



VADER Based Machine Learning Approach for Sentiment Based Product Review Examination

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Abstract: Sentiment analysis assigns sentiment scores to words, entities, topics and themes in a sentence. It uses machine learning to analyze sentences and evaluate their sentiment. This sentiment analysis tool has a website where you can input a term and it will give you an immediate response, specifically referencing sentiments in social media. This paper examines the reviews on basis of VADER and Senti-Lexicon approach. VADER evaluates text by checking to see if any of the words are a part of their lexicon, and determines the emotional tone through a sentiment analysis. VADER can also intelligently determine structures in sentences and paragraphs for clarity. The approach is usually a paragraph or two and does not have punctuation marks. The one that was paraphrased has more formal tone because it was not created by an AI, but instead written by a human. The senti-lexicon approach is utilized for the extension of dictionaries, multi-negation and multi-intensifier handling.

Index Terms – Sentiment Analysis, Senti-Lexicon, VADER.

I. INTRODUCTION

Sentiment analysis is the process of determining whether content is positive or negative by looking at written text and categorizing it under favorable or unfavorable information. This can be done through data mining, machine learning and artificial intelligence to better identify specific opinions towards a certain topic. Sentiment analysis helps organizations glean insights from unstructured text. Machine learning is often used for automatic and hybrid methods. These systems replace the manual data processing of rule-based systems, which are based on predefined lexicon-based rules. [1]

Sentiment analysis algorithms are used for both artificial intelligence and manual data processing. Rule-based systems look for predefined, lexicon rules in order to do sentiment analysis. Automatic systems use machine learning to do sentiment analysis based on inputted data. Hybrid systems make use of both approaches. Sentiment analysis can cover all scales, from sentences, to paragraphs, and even entire documents. It can determine the sentiment towards a text and who, if anyone, holds the opinion. [1]

Sentiment analysis refers to the text analysis of opinions and meanings of natural language. It can be applied to user reviews for helped sorting out sentiments on a product or mentioning of an emotion with precision. Companies often refer to eCommerce sites for customer feedback. These sites provide helpful reviews about products by customers. Sites like Amazon or flipkart provide people with good reviews of the product they just bought. [2]

Reviews on the internet are usually unstructured, which means it takes a long time to read them. It also means that companies need to spend hours of manual labor converting unstructured data into structured data. People share their thoughts on social media platforms like Facebook, Twitter, LinkedIn, Instagram, Pinterest and Reddit. However, it's difficult to collect data about a product from their conversations happening on forums or Q&A sites. [2]

You can't guarantee that the opinion is genuine because posts can be created by fake accounts, or manipulated with algorithms. Sometimes, it is difficult to discern if a person is expressing an opinion that falls into one of those three categories. [3]

As data is collected from review sites and social channels, they are in an unstructured format which is difficult to understand. When using Natural Language Processing and machine learning tools, the computer is trained to detect meaning of misapplied words and sarcastic content. Several modeling algorithms such as Linear Regression, Naive Bayes, and Support Vector Machines (SVM) are used to detect user sentiments. With this algorithm, the tool can separate reviews into tags - positive, negative, or neutral. With these algorithms you can get insights within minutes. [3]



Fig 1. Sentiment Analysis

II. LITERATURE REVIEW

M. A. Hasan, J. Tajrin, S. A. Chowdhury and F. Alam [4] In sentiment analysis, deep learning and old-school models such as SVM and Random Forest models work similarly for low asset languages with no train/test splits. However, in the case of Bangla, transformer based models showed high performance, which has not been looked at before in low asset languages. Sentiment analysis is a useful tool for understanding and categorizing human attitudes, which can be used to classify responses to social or political plans. For example, sentiment analysis can help distinguish reviews for products in online stores. Low-asset languages like Bangla consist of some significant challenges for sentiment classification such as the lack of corpora and comparable results. One way to deal with this is by using machine learning algorithms that compare potential words involved in customer reviews with a dictionary of emotional words from a low-asset language like Bangla. Our findings show that transformer-based models produce better results than traditional approaches and better, shorter dictionaries could be constructed using information about different emotions for each word in the dictionary.

K. I. Islam, M. S. Islam and M. R. Amin [5] Languages with a lot of structures and lack of data are more difficult to deeply analyze sentiment in. BERT, short for Bidirectional Encoder Representations from Transformers, can be predicated on other languages to accomplish more complex tasks. Currently, it would take 2 hours to create a model and 8 hours to create 3-class SA but with BERT this has been reduced dramatically. Results showed that 2-class sentiment classification had an accuracy of 71% as opposed to 68% and the Bengali 3-class SA had an accuracy of 60%.

A. J. Nair, V. G and A. Vinayak [6] The quantity of tweets about COVID-19 is growing with positive, negative, and impartial tweets. Different sentiment analysis procedures will detect the positivity, negativity, or objectivity of a tweet. However, researchers are proposing the use of Logistic Regression sentiment analysis, VADER sentiment analysis, and BERT sentiment analysis so that it is more sensitive to sentiment articulations in Web-based media settings.

Q. Li, S. Shah, R. Tooth, A. Nourbakhsh and X. Liu [7] A new sentiment classification algorithm has been proposed and demonstrated to outperform cutting-edge approaches for tweet sentiment classification. Authors investigated tweet sentiment characterization in the paper "Semi-Supervised Sentiment Classification" and found their approach bests two previous strategies, SSWE and National Research Council Canada's model.

X. Fan, X. Li, F. Du, X. Li and M. Wei, [8] The team studied the feasibility of word vectors in sentiment analysis. They created three sub-tasks, those being the extraction of sentiment words, recognition of polarity, and forecasting text sentiment. They used the vector highlighting technique as a baseline and experimented with different contents to see whether it's feasible in this case. The experiment yielded a F1 score of 85.77% for text sentiment analysis on APP reviews, 85.20% for the review and 86.35% for accuracy.

G. Li, Q. Zheng, L. Zhang, S. Guo and L. Niu [9] To increase sentiment analysis accuracy, this paper introduces a sentiment data-based neural organization model. We use Transformer encoding and LSTM as the core segments of the neural network. The system needs access to Chinese language resources, in order to be able to find the sentiments in Chinese content.

J. Ding, H. Sun, X. Wang and X. Liu [10] It is important to consider an emotion-generating programming designer's sentiment on the product. Developers are beginning to build sentiment analysis programs, but these programs are not as refined as they need to be. Ours is significantly more accurate, reviews well, and achieves a 75% accuracy after physical explanation.

C. Dev, A. Ganguly and H. Borkakoty, [11] Authors sentiment analysis project showed that the reviews on IMDb and VADER mainly looked at the director, actors, and overall rating and theme of a movie rather than the underlying plot. The most important part of a movie is its plot.

III. PROPOSED CONCEPT

VADER is an algorithm that measures the different emotions and sentiments of users on social media. VADER takes into account a broader range of emotions than traditional sentiment analysis systems. The sentiment analysis software, VADER, assigns a sentiment value and tracks how intense the emotional reaction is.

Other approach we used with VADER is Senti-Lexicon approach, Senti-Lexicon will create a dictionary for all the words to be considered. We can define what words we want in each file by typing them below. We will also create a file which will handle the intensifiers like very, extraordinary and more. For Handling the Negative sentences, we often make use of negations.

3.1 Negation Handling:

Step 1: Check the Word Instances

Step 2: Check for Negation

Step 3: Determine VADER based score according to it

Step 4: Release Score

3.2 Multi-Negation Handling With VADER

Step 1: Check the Word Instances

Step 2: Check for Negation

Step 3: Check for Intensifier

Step 4: Increase the VADER based score according to it

Step 4: Release Score

3.3 Intensifier Handling with VADER

Step 1: Check the Word Instances

Step 2: Check for Intensifier

Step 4: Increase the VADER based score according Positive or Negative classification of sentence.

Step 4: Release Score

3.4 Algorithm for Multi-Intensifier Handling

Step 1: Check the Word Instances

Step 2: Check for Multiple Instances of Intensifier

Step 4: Increase the VADER based score according Positive or Negative classification of sentence.

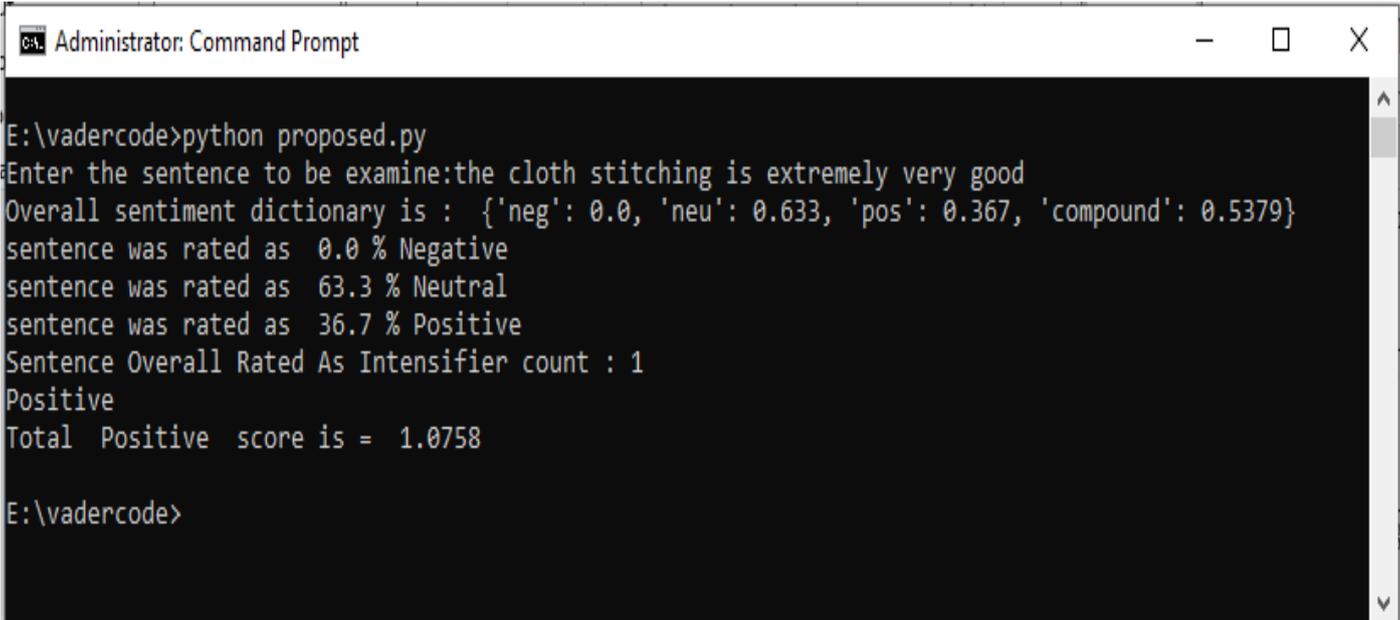
Step 4: Release Score

Step 4: Stop.



IV. IMPLEMENTATION AND RESULT ANALYSIS

The implementation is done in the language Python and on the basis of the evaluation some tables and graphs are formed.



```
Administrator: Command Prompt
E:\vadercode>python proposed.py
Enter the sentence to be examine:the cloth stitching is extremely very good
Overall sentiment dictionary is : {'neg': 0.0, 'neu': 0.633, 'pos': 0.367, 'compound': 0.5379}
sentence was rated as 0.0 % Negative
sentence was rated as 63.3 % Neutral
sentence was rated as 36.7 % Positive
Sentence Overall Rated As Intensifier count : 1
Positive
Total Positive score is = 1.0758
E:\vadercode>
```

Fig 2. Implementation in Python

Table 1. Negation Based Review Results

Review Text	Review Type	Review Score (Base Approach [11])	Review Score (Proposed Approach)
the camera was not very good (Review 1)	Negative	(N)0.3865	(N) 0.773
the camera was very good	Positive	.4927	0.9854
the camera was not very bad (Review 2)	Positive	0.4708	0.9416
the camera was very bad	Negative	(N) 0.5849	(N) 1.1698
the cloth stitching is not extremely very good (Review 3)	Negative	(N) 0.427	(N).854
the cloth stitching is extremely very good	Positive	(N) .5379	1.0758
the pen is not very bad quality (Review 4)	Positive	.4708	0.9416
the pen is very bad quality	Negative	(N) .5849	1.1698

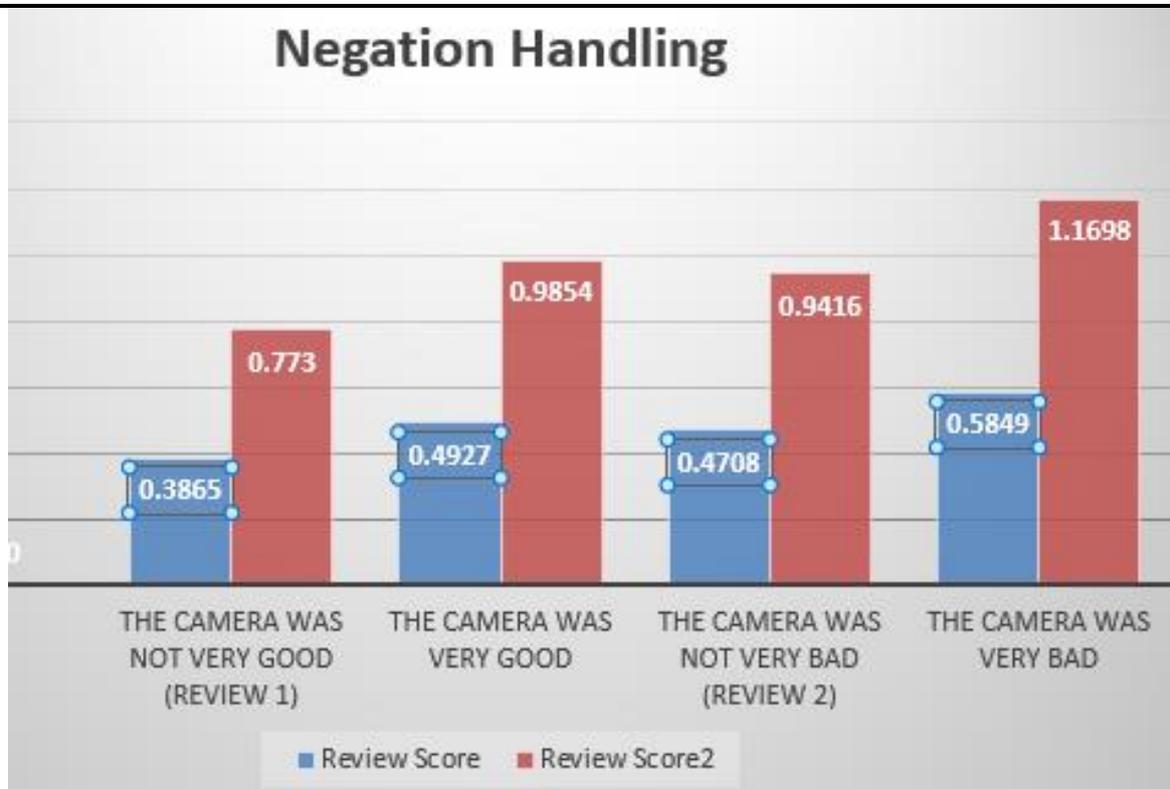


Fig 3. Graph on Results from Negation

Table 2. Results form Intensifiers

Review Text	Review Type	Review Score (Base Approach [11])	Review Score (Proposed Approach)
camera quality is extremely very good(Review 1)	Positive	0.5379	1.0758
camera quality is very good	Positive	0.4927	0.9854
The packing of the product supplied is very good (Review 2)	Positive	0.4927	0.9854
The packing of the product supplied is good	Positive	.4404	.4404
The after sales service of the balalji sales is very good (Review 3)	Positive	0.4927	0.9854
The after sales service of the balalji sales is good	Positive	0.4404	.4404

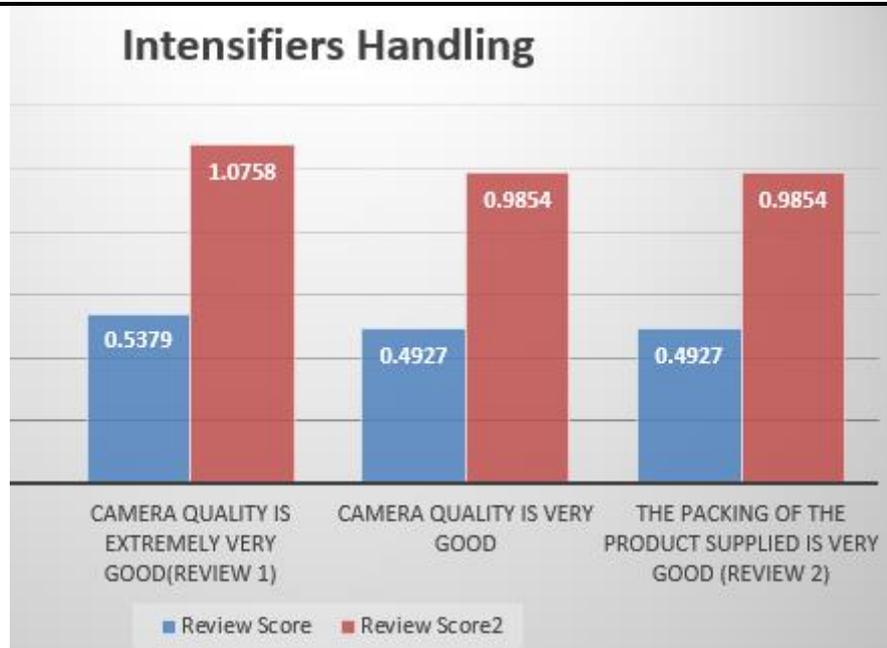


Fig 4. Graph for Intensifier Results

V. CONCLUSION

VI. This paper examines the reviews on basis of VADER and Senti-Lexicon approach. VADER evaluates text by checking to see if any of the words are a part of their lexicon, and determines the emotional tone through a sentiment analysis. VADER can also intelligently determine structures in sentences and paragraphs for clarity. The approach is usually a paragraph or two and does not have punctuation marks. The one that was paraphrased has more formal tone because it was not created by an AI, but instead written by a human. The senti-lexicon approach is utilized for the extension of dictionaries, negation and intensifier handling.

For this dissertation, we took reviews from social networking sites and movie review sites. We converted them to spreadsheet files in order to have them available offline. In the future, we hope to eventually filter out all of the reviews that are generated by algorithms, and keep only those that are human-generated.

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