

A New Framework For Privacy Setting Using Machine Learning Algorithms Using Bag Of Words Classifier

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Abstract

The primary goal of this research project is to identify and filter spam terms used in communication between two or more people. The dataset for training and testing the proposed prediction models was built using short messaging service (SMS) messages including some spam and ham terms, a minimum of two characteristics, and a sample size of 160 with two groups with a g-power value of 80%. And the banking customer loan data were collected from various web sources with recent study findings and threshold 0.05%, confidence interval 95% mean and standard deviation. The framework was developed using the bag of words classifier with Multinomial naive bayes (MNB) algorithm and is compared with Support vector machine (SVM) learning algorithm. The retrieval accuracy rate of MNB algorithm is (97.77%) and the same for SVM learning algorithm is (90.87%) with two tailed significant values p is 0.001 is less than 0.05 significant level with 95% confidence interval.: This research confirms that the effectiveness of the MNB algorithm results is more accurate than the SVM algorithm which was developed using python.

Keywords: Machine learning, bag of words classifier, Support vector machine, Multinomial naive bayes, Privacy setting.

1. INTRODUCTION

The use of mobile phones has grown, short messaging service (SMS) has grown into a multibillion-dollar commercial business. SMS (short message service) is a text messaging network that allows users to send and receive short text messages on their mobile phones [1]. Eighty percent of all mobile phone customers use this SMS texting service. It's most important is that as the popularity of this platform increased, the advertisements for some of the business development has also started their promotional activities in this platform [1], [2]. In this research, a model with a comparative analysis of two machine learning algorithms is developed using python. The applications that can be seen in this system is that the system introduces a Privacy setting framework based on a deep learning technique as well as a machine learning based approach to classify the spam words [3].

Even though more and more spam SMS are being sent. This system was not able to perform well as the input data is being increased [4]. The need for spam detection has increased. There is a need for a system to detect spam messages or SMS. In the earliest research, many of the systems use the technology of deep learning and some machine learning concepts [5]. In this study, the machine learning algorithms MNB along with a bag of words classifier and

SVM are being used and developed [6]. Some of the existing systems use machine learning algorithms like Random Forest and Clustering algorithm for the detection of spam words. The existing system's main drawbacks are its low accuracy rate and lengthy process [5], [7]. As a result, the objective of this research is to extract features and clean data prior to constructing test and training datasets. Then the most cited article in the area of study chosen is the classification of spam and ham are identified by applying both machine learning algorithms [8]. We have collaborated with various authors across our institutions that has made us complete the project with ease and accuracy[9]–[25].

In the existing system, the concepts of deep learning and Networking are used which may not provide accurate and significant results when a large dataset is used. The Proposed Research study develops a framework using MNB Machine learning algorithm along with a bag of words classifier to get a better accuracy rate significantly [4]. A comparative analysis of the model using a SVM will be developed. The advantages of using bag of words classifier are less time-consuming process, better accuracy and even the unidentified words are boosted and classified.

2. MATERIALS AND METHODS

This paper discusses two algorithms that are compared in order to get best accuracy levels in two sample group models. The dataset is created by considering the SMS which have been used in one-to-one communication. After that, the data is cleaned and characteristics retrieved, and spam and ham comments are classified. The dataset is boosted to known terms using the MNB technique and the bag of words classifier. Eventually, when the input is given, it identifies the SMS as either spam or ham. The accuracy study was carried out with the aid of 10 samples [26] using the Statistical Package for Social Sciences tool to get distinct mean and standard deviation values.

The Spam dataset used in this study was downloaded from Kaggle and comprises 5573 values with at least two characteristics. The characteristics used in this study were v1 - Review Class (either ham or spam) and v2 - Review Content. Most people use an 80:20 ratio to divide the dataset into training and testing sets. On the training data, machine learning methods are used to generate the data model. After that, both methods are applied to the testing set, and the accuracy is predicted. Figure 1 depicts the flow of feature extraction using a bag of words classifier, as well as spam and ham SMS categorization and filtering using the given machine learning approaches. The Data Text which is used for classification from the dataset works with the messages SMS which have been used in some one-to-one communications. Fortunately, the researchers who used this dataset for spam identification made it available on the Kaggle website. Each dataset has a single csv file with unique properties on each line, with spam being coded as '1' and ham being coded as '0.'

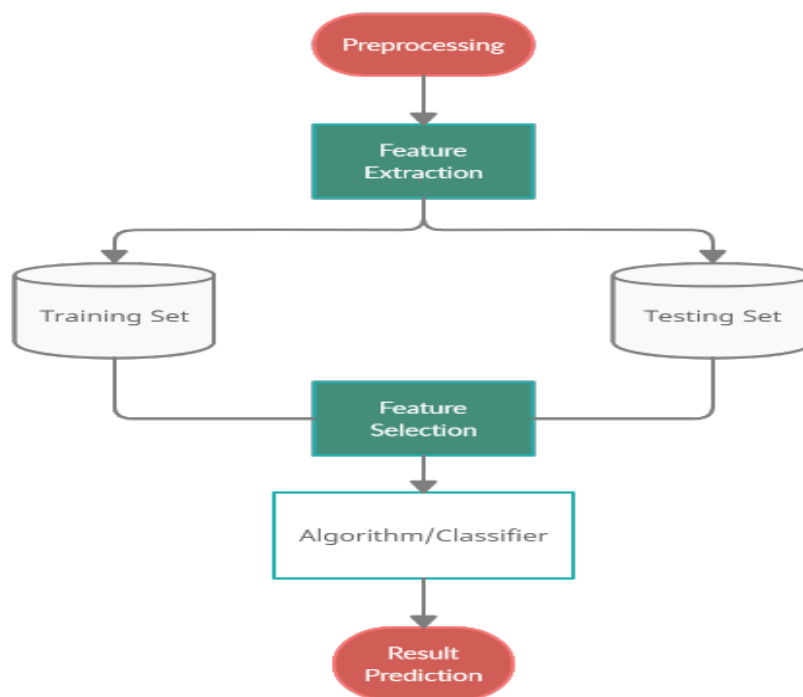


Figure. 1. Flow of feature extraction with a bag of words classifier, then classification and Spam and ham SMS are filtered using machine learning techniques.

Support vector and MNB machine learning methods were used in this study, together with bag of words classifiers, to determine the best accuracy rate. The sample dataset from several user conversations is shown in Table 1. This contains the Messages and SMS and is merged into a single dataset that contains a size of 5573 values and with a minimum of two attributes.

Table 1. The sample dataset derived from various user chats is described. This contains the Messages, which have been combined into a single dataset with a total of 5573 values and at least two characteristics.

Class	Text
Ham	You know, what people wear. T shirts, jumpers, hats, belts, is all we know. We r at Cribbs
Ham	Please leave me alone!
Ham	Nice to meet u...and you're looking so cool!
Ham	Keep it up
Ham	Please add some more info, which may help me to learn more thing about this!
Spam	Free entry for 2-week cmptns! to win a CUP
Spam	Well yeah! Check this out, to get free tickets
Ham	Very good
Spam	Easy...!!!!!! And follow xxyyzz.com for the content u wish

Certain users' SMS/Messages are first captured and aggregated into a single dataset. The system now has all of the necessary libraries. The dataset's data is then filtered and cleaned using a bag of words classifier to remove unwanted white spaces, symbols, and punctuation marks, as well as change and correct the uppercase text. Fig.2 diagram represents pseudocode of The SVM learning algorithm is applied for the similar dataset for the comparative analysis of accuracy.

```

SVM Algorithm (bag of words)
Ensemble may be imported from sklearn.
Importing as a group Import svm from sklearn
using the classifier from sklearn. import svm
SVC
bag = bagging svm = SVC ()
Classifier (n estimators=200) \ssvm.
fit(data training, y train)

```

Figure. 2. Pseudocode of SVM Learning Algorithm

Then, The bag of words classifier and the natural language processing classifier are used in MNB to extract features from the dataset and create a model by creating test and training sets from the data. Clustering and testing are done using MNB and SVM algorithms. The testing set is supplied as input, and the given message is assessed to determine if it is spam or not. x_1, x_2, \dots are the dependent variables. x_n (Class, Content...), while the experiment's dependent variable is

message accuracy. Finally, the outcomes of the group one and group two algorithms will be analysed using the statistical package for social sciences tool. Figure. 3, represents the pseudocode of the MNB machine learning algorithm is applied and is compared to get a better accuracy rate with significant results.

MNB machine learning algorithm

```
from sklearn.naive_bayes import mnbc
from sklearn.metrics import accuracy score,
precision score, recall_score, f1_score
naive_bayes = mnbc()
naive_bayes.fit (training_data, y_train)
predictions = naive_bayes.
predict(testing_data)
```

Figure. 3. Pseudocode for MNB Machine Learning Algorithm

An anaconda Spyder was used to test the suggested model. The machine utilised has a Windows 10 CPU, a 256-gigabyte hard drive, and 8 gigabytes of RAM. Finally, using the statistical package for social sciences (SPSS) tool, the results from the group one and group two algorithms will be analysed.

A. Statistical Analysis

The Statistical Package for Social Sciences version 21 was used for statistical comparisons of metrics like accuracy, precision, F-score, and standard deviation. Open, High, and Low are the independent variables, whereas stock trend accuracy is the dependent variable for computational analysis. Finally, using the statistical package for social sciences tool, the outcomes of the group one and group two algorithms will be analysed. A single sample T-test was used to test the predicted stock market prediction parameters.

3. RESULTS

In this study, it was discovered that the MNB machine learning method with bag of words classifier produced more accurate and significant findings than other algorithms such as SVM. However, they used a short dataset with fewer features and values in the prior study, which might lead to a shift in accuracy. They've also employed deep learning and networking techniques that only operate once a message has been posted. As a result, a system that automates this procedure before people make comments is required. This can only be accomplished through the use of machine learning principles.

In Table 2, we found that the NB method outperforms the SVM algorithm ($p < 0.001$, independent sample t test). The experimental results reveal that the existing research finds the effective distribution of goods with an accuracy of 97.77% and a Precision of 89.6% whereas the proposed system obtained 98% of accuracy and a precision of 94% for detecting Spam SMS [27].

Table 2. Accuracy and Loss mean, standard deviation values [Sample size=5, mean of MNB=97.77 percent, mean of SVM=90.87 percent] - Statistics for Groups.

Parameters	Algorithm	N	Mean	Std. Deviation	Std. Error Mean
Accuracy	MNB	5	97.7700	.52631	.23537
Accuracy	SVM(BOW)	5	90.8700	.62008	.27731
Loss	MNB	5	2.2300	.52631	.23537
Loss	SVM(BOW)	5	9.1300	.62008	.27731

The NB model had a 98 percent accuracy, while the SVM model had a 91 percent accuracy. The suggested MNB approach outperformed the SVM method when compared to the other algorithms. The Statistical Package for Social Sciences programme is used to ensure the correctness of the tables and graphs. Both methods are evaluated, and the approach with the highest accuracy rate is chosen.

Statistical analysis Table 3 shows the group statistics and independent sample values produced from the Statistical package for social sciences tool for both the training and test sets [28]. Analytical graphs accuracy and loss rate of SVM and NB Machine learning methods, as well as bagging classifiers, are shown in Fig. 4.

Table 3. Calculated P value=0.001 and alpha=0.05, t is negative, and the confidence interval = [-7.73876, 6] Independent sample test .05736]

Parameter	Variances	Levene test for Equality of Variance	Levene test for Equality of Variance	t	df	sig	T test for equality of means	std. difference	95% confidence interval of the difference	95% confidence interval of the difference
		F	Sig.	t	df	Sig. 2-tailed	Mean Difference	Std. Error Difference	Lower	Upper
Accuracy	Equal Variances assumed	.232	.643	18.970	8	<.001	6.90000	.36373	6.06124	7.73876
Accuracy	Equal Variances not assumed			18.970	7.794	<.001	6.90000	.36373	6.05736	7.74264
Loss	Equal Variances assumed	.232	.643	-18.970	8	<.001	-6.90000	.36373	-7.73876	-6.06124
Loss	Equal Variances not assumed			-18.970	7.794	<.001	-6.90000	.36373	-7.74264	-6.05736

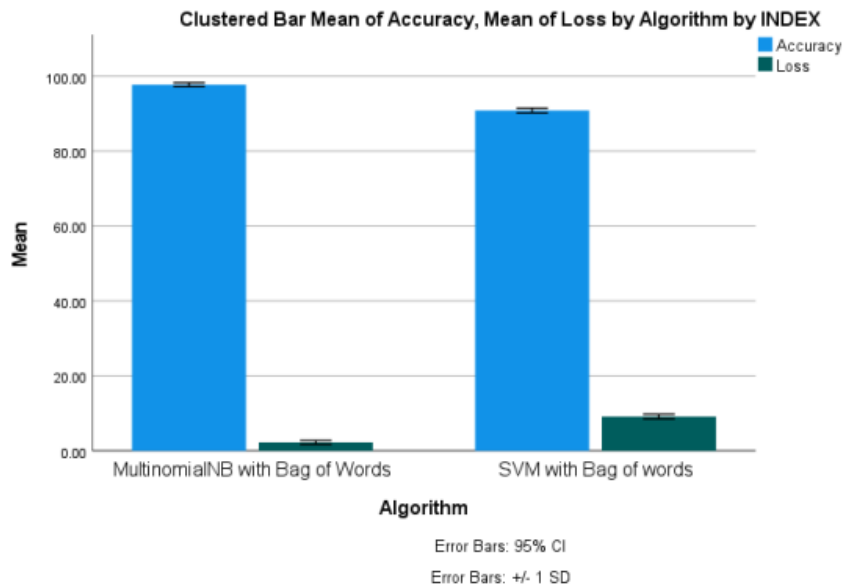


Figure. 4. MNB and SVM learning algorithms are compared in terms of accuracy and loss percentage. The MNB method has a higher average accuracy than the SVM algorithm (Accuracy of NB [98 percent] is greater than SVM [91 percent])

4. DISCUSSIONS

The accuracy of the proposed system was improved by 6-7 percent. It's also been discovered that the MNB machine learning system detects spam communications with more accuracy and specificity. For data categorization and feature extraction, the bag of words classifier is utilised. The MNB is then used to detect spam after that.

In Python, this approach is comparable to the SVM learning algorithm. According to similar findings, a one-of-a-kind Privacy setting and categorization system was created to achieve a specific aim.

without any spam terms, which might be utilised on any social media site, especially SMS services [6]. The concept for screening rubbish reviews and comments is created using machine learning approaches [26], [29]. When compared to SVM, MNB has been demonstrated to produce equivalent classification with a lot lower RV rate and a substantially shorter testing time [30].

The study's counter-finding is a model that uses networking algorithms to identify spam comments or reviews [31]. Comparative examination of the train and test datasets utilising the Clustering based Light Gradient machine technique to filter spam comments [31]. On the basis of the overall analysis of the above opposing and comparable findings, the models' performance is compared. At each filtering phase, the words are checked. The model used in the opposing findings is created utilising several machine learning and networking technologies. It's possible that the findings of this study aren't correct [6]. As a result, the recommended study is more effective than that conducted by the opponents.

One of the research's drawbacks is that it was conducted on a dataset with fewer features and values. This may have an impact on accuracy, and the time complexity of detecting spam may be surpassed as a result.. Upgradation of the system with other algorithms can also provide the best accuracy rate. Upgrading and making this system adaptive to the desired environment are two future upgrades that might be made to this system. The algorithm may be improved and modified in the future to better predict spam messages and filtering with higher accuracy and substantial outcomes. In this paper, the NB and SVM algorithms, as well as a bag of words classifier, are utilised to train prediction models.

Other algorithms, however, can be approached in the same way. However, the one we used to be quite successful and had the desired outcomes.

5. CONCLUSION

This Research study has confirmed that the effectiveness of the MNB with bag of words classifier in machine learning has given more accuracy rate when compared to the SVM algorithm. As a result, we can deduce that the MNB algorithm is effective in filtering spam SMS and texts. The accuracy level has also increased to 98.32% for the proposed algorithm over the other machine learning algorithm which has an accuracy of 91.35% and the loss rate is also predicted using Statistical Package for Social Sciences Tool.

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