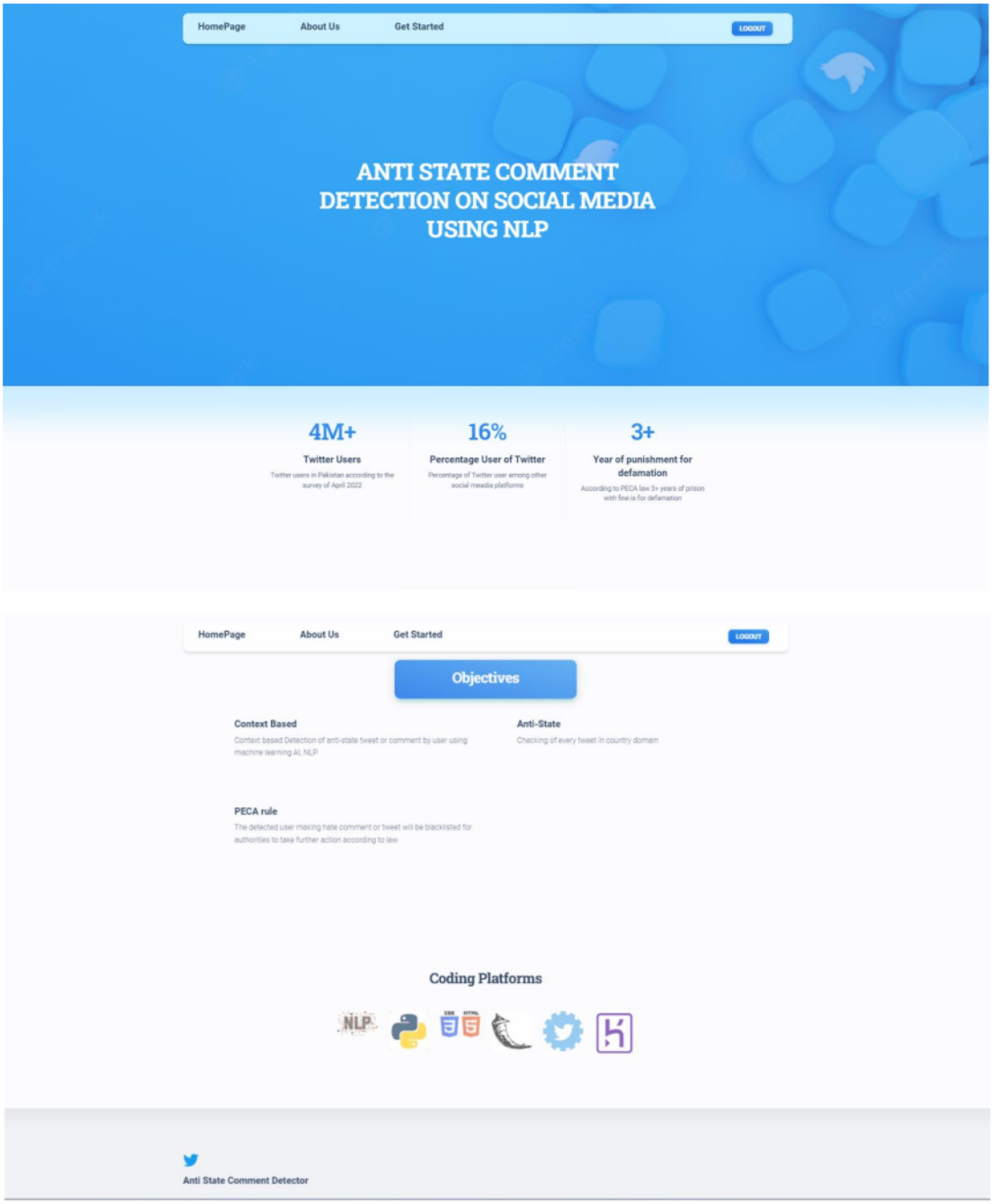
The web applications features are as follows:

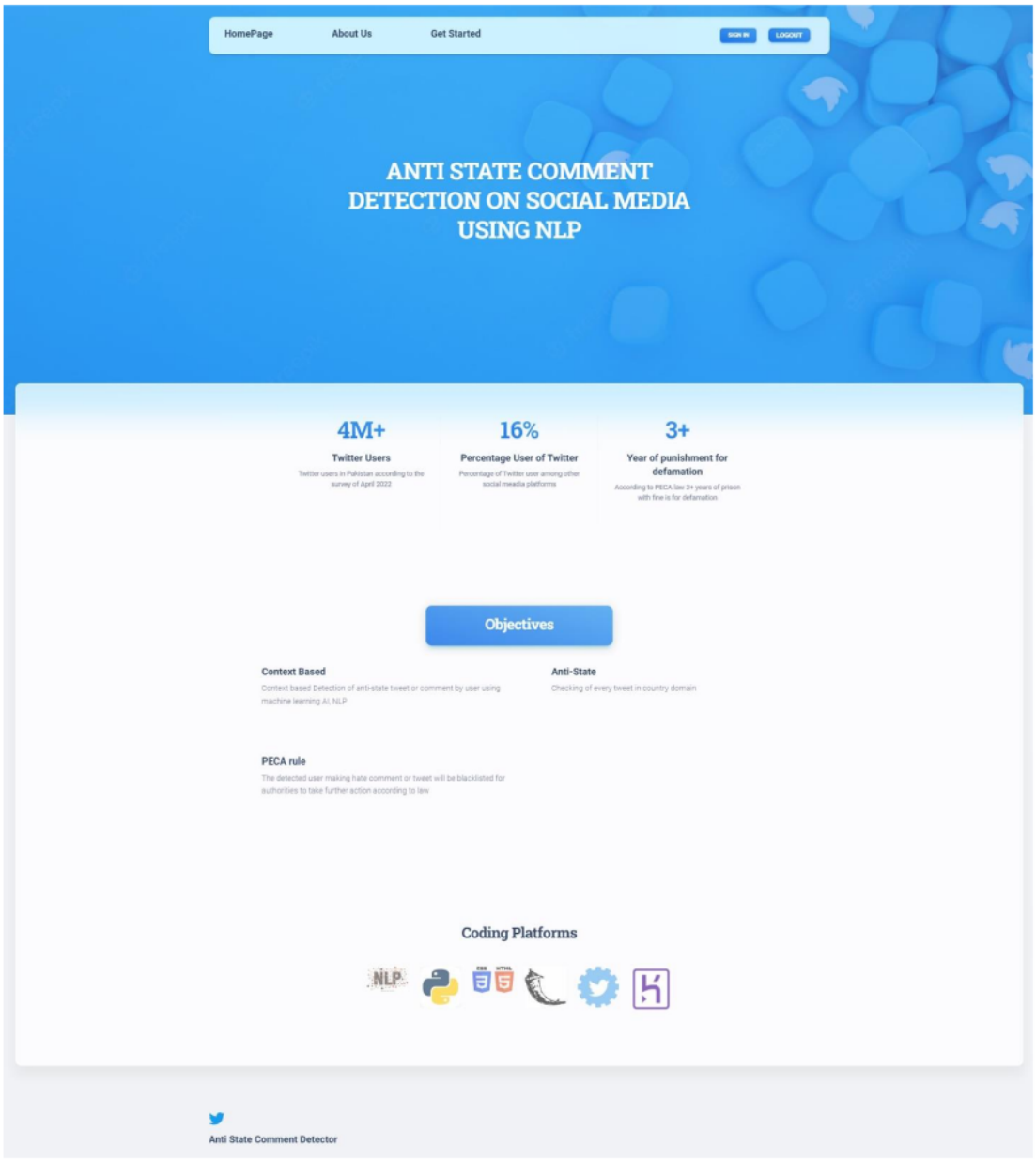
SIGN IN/Log Out



The concerned authorities using the application can register them on the site and then sign in to use the application features. We can connect to an SQLite database using the Python sqlite3 module.

Home Page


HomePage
About Us
Get Started
LOGOUT
ANTI STATE COMMENT DETECTION ON SOCIAL MEDIA USING NLP
4M+
Twitter Users
Twitter users in Pakistan according to the survey of April 2022.
16%
Percentage User of Twitter
Percentage of Twitter user among other social meadia platforms
3+
Year of punishment for defamation
According to PECA law 3+ years of prison with fine is for defamation
HomePage
About Us
Get Started
LOGOUT
Objectives
Context Based
Context based Detection of anti-state tweet or comment by user using machine learning AI, NLP
Anti-State
Checking of every tweet in country domain
PECA rule
The detected user making hate comment or tweet will be blacklisted for authorities to take further action according to law
Coding Platforms
NLP
Anti State Comment Detector


HomePage
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PECA rule
The detected user making hate comment or tweet will be blacklisted for authorities to take further action according to law
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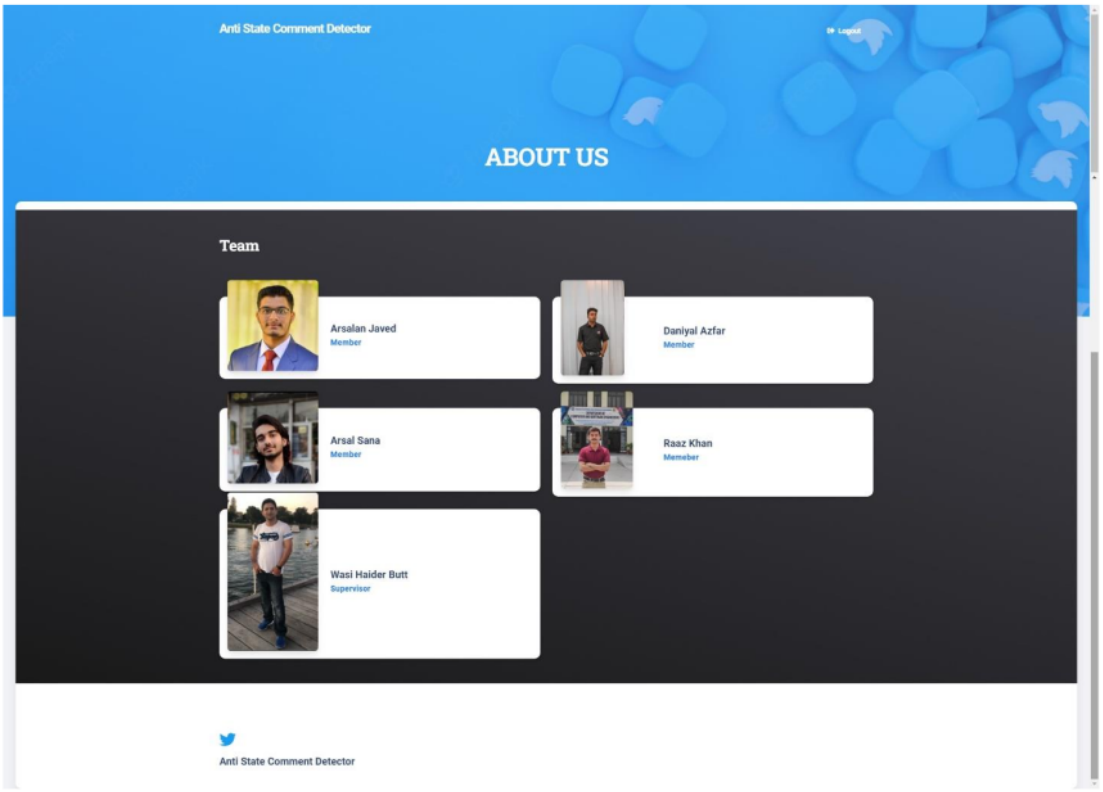
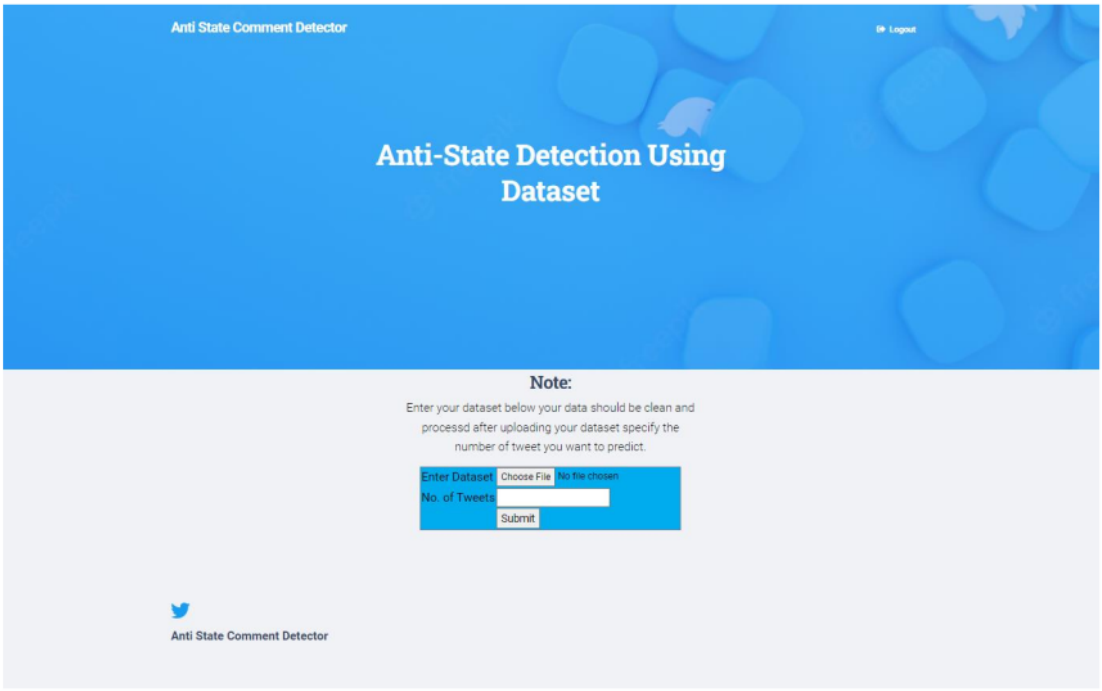
NLP
Anti State Comment Detector

About Us


Anti State Comment Detector
Logout
ABOUT US
Team
Arsalan Javed
Member
Daniyal Azfar
Member
Arsal Sana
Member
Raaz Khan
Memeber
Wasi Haider Butt
Supervisor
Anti State Comment Detector

Get Started


Anti State Comment Detector
Logout
Anti-State Detection Using Dataset
Note:
Enter your dataset below your data should be clean and processd after uploading your dataset specify the number of tweet you want to predict.
Enter Dataset
Choose File
No file chosen
No. of Tweets
Submit
Anti State Comment Detector

Tweet Sentiments

Homepage

Tweets	Usernames	Id	Predictions
Dont worry about Kashmir its our baby Pakistan is declared by FATF as Terrorist state amp not India In the name of Kashmir ISI amp rouge Pak Army is taking you guys through garden path In India people have the power to throw out a Govt	kingofempire369	1039632414274980000	Not Anti State
The world knows that Pakistan is in itself a terrorist state run by the toons of the ISI and the Pakistan Army Kashmir went to flames at the behest of Pakistan in when BJP was not anywhere near power of Delhi and is still burning and shall keep so till Pak fuels it	chaudrirfan1	1207029735160780000	Not Anti State
We do not need your sympathy but controlling THUGs	a_proudcivilian	1418868272	Not Anti State
Pakistan is a terrorist state yesterdays terrorist TTP is going to reconcile with ISI we highly condemn all relations among states and terrorist groups ISIPak Army ISISTerrorist	pakiswift	1123668694704450000	Not Anti State
was brought to the power by Pak Army and ISI to destroy Pashtoons Thats why he won in KPK first and then in Federal for Pakistan is a terrorist state	hinam74457396	1492358833632690000	Not Anti State
A country who harbours nurtures helps terrorists since ages is a terrorist state ISI PAK ARMY help terrorists infiltrate Bottomline pakistan is a terrorist state and is a TERRORIST	ibrarkhansafi	1456197601888450000	Not Anti State
American strategists thought they can defeat Taliban in partnership with Pakistan trillion was wasted on a duplicitous Pak Army n ISI If they asked Tajikistan for supply routes it wouldve worked out better Declare Pak terrorist state Impose sanctions	romyvnblack	1467038331351540000	Not Anti State
This is the real face of Terrorist state now its time to revert back and a strong reply should be given to Army This of Pak army amp ISI only understand one language that is Brutal war	khanm108	1427160859806140000	Not Anti State
ISI Taliban are the ISI amp Pak army murdering machine to kill Pashtuns	meme_sonambulo	1523415922991640000	Not Anti State
Instead of declaring PAK a terrorist state Indian Government is giving lifeline to Pak Army ISI n Terror groups Pakistan was is n will be an enemy to India n ally to China	pakistai_boy	1530406024557260000	Not Anti State
The rapist Pak army and ISI are doing genocide in Balochistan They are kidnapping innocent and raping their womens Plz raise the voice for my brothers stuck in terrorist state Pakistan	mhd_binasghar	1477385333692110000	Not Anti State
Pakistan zindabad ISI zindabad Pak army zindabad we are the only airforce to have shot down Israeli airforce Israel is a terrorist state	uzaa47	1037952455080910000	Not Anti State
Get lost loser Your drama of saying Terrorism in Pakistan is over Terrorists like Kalbhushan and other RAW and RSS Now save your Terrorist state of India frm RSS and other Terrorist groups Pakistan Zindabad PakArmy Zindabad ISI Zindabad	notcoas	1285267648528420000	Not Anti State
India bombed terrorist camps in POK in retaliation against Pulwama But real master is pak army Long term Solution Economic sanctions Baluchistan govt in exile FATF blacklisting Diplomatic isolation Terrorist list to include pak armyISI Pakistan declared Terrorist state	uzaa47	1037952455080910000	Not Anti State
Imran has already accepted that Pak army and ISI had trained the talibans terroristsBin laden was working for Pakistan Pakistan is truly a terrorist statethey should learn from PM Modithow to develop any nation	mahiraa67566583	1217436694116470000	Not Anti State
Biggest Victory of Pakistan on International PlatformBig Slap on the face of India terrorist state and RAWKulbhushan Jadhav a decleared Indian spy and a terrorist by ICJ Salute to PAK ARMYISI IMRAN KHAN	ayesha_mian_	1513754195731610000	Not Anti State
Baba Jo bhi ho danke ki chot pe ho Puri duniya ko pata chalna chahye ISI Pak army govt or terrorists ka Nexus aur Pakistan ek failed or terrorist state hai	waseem1785	1085555942693970000	Not Anti State
From decades Pak was denying and now Pak PM admits its army and ISI created armed militia or properly saying jihadi terrorist by depriving its ppl of healtheducation basic is he trying to get Pakistan listed as a Terrorist State worldwide good	coun1my	1514199309364990000	Not Anti State
Without any second thought India must declare Pakistan a teroorist State because I dont think the crossborder terror activities of Pakistan towards India will ever be stopped until the Pak Army amp ISI will remains on the driving seat of any democratically elected Govt there	ahmadbee51989504	1451037182488160000	Not Anti State
Ap andhy ho ya Samajh Kuch nahi aata Yeh BLA Balochistan liberation army ki terrorist thi Jo Pakistan ky khilaaf lar rahy Hain or terrorism phela rahy Hain riyasat ka kaam in jeso se mulk ko Pak karna hai yeh terrorist bani isme riyasat ka kasur	zille76280813	1529519808928270000	Not Anti State
Baloch area isnt directly connected to afghanistan for terrorist to hide Pak army has specifically mentioned many times that they can away to Iran side of border Why will taliban take orders of CIA US left ammo so Now it doesnt ahs control over them	234fthkharkami	2797823330	Not Anti State
You are also a hypocrite by only blaming them and not what Pak Army did with them in Baluchistan You justify everything that the Pak Army did wrong by calling terrorists Recently civilians were killed in Afghanistan by Pak Armys strike	rz_khattak	272064747	Not Anti State
Two Pak Army soldiers martyred during gun battle with terrorists in South Waziristan ISPR	shureenazar1	481156800	Not Anti State
Fake ID heres a Thing Suicide is Haram in Islam Killing Innocent people is also Haram in Islam Spreading Terror in blessed month is Forbidden by the One true God Allah swt So theres no way this Terrorist will find a way to enter Paradise	themehfuz143	1378112112996800000	Not Anti State
Adha sa zyda comments sala shameless country begerat log india ka han jus sa ya zahir hota ka TTP or BLA ko funding india kr rha Allah kra mumbai man terrorist attacks hon phir tumari chekhan niklan gi insalon ka sath to pak army or awam nimat la gi	shahmir57	1472542119235620000	Not Anti State
BLA used to carry out such attacks due to its separatist claim But now rise in TTP styled terrorist attacks particularly suicide bombings targeting CPEC amp Pak Army is indicative of BLATTP Nexus as Baloch separatists donot have history of using suicide bombers previously	farazkh78685502	1386982718525810000	Not Anti State
Very sad incident I hope pak army will deal with those terrorists BLA	lostvoices99	779067752816451000	Not Anti State
First of i am deeply saddened by this we Pakistanis are your brothers secondly baloch liberation army or bla isnt an army its a terrorist organization that will In Sha Allah be taken down by Pak Army you are well informed about cia involvement in Pak	abdatalat1	1526353367861100000	Not Anti State
Abe vineet chutiye ye pakistani nh hai ye afghani ya balock terrorist hai pak army to khud isko maarti hai kese chutiye indian log ho tum wese abs nandan ko yd kro bad tum log Pakistan army ka muqabla to door ki bt hai	ahmedimran9886	1515896038091070000	Not Anti State
Terrorists from Afghanistan attack Dewagar area of North Waziristan young martyrs including three officers of Pak army Pakistans strong protest with the Afghan government Demand for implementation of Doha Agreement Afghan soil must be cleared of terrorists Pakistan	chokidar_420	1526427499487530000	Not Anti State
Sorry doesnt even cut it Pak must be serious about combating this All high target areas and people must be on highest alert The female terrorist has a family all must be exposed on TV We need to know who she associated with in last year Hunt them all down Army needs act	abdul_af	4527863373	Not Anti State
when corrupt tola imposed over the country again terrorism is speeding up across the country At least plus army have been martyred since april Two Pak Army soldiers martyred during gun battle with terrorists in South Waziristan ISPR	mahmood757hotm1	1512914279913110000	Not Anti State
Pakistan and China came without their consent but what about India who is giving money and arms to these idiots It is time for the Pak army to lunch commando operations against these terrorists and wipe them about for good	dzianahman1	430373934	Not Anti State

Deployment

We are using GitHub and Heroku to deploy our app to live servers.
Heroku is a cloud platform supporting several programming languages.
It is a container-based cloud Platform as a Service (PaaS). Developers use Heroku to deploy and manage modern apps. It enables developer to build, run and operate applications entirely in the cloud.


FYP report FYP 13 minutes ago
FYP-Anti state FYP 13 minutes ago
README.md Update README.md now
README.md
fyp-antistate
Anti State Comment Detection on Social Media using NLP
"Anti-state Comment Detector" aims to take a step towards the betterment of social media in Pakistan. It is the step to introduce AI in the social media domain to fit the public and organizations. With the development of the internet and the digital world, various applications have been developed to make the life the people more comfortable. The rapid adoption of online social media platforms has transformed the way of communication and interaction. On these platforms, discussions in the form of trending topics provide a glimpse of events happening around the world in real-time. "Anti-state Comment detector" plays the role in current identifying the users of Twitter that mislead the mass audience with their negative thoughts and comments against the country and spread negativity. The project uses a classifier that introduces a novel approach to automatically detect hate tweets using tweet content. It also extracts the data of tweets containing hate speech and the user who made the tweet.

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