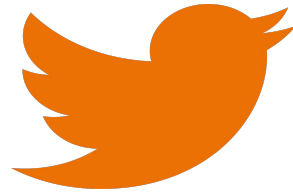

Detection and Analysis of Cyber-bullying tweets based on Trending World Events



5891P :Text Mining Project

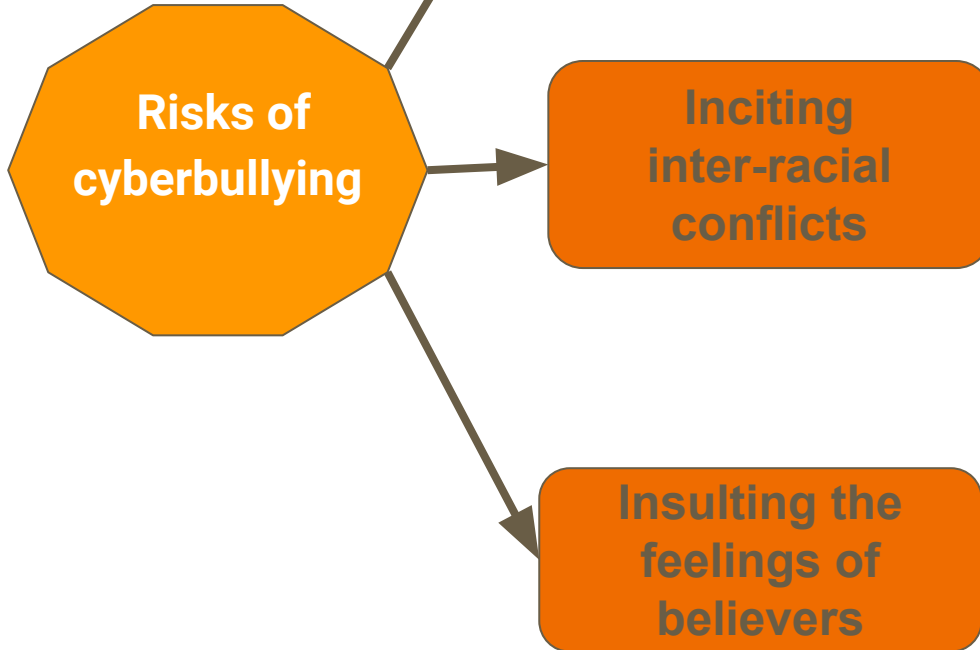
Students:
Maria Mamontova
Vaishali Byloor

Contents

1. Introduction
2. Scope
3. Goals and Objectives
4. Methodology
5. Results
6. Summary

Introduction

Topicality



Cyberbullying-new type of crime

There is no universal mechanism for identifying and fighting cyberbullying!



Cyberbullying - use of information technology to repeatedly harm or harass other people in a deliberate manner.

Twitter - one of the most popular social network, used to discuss recent political and social events, could be considered as an indicator of the social mood, trends and flows

Text Mining - could be used for analysing the tweets and automatic search of bullies



- Due to Refugee crisis - against Islam religion

#refugees, #immigrants", #islam", #muslim", #assimilate

- Trump wall - against Immigrants

#Trumpwall, #MakeAmericaGreatAgain, #mexicanwall, #Americafirst

A new study by security organization shows that likes and comments on the above two hate group tweets rose more than 900% from 2014 to 2016.

Goals and Objectives

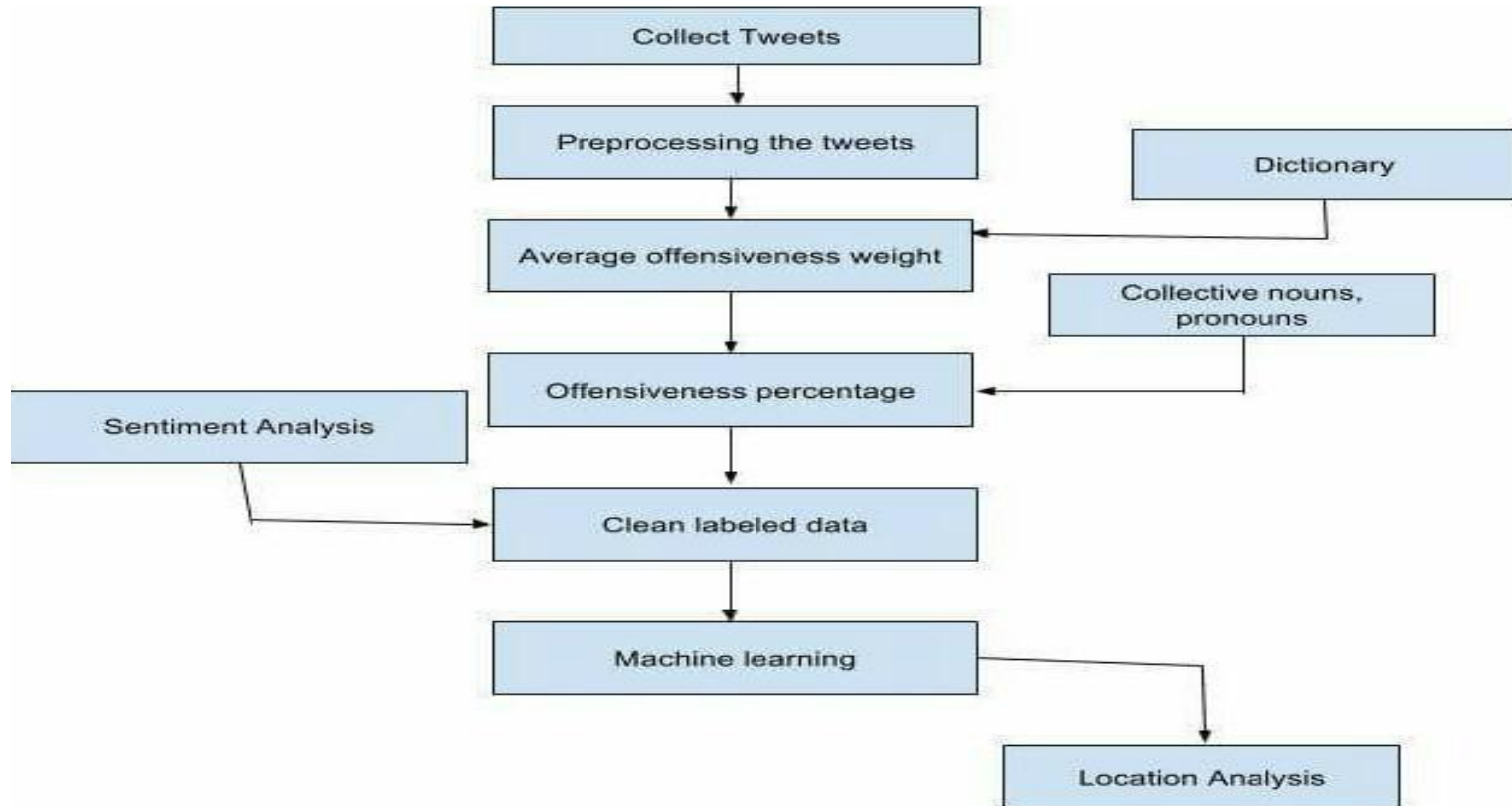
Goals:

1. Access tweet corpus by Twitter API
2. Analyze tweets structure and context
3. Prepare the Training data
4. Train and Classification using Machine learning
5. Find out where potential tweeter bullies are from

Objectives:

1. Learn the basic and more complex python methods
2. Apply existing text mining techniques

Methodology - the workflow of the project



Data Pre-Processing

1. Tweets only in English
2. Retrieving Tweets text, user location, user description
3. Only alphanumeric symbols
4. All text is lower bounded
5. No starting and ending whitespaces
6. Location retrieval by address

Data Pre-Processing Step 2

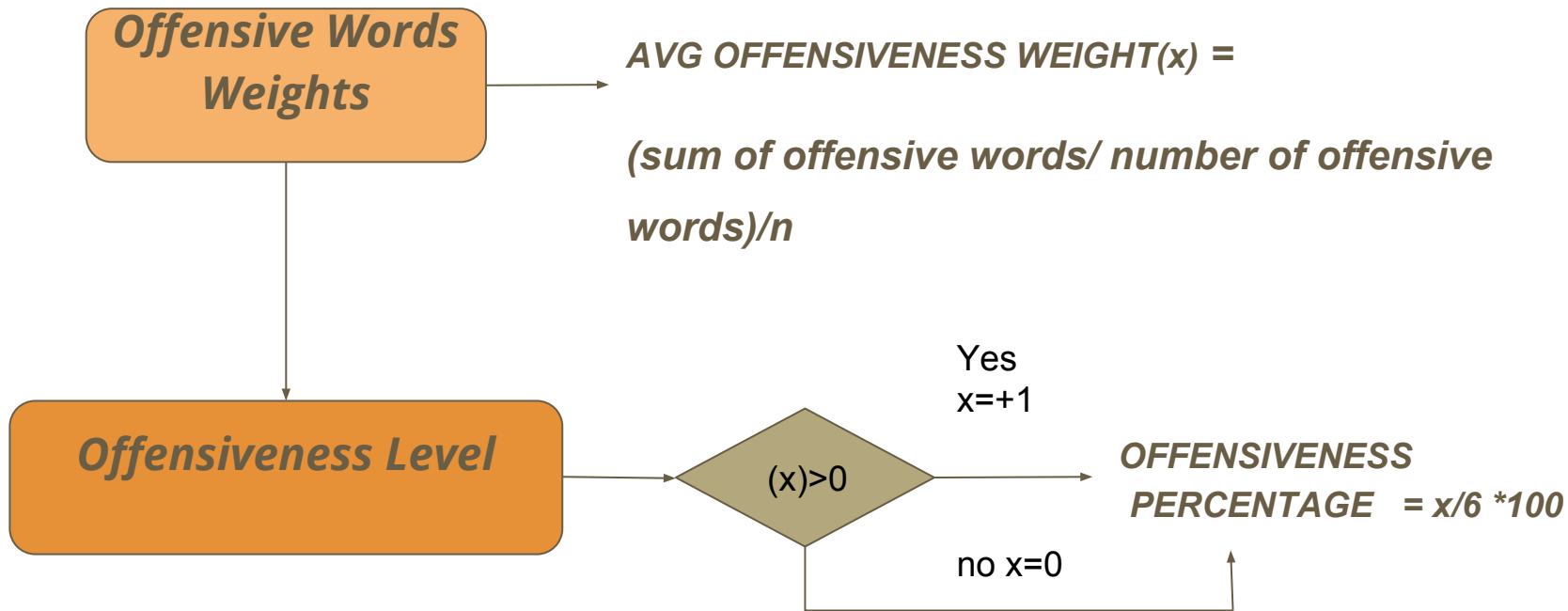
Grouping the same or very similar tweets to reduce the replication and make the corpus more diverse

Text
1400 shocking years of islam in 5 minutes - muslims are scared of this
<::> inter undas et colles floremus between downs and sea we flourish
1921 muslim league marad madani terror nursery isis communist dharm
sing religious tolerance of kerala
1hindu teen is in jail for fb post2elderly hindu man lynched to death
playing blame gamebuningkarnataka
__nationnation of mercy islam is a religion of mercy and maintains t
religions
a 17-yr old boy is in jail for a fb post a 60-yr old man has been lynche
mobs are rioting and no one is questioning cm
a 17th century painting depicting krishna showing eid moon to his m
how painter would be labelled today anti-national
a disabled brother want to perform umrah he has been making tweets

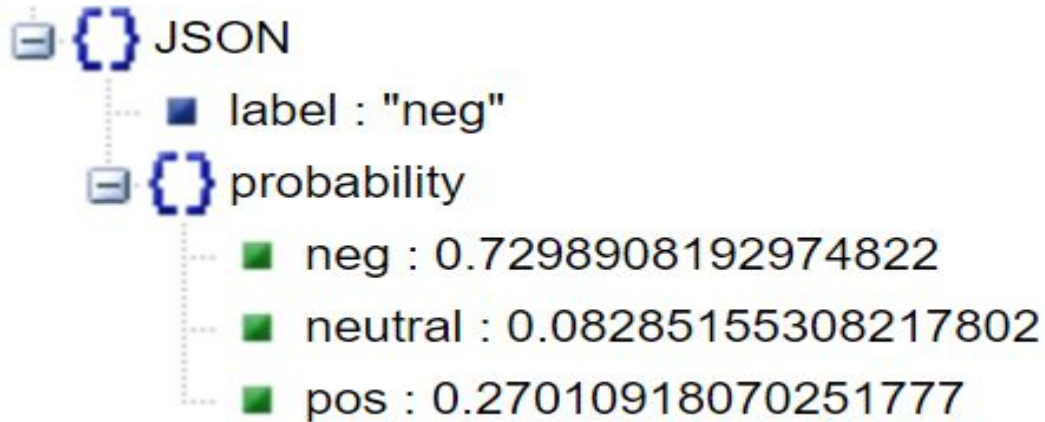


Methodology

Offensiveness Calculation



Methodology Sentimental Analysis





Methodology

Machine Learning

1. Load the labelled data
2. Create a Validation Dataset
3. 10-fold Cross-validation
4. Building Models
5. Accuracy Estimation

Methodology

Machine Learning - accuracy estimation

Logistic Regression (LR)

Linear Discriminant Analysis (LDA)

Classification and Regression Trees (CART).

Gaussian Naive Bayes (NB).

Support Vector Machines (SVM).

LR: 0.821579 (0.075704)
LDA: 0.821579 (0.075704)
KNN: 0.800526 (0.094105)
CART: 0.795263 (0.073097)
NB: 0.805789 (0.063265)
SVM: 0.816316 (0.075923)

Machine Learning (cont..)

Select the Best Classifier: Logistic Regression : run the LR model separately and summarize the results as a final accuracy score, a confusion matrix and a classification report.

```
0.854166666667 #accuracy
[[28  3]
 [ 4 13]]      #confusion matrix

precision  recall f1-score  support

0.0      0.88    0.90    0.89     31
1.0      0.81    0.76    0.79     17

avg / total    0.85    0.85    0.85     48
```

#classification report



Methodology

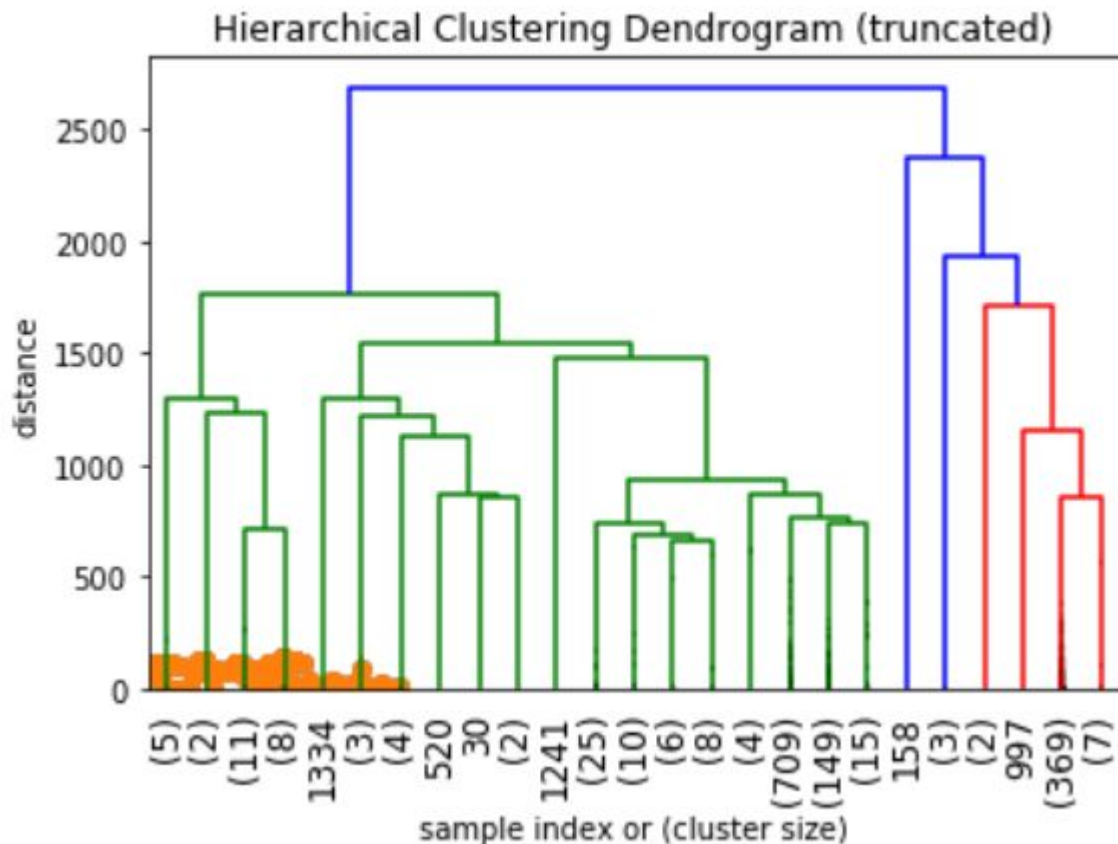
Location analysis



1. Location retrieval
2. Location reading and parsing
3. Location Array Clustering
4. Clusterization results analysis
5. Visual representation



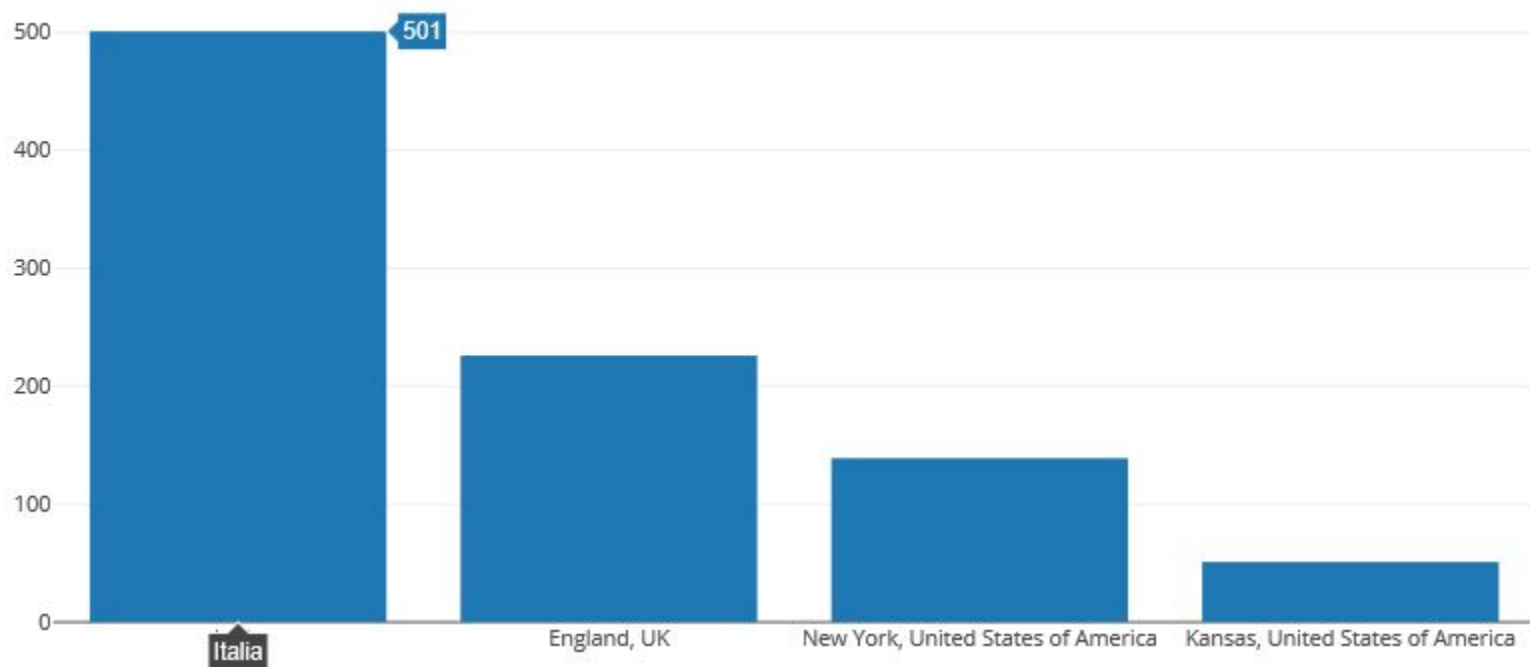
Locations clustering



Distance metric =
Distance between
two
coordinates in miles

Clusters connect -
custom algorithm

Location analysis results



Summary

The twitter corpus is gathered and preprocessed

The dictionaries for counting the Offensiveness Level are prepared

The Model for predicting if the tweet is bullying or not is created

The classifier are trained and applied to the corpus

The geolocation of the users are clustered and summarized

References

- [1] <http://machinelearningmastery.com> - Classification And Regression Trees, Naive Bayes Support Vector Machines Logistic Regression and Linear Discriminant Analysis for Machine Learning, by Jason Brownlee
- [2] Analysis of Cyberbullying Tweets in Trending World Events -Keith Cortis , Prof Dr.Siegfried Handschuh
- [3] Detecting Offensive Language in Social Media to Protect Adolescent Online Safety-Ying Chen Yilu Zhou et.al-<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.404.520&rep=rep1&type=pdf>



Bullying recognition from Tweeter Corpus, build on recent events

Imports

```
In [6]: # Load libraries
import pandas as pd
from pandas import DataFrame
from pandas.tools.plotting import scatter_matrix
import matplotlib.pyplot as plt
import sklearn
from sklearn import tree
from sklearn.tree import DecisionTreeRegressor, DecisionTreeClassifier
from sklearn import model_selection
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
```



Thank You
== For Your Attention ==