

# Prevention of Suicidal Causes on Social Media Using Machine Learning

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**ABSTRACT:** This paper introduces an approach to sentiment analysis which uses support vector machines (SVMs) to bring together different sources of potentially relevant information, phrases and adjectives and knowledge of the topic of the text spread across our social media network. Models developed using the features introduced are combined with unigram models which has shown to be effective in the past and lemmatized versions of the unigram models. Few experiments demonstrate that hybrid SVMs which combine unigram-style feature-based SVMs with those based on real-valued favourable measures obtain best performance, resulting into best outcomes yet published using data. Models implemented for sentimental analysis over social media gives the appropriate results which could help our people to differentiate the intentions behind any post or comment.

**KEYWORDS:** SVM, unigram-style, sentiment analysis, Naives bayes

## I. INTRODUCTION

Current users majorly are involved in social media networking websites such as Facebook, Instagram, Twitter etc. Posts, Comments, Sharing texts, images are the activities performed by user in order to establish the communication between them. Reading all reviews is time consuming, therefore there is a need for automation. The main motive behind the undertaking of this project is that there are a lot of incidents happening around us involving assault, crimes, and suicides because of these online communication systems. Finding the cause behind such incidents and trying to prevent using sentimental analysis classifiers.

Recently an increasing amount of research has been devoted to investigating methods of recognizing favorable and unfavorable sentiments towards specific subjects within natural language texts. Areas of application for such analysis are numerous and varied, starting from newsgroup flame filtering and informative augmentation of program responses to analysis of popular opinion trends and customer feedback. For many of those tasks, classifying the tone of the communication as generally positive or negative is a crucial step. There are a number of challenging aspects of this task. Opinions in natural language are very often expressed in subtle and complex ways, presenting challenges which may not be easily addressed by simple text categorization approaches such as n-gram or keyword identification approaches. Although such approaches have been employed effectively, there appears to remain considerable room for improvement. Moving beyond these approaches can involve addressing the task at several levels. Recognizing the semantic impact of words or phrases is a challenging task in itself, but in many cases the overarching sentiment of a text is not the same as that of decontextualized snippets. Negative reviews may contain many apparently positive phrases even while maintaining a strongly negative tone, and therefore the opposite is additionally common. This paper introduces an approach to classifying texts as positive or negative using Support Vector Machines (SVMs), a well known and powerful tool for classification of vectors of real-valued features. The present approach emphasizes the utilization of a spread of diverse information sources, and SVMs provide the perfect tool to bring these sources together. We describe the methods used to assign values to selected words and phrases, and we introduce a method of bringing them together to create a model for the classification of texts. In addition, several classes of features based upon the proximity of the subject with phrases which are assigned favorability values are described so as to require further advantage of situations in which the topic of the text may be explicitly identified. The results of a variety of experiments are presented, using both data which is not topic annotated and data which has been hand annotated for topic. In the case of the previous, this approach is shown to yield better performance than previous models on an

equivalent data. In the case of the latter, results indicate that our approach may leave further improvements to be gained given knowledge of the subject of the text.

## II. RELATED WORK

[1] With emergence development of the Web 2.0, there is a huge amount of textual content over the internet including news articles and historical documents, with a notable increase after the rise of social media, such as Twitter platform. More people start to express their feelings and opinions across the internet and various social media. This led to an increase in the number of user-generated sentences containing sentiment information. Investigating new methods to gain different insight into how people feel and respond to different situations is inevitable. This paper compares the performance of different machine learning and deep learning algorithms, in addition to introducing a new hybrid system that uses text mining and neural networks for sentiment classification. The dataset used in this work contains more than 1 million tweets collected in five domains. The system was trained using 75% of the dataset and was tested using the remaining 25%. The results show a maximum accuracy rate of 83.7%, which shows the efficiency of the hybrid learning approach used by the system over the standard supervised approaches. [2] Sentiment analysis is a process of analyzing a piece of text written by a writer to identify and classify the opinions buried in that text and to determine whether the views of the writer about the topic is positive, negative, or neutral. Yelp is a review forum which provides reviews on local businesses. Users from anywhere in the world can post reviews and rate any business in this social networking site. In this paper, the textual yelp reviews of businesses are analyzed to assign a probability for the review as having positive or negative sentiment. The data considered for the sentiment analysis are the reviews on restaurants about food, service, price and ambience. Machine learning algorithms in the nltk library of python can prove to be very useful in any such research on Natural Language Processing and the library has been used extensively in this work. Each algorithm used has been analyzed and has been compared on the basis of their efficiency (confidence). [3] As there is an exponential growth of social networks and due to large usage of social media, there is an increasing demand for data in the web for the users which leads to recent trends and ideas in the field of research. The users will be eagerly using these data for the future purpose and get information about the opinions of others thus there is a need of automatic summarization of opinion of the web users. Opinion Mining is a process of extracting and analyzing people's opinion regarding the given object and Sentiment Analysis explains about the hidden sentiments in the opinions. A most important challenge in this is to identify the sentiments and aspects and then perform the data classification based on these features and this process is called aspect based feature extraction. Opinion summarization can be done using machine learning such as maximum entropy, naive bayes, Support vector machine (SVM) model and, Random forest technique. The data sources to be taken for the proposed method are from customer review of product. In this paper experiments were conducted to compare the performance of proposed iterative decision tree method against other machine learning algorithms like SVM, Baseline, and Naive Bayes. [4] In the recent few years several efforts were dedicated for mining opinions and sentiment automatically from natural language in online networking messages, news and business product reviews. In this paper, we have explored sentiment orientation considering the positive and negative sentiments using film user reviews. We applied the technique Naive Bayes' classifier. We have performed the sentiment analysis on the reviews using the algorithms like Naive Bayes, Linear SVM and Synthetic words. Our experimental results indicate that the Linear SVM has provided the best accuracy which is followed by the Synthetic words approach. The result also evaluate that the highest accuracy rate is of drama. [5] The modern era internet is full of information pertaining to opinion of people through applications such as social media, micro blogging sites, review sites, personal blogs etc. Sentimental analysis is an area in text mining where opinion of people can be analyzed and classified into positive, negative or neutral. In this work, the sentiments of the tweets or reviews published in the twitter is identified by searching for the particular keyword in tweets and then evaluate the polarity of the tweets as positive and negative. The sentiments of the tweets that are tweeted on a twitter evaluated based on feature selection of each score words. In order to select the best features Naive Bayes Classifier (NBC) is used for training and testing the features of a words and also evaluating the sentiment polarity of each tweets. Performance evaluation parameters such as accuracy, precision and time is taken into consideration and compared with three machine learning classifiers, namely, Random Forest, Naive Bayes and Support Vector Machine (SVM).

### III. PROPOSED SYSTEM

A continual challenge in the task of sentiment analysis of a text is to focus on those aspects of the text which are in some way representative of the tone of the whole text. In the past, work has been done in the area of characterizing and categorizing words and phrases according to their emotive tone but in many domains of text, the individual phrases may belittle related to the overall sentiment expressed by the text. Sources of misleading phrases include what one refer to as “thwarted expectations” narrative, where emotive effect is attained by emphasizing the contrast between what the reviewer expected and what the actual experiences. For example, in the recorded data used the sentence. Other rhetorical devices which tend to widen the gap in emotional tone between what is said locally in phrases and what is meant globally in the text include the drawing of contrasts between sarcasm, understatement, and digressions, all of which are used in abundance in many different domains. The motivation of the present research has been to incorporate methods of measuring the content of phrases which may cause mental harm leading to physical casualty such as suicides, mental instability or disturbance, trauma. In the proposed system, we will retrieve tweets from twitter using twitter API based on the query. The collected tweets will be subjected to preprocessing. We will then apply the supervised algorithm on the stored data. The supervised algorithm used in our system is Support Vector Machine (SVM). The proposed system is more effective than the existing one. This is because we will be able to know how the statistics determined from the representation of the result can have an impact in a particular field.

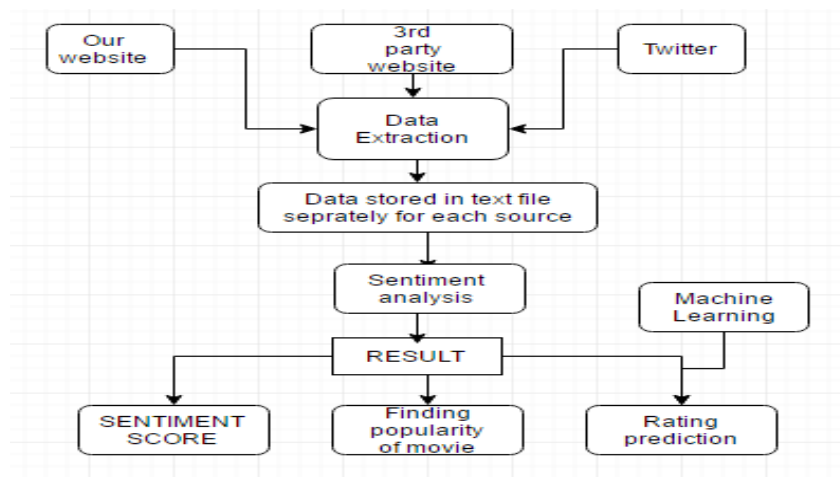


Figure 1: Block Diagram Of system architecture

### IV. METHODS AND ALGORITHMS

The sentiment posted or commented in the page is classified into classes by the machine learning based approach using classification techniques. The two categories of these machine learning techniques are:

- a. Unsupervised learning: There is no category involved and the targets are not provided by them at all. Thus, clustering is considered to be an important factor here.
- b. Supervised learning: The labeled dataset is used to develop this method. When the classification approach is to be designed, the labels are provided to the model. For getting significant outputs when going through decision making these labeled datasets are trained.

Naive Bayes (NB), Maximum Entropy (ME), and Support Vector machines (SVM) are the widely used machine learning techniques for sentimental classification.

#### A. Naive Bayes Classifier (NB)

The considerable numbers of features are utilized in feature vector through Naïve Bayes classifier. Since these features are independent equally, analyzing them exclusively is important. The mathematical representation of conditional probability for Naive Bayes is given as:

$$P(X|y) = \prod_{i=1}^n P(x_i|y)$$

A feature vector denoted by "Xl" is included here which is defined by  $Xl = \{x_1, x_2, \dots, x_m\}$ . The class label is represented by  $y_j$ . The classification of different types of independent features such as positive and negative keywords, emoticons and emotional keywords is done efficiently using NB. The relationships amongst features are not considered in NB classifier. Thus, the relationships which exist among emotional keyword, negation words and speech tag are not utilized in it.

**B. Support Vector Machine Classifier (SVM)**

Huge margin is used for classification through SVM classifier. A hyperplane is used to differentiate the posts. A function is implemented by SVM as:

$$g(XS) = v_w T \varphi(XS) + b_v$$

The feature vector is denoted in the above equation by "XS", weights vector by "v\_w" and the bias vector by "b\_v". The non-linear mapping which transforms information space to high dimensional feature space is denoted by  $\varphi()$ . On the training set, "w" and "b" are recognized automatically. A linear kernel is applied for classification in this approach.

**C. Maximum Entropy Classifier (MEC)**

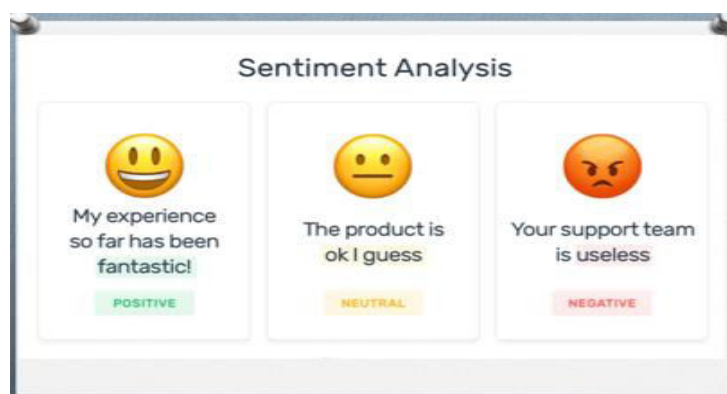
No assumptions are considered in maximum entropy classifier with respect to the relationship amongst features. The conditional distribution of class label is estimated by maximizing the entropy of system through this classifier.

**D. Ensemble classifier (EC)**

Different kinds of ensemble classifiers are developed. For performing the best classification, all the features of all the best classifiers are utilized in this classifier. Naive Bayes (NB), Maximum entropy (MEC) and SVM are the three approaches utilized by the base classifiers. Depending upon the output of larger parts of classifiers, their classification is done.

The two sets of data needed within machine learning approaches are the set used for training and the set used for testing. The training dataset is collected to initiate machine learning. The training data is used in the next step for training a classifier. Selecting the feature is an imperative decision to be made after the selection of a supervised classification approach. The representation of documents can be known through this. During sentiment classification, the most commonly used features included opinion word, speech information, negations and term presence with a degree measure of frequency.

**V. RESULT**



**Fig 2: Sentiment analysis**



Fig 3. Data gathered from the analysis of product reviews

The accuracy value represents the percentage of test texts which were classified correctly by the model. In this we have used two approaches, the first approach is using the “Naive Bayes (NB)” method and the other approach using the “Support Vector Machine (SVM)”.

Training dataset is provided using API.

Your 5 Most Recent Posts						
Published	Post	Type	Targeting	Reach	Engagement	
10/18/2016 1:30 pm	Dive into how brands annoy their customers on social media and what that means for your bottom line. <a href="http://bit.ly/">http://bit.ly/</a>			190		1 0
10/18/2016 11:45 am	It's all about your community, and CMX Summit West is a n opportunity for you to step back, soak in knowledge, me			271		0 0
10/18/2016 10:24 am	A comprehensive look at how banks and financial institutions can become more social on social media.			498		9 1
10/17/2016 3:30 pm	57.5% of people who follow you on social media are likely to buy from your brand. Take advantage of this stat: <a href="http://">http://</a>			906		10 7
10/17/2016 12:00 pm	Meet the new report in town!			1.2K		19 9

Fig 4 : Performance Metrics

1. SVM

Correctly classified posts	53	60.92%
Incorrectly classified posts	34	39.08
Mean Absolute error	0.34	
Root mean squared error	0.438	

Fig 5. SVM Measures



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Accuracy: 90.6 %

Output Analysis:

Weighted Avg	Precision	Recall	F-Measure
1	0.786	0.88	
0.519	0.609	0.56	
0.75	0.735	0.742	
0.729	0.709	0.716	

2. Bayes Classifier

Correctly classified posts	49	45.3704%
Incorrectly classified posts	59	54.6296%
Mean Absolute error	0.4262	
Root mean squared error	0.4617	

Fig 6. Bayes Measures

Accuracy: 70.9 %

Output Analysis:

Weighted Avg	Precision	Recall	F-Measure
1	1	1	
1	0.043	0.083	
0.69	1	0.817	
0.813	0.728	0.629	

Methods Implemented	Accuracy
Naive Bayes Classifier(NB)	70.9
Support Vector Machine(SVM)	90.6

Analysis is measured using the following parameters:

T\_P: True Positive: Positive correctly recognized as Positive.

F\_P: False Positive: Negative incorrectly recognized as Positive.

T\_N: True Negative: Negative correctly recognized as Negative.

F\_N: False Negative: Positive incorrectly recognized as Negative.

Accuracy denotes the proportion of the correct result. Accuracy (AC) =  $(T_P + T_N) / (T_P + F_P + T_N + F_N)$

Accuracy: The Accuracy is used to calculate the overall correctness of the model and it is calculated as the ratio of the sum of correct classifications and the total number of classifications, as determined using the equation:

$$Accuracy (AC): T_P + T_N / T_P + F_P + T_N + F_N$$



Precision: The Precision is the proportion of the positive cases that were predicted correctly, and is calculated using the equation:

$$Precision = \frac{T_{P_T P} + F_P}{T_{P_T P} + F_P}$$

Recall: Recall is the fraction of relevant instances that are retrieved.

$$Recall = \frac{T_{P_T P} + F_N}{T_{P_T P} + F_N}$$

F-Measure: F-measure is a measure of a test's accuracy. It considers both the precision  $p$  and the recall  $r$  of the test to compute the score.

## VI. CONCLUSION

In this paper, we present the possibility of assessment investigation of Facebook posts and reviews utilizing Naive Bayes Classifier (NB) and Support Vector Machine (SVM). The information utilized is an irregular inspection of spilling face book statuses, which are not gathered by explicit queries. The size of our manual marked information licenses us to perform cross approval and think about execution of the classifier crosswise. Finally, exploratory outcomes which demonstrate the exactness in dissecting the territory of Face book clients utilizing Support Vector Machine, is really high.

1. By using sentiment analysis, you gauge how customers feel about different areas without having to read thousands of customer comments at once.
2. If you have thousands or even tens of thousands of survey responses per month, it is impossible for one person to read all of these responses and have an unbiased and consistent measure of customer sentiment.
3. By using sentiment analysis and automating this process, you can easily drill down into different customer segments of your business and get a better understanding of sentiment in these segments.
4. One can prevent the suicides using the analyzed data if possible.
5. One can find if the post or comment indicates any message which might hurt someone emotionally at such levels.

## REFERENCES

1. "Sentiment Analysis of Social Media Networks Using Machine Learning", Mohammed H. Abd El-Jawad ; Rania Hodhod ; Yasser M. K. Omar, 2018 IEEE 14th International Computer Engineering Conference (ICENCO).
2. "Sentiment Analysis of Yelp Reviews by Machine Learning", Hemalatha S ; Ramathmika Ramathmika, 2019 International Conference on Intelligent Computing and Control Systems (ICCS).
3. "Aspect based feature extraction and sentiment classification of review data sets using Incremental machine learning algorithm", Rajalaxmi Hegde ; Seema S. 2017 Third International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB)
4. "Comparative analysis of sentiment orientation using SVM and Naive Bayes techniques", Shweta Rana ; Archana Singh, 2016 2nd International Conference on Next Generation Computing Technologies (NGCT).
5. "Sentiment Analysis Using Machine Learning Classifiers: Evaluation of Performance", Rai B Shamantha ; Sweekriti M Shetty ; Prakhyath Rai, 2019 IEEE 4th International Conference on Computer and Communication Systems (ICCCS).
6. Troussas, Christos, et al. "Sentiment analysis of Facebook statuses using Naive Bayes classifier for language learning." Information, Intelligence, Systems and Applications (IISA), 2013 Fourth International Conference on. IEEE, 2013.
7. Vohra, S. M., and Jay Teraiya., "A comparative study of sentiment analysis techniques", Journal JIKRCE 2.2 (2013): 313-317.
8. Zamani, N. AZMINA M., et al, "Sentiment Analysis: Determining People's Emotions in Facebook." (2013): 978-960.
9. Zainuddin, Nurulhuda, and Ali Selamat, "Sentiment analysis using support vector machine.", Computer, Communications, and Control Technology (I4CT), 2014 International Conference on. IEEE, 2014.
10. Povoda, Lukas, Radim Burget, and Malay Kishore Dutta, "Sentiment analysis based on Support Vector Machine and Big Data", Telecommunications and Signal Processing (TSP), 2016 39th International Conference on, IEEE, 2016.