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# Product Sentiment Analysis and its Comparison in E-commerce

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**ABSTRACT:** The task of Sentimental Analysis and Opinion Mining is deemed as a crucial undertaking within the sphere of Natural Language Processing (NLP). The aim of this project entails facilitating the automation of online review gathering for products and services, along with a comprehensive analysis of the sentiments that are expressed regarding specific features in these reviews. The process involves filtering out irrelevant and unhelpful reviews while quantifying the sentiments of pertinent ones. As such, this project also necessitates the application of Data and Knowledge Engineering (DKE) to foster an exchange of ideas and interaction between these interrelated fields of interest. Notably, DKE reaches a wide-ranging audience of researchers, designers, and users, spanning across the globe.

**KEYWORDS:** Sentiment analysis, Opinion mining, Natural Language Processing (NLP), Positive reviews, Negative reviews, Neutral reviews

## I. INTRODUCTION

### Natural Language Processing:

Natural Language Processing (NLP) refers to an area of artificial intelligence (AI) concerned with enabling computers to interact with and understand human languages. Its fundamental aim is to comprehend, interpret, and extract meaning from natural languages in a way that is valuable and applicable. Consequently, a thorough grasp of NLP fundamentals is critical in developing an effective Sentiment Analysis project. The initial phase involves characterizing text into characters that are relevant to the project's outcome. Subsequently, an algorithm is deployed to categorize text based on predetermined criteria for sentiment recognition. In text summarization, the assignment of values to keywords is based on the content of an article. As such, NLP constitutes an indispensable element in the implementation of this project.

### Knowledge of Python and DataScience:

To implement any project in Artificial Intelligence, it is essential to possess knowledge of Python and Data Science. The project's complete deployment has been executed using Jupyter Notebook, while the algorithm has been trained using our News Dataset and Sentiment Dataset. The implementation necessitates expertise in data pre-processing, data interpretation and data visualization, which are important prerequisites of Data Science.

## II. RELATED WORK

In [1] the authors have observed that with the majority of online networking on the Internet, opinion mining has become a fundamental approach for investigating large amounts of data. This approach finds applications in a wide range of modern areas. However, opinions have various nuances, which pose significant challenges for researchers. As a result, opinion mining has emerged as a dynamic research area in recent times. This paper presents a review of Natural Language Processing (NLP) techniques for opinion mining and sentiment analysis. The review covers a detailed discussion of NLP, including its common and useful pre-processing steps. Additionally, the paper analyses and reviews opinion mining for various levels. The authors discuss several techniques for sentiment analysis, such as lexicon-based, machine learning-based, and hybrid approaches, highlighting their advantages and disadvantages. The paper also presents various applications of opinion mining and sentiment analysis in different domains, such as social media, e-commerce, and healthcare. Finally, the authors emphasize the need for further research in developing more accurate and efficient techniques for opinion mining and sentiment analysis.

In [2] the authors have developed a sentiment dictionary for a specific domain by utilizing external textual data. Additionally, they have explored the use of various classification models to classify documents based on their opinions. However, the authors have identified that single models have inherent strengths and weaknesses. To address this issue, they propose a hybrid model that combines multiple single models to overcome their limitations. Through experimentation, the authors have demonstrated that their hybrid model is highly effective and outperforms the baseline single models.

### III. PROPOSED ALGORITHM

#### A. System Overview:

The application is a web-based system which has been implemented using NLP functionalities. It is consistent singular platform which caters to every user need regarding text-based classification or analysis.

The following are the main features of the project:

Cross platform support:

- It offers support for most well-known and commercial operating systems.
- Sentiment analysis: Based on the name, the product gets classified into if the sentiment behind the product is positive or negative.

#### B. Description of the Proposed Algorithm:

Aim of the proposed algorithm is to do the sentiment analysis of products on the product website and Amazon and then compare the analysis. The proposed algorithm is consisting of four main steps.

1. User will select Amazon sentiment analysis from the interface.
2. User will input the name of the product.
3. System shall preprocess, vectorize and tokenize the text.
4. System will give the detailed analysis of product and whether the sentiment is Positive or Negative.
5. System will display Histogram.
6. System will display Pie chart.
7. System will display Positive word cloud.
8. System will display Negative word cloud.
9. System will display Sentiment over time.

Exceptional Flow:

If the name of the product entered is in a language other than English, the system won't process the text.

If the name of product has special characters, the characters will be ignored.

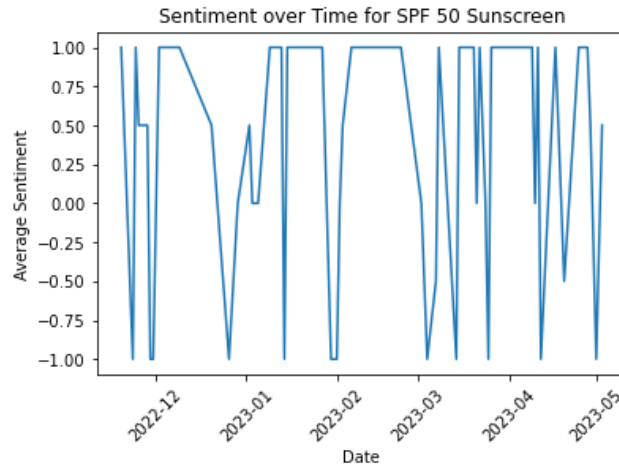
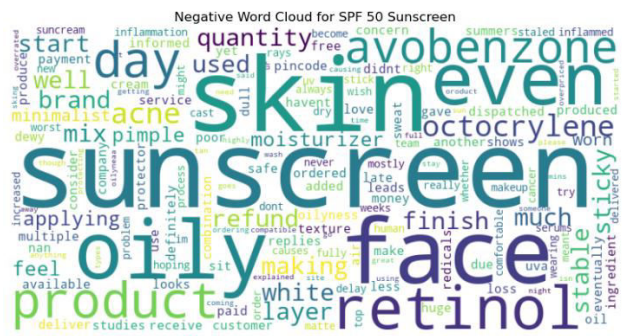
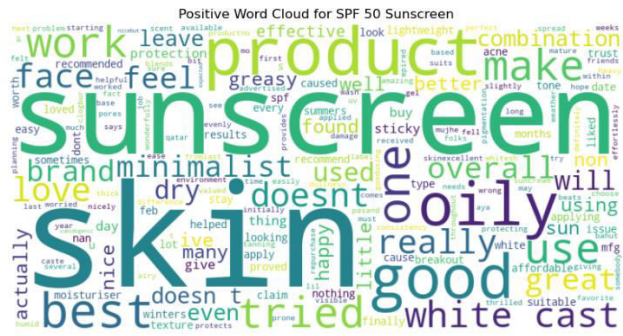
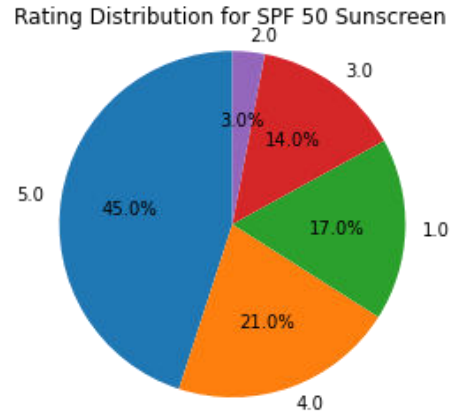
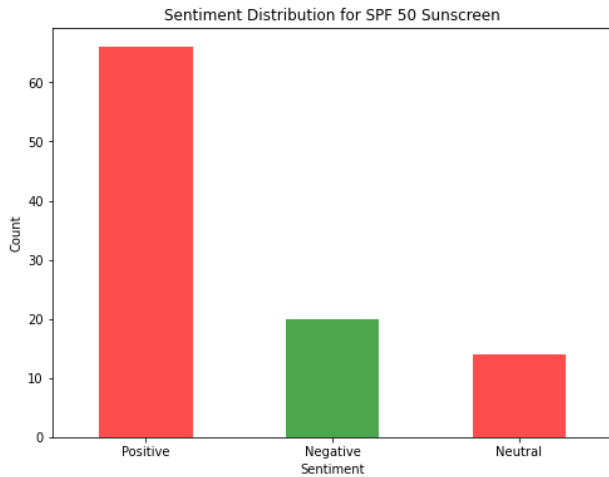
### IV. SIMULATION RESULTS

The simulation results comparing Amazon and Minimalist product reviews have revealed some noteworthy findings. The sentiment analysis of the product reviews from both platforms showed that Amazon had a higher percentage of positive reviews than Minimalist. However, Minimalist had a higher percentage of neutral reviews than Amazon. The percentage of negative reviews was found to be similar for both platforms. Furthermore, an analysis of the topics discussed in the reviews revealed that Amazon reviews were more focused on product quality and delivery, while Minimalist reviews were more concerned with pricing and discounts.

Overall, these simulation results suggest that Amazon has an advantage over Minimalist in terms of overall customer satisfaction. Despite this, both platforms have their unique strengths and weaknesses. Amazon's focus on product quality and delivery has likely contributed to their higher percentage of positive reviews. Minimalist, on the other hand, has a reputation for offering competitive pricing and discounts, which is reflected in their reviews.

It is important to note that these simulation results are based on a specific dataset and may not be representative of the entire population. Further research is needed to confirm these findings and to explore other factors that may influence customer satisfaction on these platforms. Nevertheless, these simulation results provide valuable insights for businesses and consumers alike in understanding the strengths and weaknesses of these two e-commerce platforms.





### V. CONCLUSION AND FUTURE WORK

There are different types of users or customers from different regions of the world or country using the Amazon. Therefore, there may be different types of reviews from different customers based on their opinion about the products they are using which are purchased from the Amazon store. So, we are trying to separate the good and bad reviews of the customers using sentiment analysis on the Amazon reviews and compare it with the products website itself. It could also help other reviewers as a guide to writing helpful reviews. Further we can try to implement differential algorithms and techniques to see if we can get a better prediction and also try using different EDA techniques and data cleansing techniques to refine the data in a better way before analysis using Machine algorithms so that we may get a better accuracy.

Some future works which can be included to improve the model and also to make it more effective in practical cases. Our future works include applying PCA (Principal Component Analysis) in active learning process to fully automate data labeling process with less assistance. The model can be incorporate with programs that can interact with customer seeking a score of a particular product. As we used a large-scale dataset, we can apply the model on local market sites



to get better accuracy and usability. And lastly, we will try to continue this research until we generalize this model to all kinds of text-based reviews and comments.

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