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The Impact of Product Reviews on E-Commerce Performance: A Comprehensive Review

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Abstract: ***Sentiment analysis of product reviews has become an important research area in recent years. With the rise of e-commerce platforms, online reviews have become an essential part of the decision-making process for consumers. This paper presents a review of the recent advancements in sentiment analysis techniques for product reviews. The paper covers various aspects of sentiment analysis, such as feature extraction, sentiment classification, and aspect-based sentiment analysis. This paper is to analyse the strengths and weaknesses of different techniques, such as rule-based approaches, machine learning-based approaches, and deep learning-based approaches. The paper also highlights the challenges in sentiment analysis, such as handling negation, sarcasm, and irony in reviews. Furthermore, the paper discusses the future research directions in this field. Finally, this paper conclude with a discussion on the potential applications of sentiment analysis, such as market research, product development, and customer service. Overall, this paper provides an overview of the recent advancements in sentiment analysis techniques for product reviews and serves as a roadmap for future research in this field.***
Keywords: Sentiment Analysis; Product Reviews; E-Commerce; Polarity; Natural Language Processing

I. INTRODUCTION

In the era of Web 2.0, many customers rely on internet reviews to make purchasing decisions. People share their subjective experiences and thoughts about various products, making it easier for others to learn about a product before buying. With the proliferation of e-commerce platforms, online product reviews have become a crucial source of information for consumers. The sentiment analysis of product reviews has thus gained significant attention as it can provide insights into customer opinions towards different products and services. Sentiment analysis involves extracting features, classifying the polarity of the review, and analysing the sentiment towards specific aspects of the product or service. The analysis of these sentiments has various potential applications, such as market research, product development, and customer service. However, it can be time-consuming and challenging for customers to find relevant and reliable information. Companies may also struggle to understand customer requirements. Product reviews provide valuable insights into customer sentiment toward a particular product.

Utilising various algorithms and methodologies, sentiment analysis for product reviews involves extracting a feature-by-feature evaluation of a product and analysing it to produce an honest review. Companies can learn about client expectations before a new launch by conducting sentiment research on a certain product. Companies can benefit from this knowledge by using it to create efficient marketing plans. For customers, sentiment analysis can help them make informed purchasing decisions. By conducting comparative analysis of products and brands, customers can select the product that best suits their requirements. By determining the features and their ratings, customers can make well-informed decisions.

In order to categorise opinions based on various product aspects, sentiment analysis on product reviews aims to gather information about a certain brand or product from the vast amount of data that is readily available online. This necessitates locating the pertinent features and training a classifier on them. The classification should be carried out in an effective and accurate manner. This requires the identification and classification of both advantageous and detrimental characteristics. Due to the lack of a single, comprehensive evaluation for a variety of products, sentiment analysis on product reviews is required. Customers often presents a mix of positive and negative opinions, which can be difficult to interpret. By using sentiment analysis, customers can make informed decisions before purchasing a product. Companies can also use this analysis to develop effective marketing strategies and better understand the needs of their customers. Following a product launch, analysis of the product can assist businesses to identify the advantages and disadvantages of the product. In general, sentiment analysis of product reviews can assist businesses and consumers in making wiser decisions and enhancing their offerings. This study will use a systematic literature review to analyse existing research on the impact of sentiment analysis on e-commerce performance in social network communities.

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Data from e-commerce websites like Amazon and Flipkart, which provide user reviews on a variety of products, mainly electronic goods like mobile phones, televisions, computers, and cameras, was collected to analyse sentiment from these reviews.
Through web scraping, data is dynamically collected. The polarity of opinions was studied after data collection. Words like "good" and "bad" used to connote positive and negative ideas, respectively. The words used to express the user's opinion can also be used to gauge the strength of an opinion. For instance, "good" and "excellent" indicate different levels of positive sentiment. The classification of reviews is then determined with respect to sentiment classes, such as positive and negative reviews.

II. LITERATURE REVIEW

In recent years, sentiment analysis of product reviews has become an important research area due to the rise of e-commerce platforms and the crucial role of online reviews in consumer decision-making. Various approaches has proposed to classify product reviews as positive, negative, or neutral, as well as to extract the features of the products and the sentiment expressed towards them.
Several studies that make use of machine learning and deep learning techniques have put forth several ways for sentiment analysis of product reviews.

1) Jantima Polpinij, et al., [4] in 2008, proposes a technique for categorising and analysing consumer product reviews posted online using an ontology. We put into practise and test a lexical variable ontology-based support vector machine text categorization method. Testing revealed that the suggested approach could be more successful in classifying sentiment based on text content.

2) Weishu Hu et al., [14] in 2010, focuses on the mining of product features from customer reviews and opinions expressed in internet forums, discussion groups, and blogs. The suggested method differs from earlier ones in that it exclusively extracts product attributes from statements of opinion where users share good or bad experiences. The study provides a three-step procedure to extract product attributes, including pruning of inaccurate data, and a Senti-Word Net-based algorithm to find opinion phrases. The experimental results display higher precision and recall than earlier work. With the help of this study, producers and consumers will be able to analyse online product reviews more effectively.

3) Siddharth Aravindan et al., [12] in 2014, proposes a system for automatically extracting product features from customer reviews and determining the sentiment expressed towards those features. With the increasing popularity of web shopping portals, customers frequently asked to rate and review products they have purchased. This leads to a large volume of reviews for each product, making it difficult for customers to make informed purchasing decisions. Feature extraction and polarity classification are the first two steps of the suggested algorithm's operation.

4) K Indhuja, et al. [5] in 2014, provides a technique for identifying features extracted from product evaluations as good, negative, or neutral. The method includes polarity labelling, feature extraction, and noise removal during preprocessing. Utilising fuzzy functions, the method expands the feature-based approach by taking into account the impact of linguistic hedges. The system's evaluation of the SFU corpus shows how effective sentiment analysis using fuzzy logic is at classifying product evaluations appropriately. The suggested approach can assist companies in properly and rapidly analysing customer feedback and identifying areas for development, increasing customer satisfaction.

5) In 2014, M.S Usha et al., [7] addresses the problem of sentiment analysis, which involves classifying reviews as positive or negative based on their content. With the growth of the internet and digital reviews, this task has become increasingly important. The paper explores different approaches to sentiment analysis, including feature selection methods and sentiment classifications. The goal is to improve information retrieval and natural language processing methods by better understanding the sentiment expressed in reviews.

6) In 2015, Aditya A et al., [1] focuses on the task of gathering popular product reviews from numerous product review websites. Making informed purchasing selections is becoming more difficult for potential customers due to the growing volume of product reviews. In order to address this issue, the researchers propose performing sentiment analysis on the reviews to determine their polarity and classify them accordingly. The study compares different WEKA classifiers using charts and graphs to evaluate their effectiveness in this task.

7) P. Venkata et al., [10] in 2015, explains the creation of a web-based system that compares and recommends things purchased online. In order to analyse customer evaluations and identify their polarity using the Naive Bayes classification method, the system employs natural language processing algorithms. The product features and polarity of these features were extracted from the reviews through further analysis. The method graphically displays the superior of two items to the client based on many factors including star ratings, date of review, helpfulness score, and polarity of reviews. By offering clients a thorough comparison of products, this method seeks to help them make wise purchasing decisions.

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8) In 2020, Kumbhar, A., & Wavhal, S. [6] proposes an aspect-based sentiment analysis approach for Indian product reviews using machine-learning techniques. The authors use a dataset of 3000 reviews from an Indian e-commerce website and evaluate the performance of different algorithms, including support vector machine and decision tree. The authors show that the support Vector machine algorithm performs the best.

9) Taneja, H., & Singh, R. (in 2021) [14] uses a combination of machine learning and deep learning methods to suggest a mixed method approach to sentiment analysis of product reviews. The authors use a dataset of 1700 reviews from an Indian e-commerce website and compare the performance of different algorithms, including logistic regression, decision tree, and convolutional neural network. The authors show that the convolutional neural network algorithm performs the best.

III.COMPARATIVE STUDY

The articles in the below table focus on different methods and techniques to extract sentiment and feature information from online product reviews. In order to provide information to consumers, producers, and merchants to help them make better decisions, they employ a variety of techniques and algorithms to analyse and categorise the sentiment polarity and aspects of the reviews. This table also provide comparative evaluations of the different methods used, highlighting the strengths and weaknesses of each approach.

TABLE I
Sentiment Analysis of Product Reviews Using Various Techniques

Ref. No.	STUDY FOCUS	METHOD/ TECHNIQUE	SAMPLE	RESULT	ADVANTAGES	LIMITATIONS	FUTURE WORK/ CONCLUSION
[15]	The focus of this study is to determine the strength of opinions in user-generated reviews by analysing relevant features and paying attention to sentiment-conveying modifier words.	An opinion mining system based on analysing features.	A dataset of 1000 sentences, 1000 of which are objective and 1,000 of which are subjective, sourced from Amazon and Flipkart.	Provided a numeric score for each feature, which then used to determine the overall order of features based on the intensity of positive and negative opinions.	Identified both features and modifiers in the analysis of product reviews. Based on the supplied score values, each feature's weight is computed, and the ranking of all features is established.	The system had low recall values potentially because some reviewers used incorrect English and did not provide accurate POS information. The parser also struggled to identify some sentences in the reviews, which further affected the recall values.	Future work will use a system that can correctly manage correct English and POS as well as an analyser that can successfully recognise every phrase in the reviews in order to increase recall levels.
[5]	The goal is to categorise product reviews into one of three categories—positive, negative, or neutral—by extracting their attributes and analysing their	The approach used for sentiment classification based on features, which involves analysing specific aspects of the text to determine the sentiment expressed. Fuzzy Opinion Mining Model	Analysed 2000 product reviews generated by users from various websites.	The system achieved an accuracy of 58.58%, which considered good performance for this type of analysis.	This study's classification algorithm does not need a labelled training set. It combines neural network and fuzzy network techniques, which could	Determined the subjectivity of the reviews analysed, but the objectivity of the reviews was not assessed or determined.	Co-reference resolution, domain dependency, and entity recognition are only a few of the difficulties that the future work will have to overcome. For sentiment

	sentiment.	and Tree Bank Model were used.			result in novel data mining discoveries.		analysis to advance, these issues must be solved.
[16]	The goal of the study is to pinpoint opinion sentences in each review. Feature trimming is used to get rid of any inaccurate features that can obstruct sentiment analysis.	Senti-Word Net methodology	Five sets of product reviews were examined.	The study's findings showed increased precision and recall values.	Higher precision and recall values were attained by the system, which also used a feature pruning strategy to get rid of any inaccurate characteristics that would have harmed sentiment analysis.	The features were not arranged in the Senti-word Net technique from strongest to weakest.	Future research will concentrate on enhancing the Senti-word Net technique and include a categorization process that arranges the features in order of their opinion strength, from strongest to weakest.
[4]	The focus of the study is to analyse and classify customer's product reviews.	An ontology-based sentiment classification approach.	20,000 product reviews to train the sentiment classificati on models.	An ideal hyperplane curve that depicts the boundary between data that is suitable and data that is not.	The system achieves high success in sentiment classification based on reviews.	-	-
[13]	The work focuses on feature extraction, POS tagging for polarity analysis, and reprocessing methods to remove undesirable and inaccurate words.	A feature-based sentiment classification approach.	Five different products from Amazon.	Compactness pruning resulted in higher precision levels and lower recall values in the reviews. On the other hand, precision values rose but recall values stayed the same when p-support pruning was used.	The primary benefit was the comparison of the precision and recall values using two forms of pruning, namely compactness and p-support pruning.	The system achieves high success in sentiment classification based on reviews.	For sentiment categorization based on reviews, the system attained an accuracy of 79.67%, which is lower than that of the Fuzzy Logic Based approach.

[1]	The main focus is to categorize the reviews available online.	The WEKA classifier method.	Over 5000 reviews	The study divided the reviews into three categories: favourable, unfavourable, and neutral. Consumers were aided in making their buying decision by the polarity of the product reviews.	Depending on polarity, divided the evaluations into categories that were good, negative, and neutral, assisting customers in making a purchase decision.	The WEKA tool had one disadvantage: some of the classifiers it provided had poor accuracy.	The goal of the upcoming work is to increase classification performance by integrating classifier features and creating hybrid classifiers to address the WEKA tool's accuracy issue.
[8]	The focus of this study is to perform topic detection and sentiment analysis on reviews using an unsupervised learning technique.	The CST (Combined Sentiment Topic) model employed to perform topic detection and sentiment analysis of reviews.	Unstructured documents selected for classification.	Good performance in multiple domains, indicating the versatility of the Combined Sentiment Topic (CST) model for sentiment analysis tasks.	The CST model outperformed other approaches in terms of performance, used to improve the accuracy and efficiency of the system.	The system's main limitation was its inability to detect neutral sentiment class.	-
[6]	The focus of this paper is to propose an approach for aspect-based sentiment analysis specifically for Indian product reviews.	SVM and decision tree is used.	3000 reviews sourced from an Indian e-commerce website.	The best performing algorithm among the ones used was SVM.	The proposed aspect-based analysis approach is suitable for analysing large datasets of product reviews.	Lack of human interpretation: The system lacks the ability to interpret certain aspects of language and context that require human understanding. Limited scope: The system's capabilities and application are limited to the specific context.	The methodology can expanded to various other fields apart from e-commerce, including but not limited to healthcare, finance, and hospitality, to evaluate customer feedback on particular features of products and services.

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[11]	The focus of the paper is to extract features from reviews and assign polarity to those features.	Naive Bayes classification method.	Only mobile phone reviews selected from the Flipkart website.	Provided a star rating classification for the reviews.	It assists in selecting the appropriate product.	The main limitation of the system is that it only analysed reviews for a single product.	Future work will involve expanding the analysis to include more than two products and improving the techniques based on their features.

IV. DISCUSSION

The articles compared in this study offer diverse approaches to extracting sentiment and feature information from online product reviews. These methods employ a range of tools and algorithms to analyze and classify the sentiment polarity and features expressed in the reviews. The ultimate goal is to provide valuable insights to customers, manufacturers, and retailers, facilitating informed decision-making processes. Through comparative evaluations, this study sheds light on the various techniques utilized, highlighting their respective strengths, weaknesses, and potential for future development. By exploring these different approaches, researchers and practitioners can gain a deeper understanding of sentiment analysis in the context of product reviews, enabling them to make informed choices and enhance the overall customer experience.

V. CONCLUSION

In conclusion, we found that Naive Bayes' classifier is capable of producing excellent outcomes according to appropriate features selected. The results tend to differ for various n-grams, unigrams and bigrams have found to be particularly effective. It has also observed that feature presence is a superior metric for sentiment analysis compared to feature frequency. The effectiveness of different techniques used in sentiment analysis varies depending on the dataset employed. Accuracy can be improved using POS tagging and negation. Aspect level sentiment analysis can also be performed utilising several unsupervised learning approaches, such as POS tagging to identify features and opinions and Word Net to categorise opinions according to their semantic orientation. According to the study, word presence rather than word frequency produces superior outcomes, which is in line with earlier studies. In contrast to sentences that had only features or only opinions, those that contained both produced meaningful results.

VI. FUTURE WORK

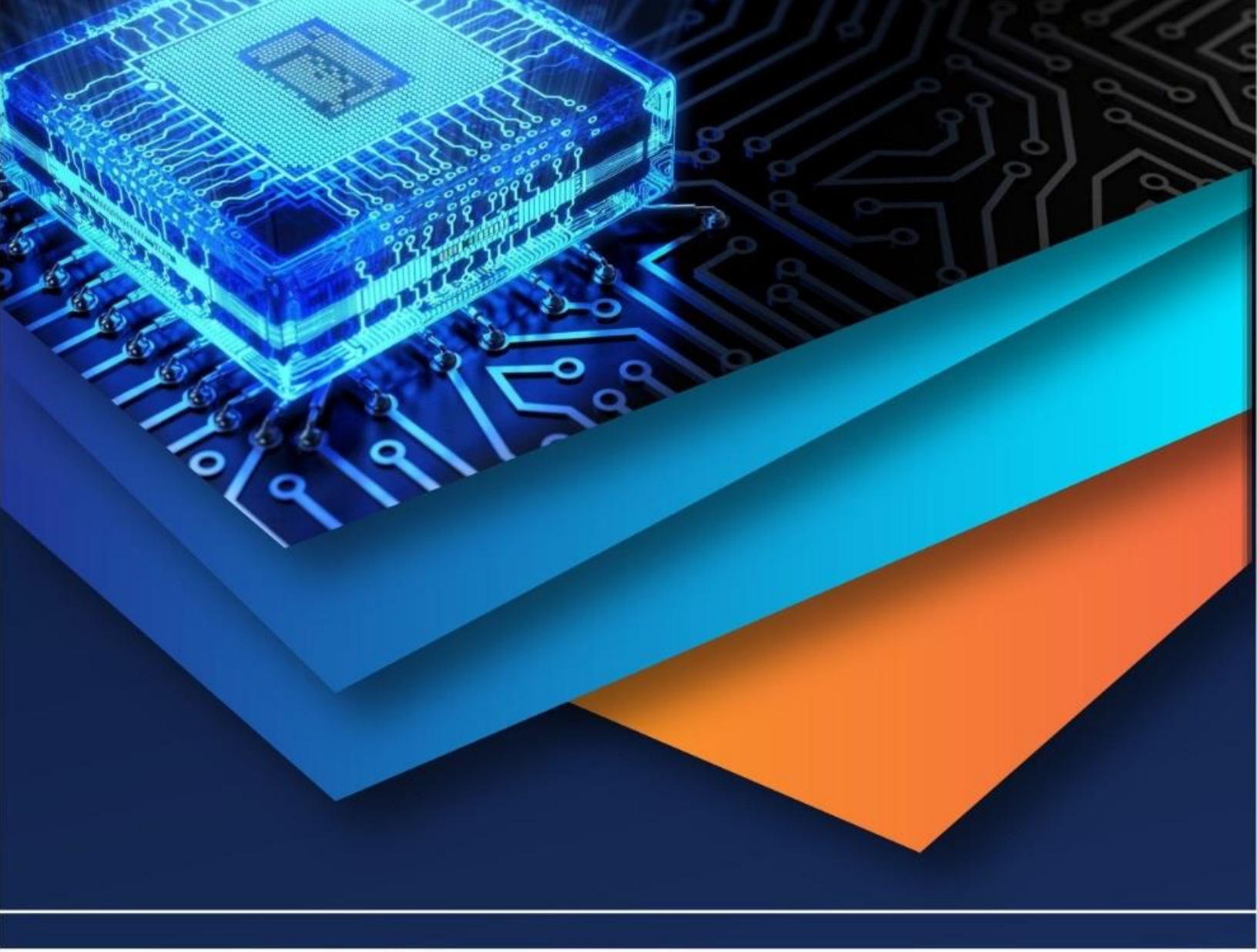
In the future, reviews will be aggregated and more reviews will be provided using data from places like Twitter and eBay. From Amazon and Flipkart, data had already been extracted. To evaluate the performance of the classifier, performance metrics like recall and precision will be used. The quality of the words used to express the user's emotion would be taken into consideration to produce accurate results. For example, the words "good" and "excellent" signify various degrees of positive emotion. Any word's strength can be determined by adding intensifiers like "very" before it. In addition, future work will expand to more product review websites and concentrate on more difficult natural language processing problems. In order to produce accurate results, the algorithm will only take into account the keywords that are already present in the dataset and ignore any other words. To improve the accuracy of the outcomes, the latest and best methods and technologies will be used.

REFERENCES

[1] Aditya A. Kshirsagar, Prarthana A. Deshkar. “Review Analyzer Analysis of Product reviews on WEKA Classifiers”, IEEE Sponsored 2nd International Conference on Innovations in Information, Embedded and Communication systems, 2015.
[2] Alexandra Cernan ,ValentinSgarciu and Bogdan Martin. “Sentiment analysis from product reviews using SentiWordNet as lexical resource”, IEEE 7th International Conference on Electronics, Computers and Artificial Intelligence (ECAI), 2015.
[3] I. Hemalatha,G.P.SaradhiVarma and A. Govardhan.“Sentiment classification in online reviews using FRN algorithm”, IET Chennai Fourth International Conference on Sustainable Energy and Intelligent Systems (SEISCON), 2013.
[4] JantimaPolpinij, Aditya K. Ghose. “An Ontology-based Sentiment Classification Methodology for Online Consumer Reviews”, IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology, vol. 1, 2008.
[5] K Indhuja, Raj P C Reghu. “Fuzzy Logic Based Sentiment Analysis of Product Review Documents”, IEEE First International Conference on Computational Systems and Communications, 2014.

[6] Kumbhar, A., & Wavhal, S. (2020). Aspect based sentiment analysis on Indian product reviews using machine-learning techniques. In 2020 International Conference on Emerging Trends in Information Technology and Engineering. IEEE.
[7] M.LovelinPonn Felciah and R.Anbuselvi. "A study on sentiment analysis of social media reviews", IEEE International Conference on innovations in Information, Embedded and Communication Systems (ICIIECS), 2015.
[8] M.S. Usha, M.Indra Devi. "Analysis of Sentiments using Unsupervised Learning Techniques",IEEE International Conference on Information Communication and Embedded Systems, 2013.
[9] PankajGupta,RituTiwari and Nirmal Robert."Sentiment analysis and text summarization of online reviews: A survey", IEEE International Conference on Communication and Signal Processing (ICCSP), 2016.
[10] PingJi and Jian Jin. "Extraction of comparative opinionate sentences from product online reviews", 12th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD), 2015.
[11] P.Venkata Rajeev, V.SmrithiRekha "Recommending Products to Customers using Opinion Mining of Online Product Reviews and Features", International Conference on Circuit, Power and Computing Technologies, 2015.
[12] R.Nithya and D.Maheswari. "Sentiment Analysis on Unstructured Review", International Conference on Intelligent Computing Applications (ICICA), 2014.
[13] SiddharthAravindan and AsifEkbal."Feature Extraction and Opinion Mining in Online Product Reviews", International Conference on Information Technology, 2014.
[14] Taneja, H., & Singh, R. (2019). Sentiment analysis of product reviews using machine learning and deep learning techniques. In 2019 International Conference on Automation, Computational and Technology Management (ICACTM) IEEE.
[15] Tanvir Ahmad, Mohammad NajmudDoja. "Ranking System for Opinion Mining of Features from Review Documents", International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, July 2012.
[16] Weishu Hu, Zhiguo Gong, JingzhiGuo. "Mining Product Features from Online Reviews", 7th IEEE International Conference on E-Business Engineering, 2010.

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