A Review on Sentiment Analysis Techniques and Approaches

Devendra Singh Rathore[1]
Rabindranath Tagore University Raisen, M.P. India

Dr. Pratima Gautam[2]
Rabindranath Tagore University Raisen, M.P. India

Abstract:- **In current scenario persons share their emotions and views on social media in symbolically and text form. These views turn out to be beneficial to organizations, political institutions and the public. It can be difficult to record and understand consumer emotions because reviews on the Internet are available to millions for a product or service. Sentiment examination assumes a significant part in corporate life as they influence their dynamic cycle in different sorts of occasions they face. The essential goal of this survey is to give a total image of sentiment investigation techniques and approaches, its sorts and grouping. This research paper presents an insight of different approaches on sentiment analysis along with demerits.**

Keywords:- *Sentiment Analysis, Machine Learning, Algorithm, NLP.*

I. INTRODUCTION

Sentiment analysis uses natural language processing in order to extract useful information about public reactions to a specific product or topic. Generally, sentiment analysis is the analysis of feelings and opinions from a predetermined point of view. It involves using blog posts, comments, and reviews to collect and document the public's attitude toward the product. Increasing interest in e-commerce is also a significant means of expressing and analyzing opinions, which is an important source of sentiment, estimation and reviews [1]. People constantly seek other*s' opinion for decision making on any topic, because opinions are the key to most of their activities and the crucial influencer of their behavior. There are different classification of tools for sentiment analysis like Senti WordNet, Happiness Index, SenticNet, emoticons, liwc.

➢ *Different Level of study*
There are three types of sentiment analysis: analysis at the Document level, Sentence level and Aspect or entity level.

- Document level is possible that results produced at the document level are sometimes inappropriate because the whole document is taken into account as one unit.

- In Sentence level Every sentence is treated as an entity in the sentence-level approach, and analyses are applied to each sentence individually before their results are summed up and the result is supplied to the user as a result. [4].
- Entity and Aspect level is an approach that is based on features. During this process, we consider both positive and negative sentiments about features.

This is an approach that is based on features. During this process, we consider both positive and negative sentiments about features.

➢ *Issues in Sentiment Analysis*

- Positive and negative sentiment might have inverse implications in an exceptionally specific space, so foreseeing its significance from its keyword is troublesome. It is difficult to analyze such peaceful sentences in terms of positive or negative aspects, but the keyword is still of important and importance significance for dissecting these sentences[2].
- Sarcastic Sentences is terms of a style of jocks, very few sentences may violate the complete meaning of the entire sentences, since quiet sentences need attention to the keyword and sentence structure. Not only do these funny sentences destroy a sentence, yet, they additionally obliterate the worth of the entire archive. Ex-What an incredible vehicle? It hasn't worked after just 10 days.
- Language Issues Change Place to position like Motorola word is utilized as motto, Lamia word word might be utilized as Lummi. Such reasonable phrases alter the meaning of the problem and phrases.
- Conditional sentences are a challenge when analyzing feelings. conditional sentences create the same problem that interrogative sentences do. Ex-If the image nature of this camera is delicate, I will be able to go for it.
- Author & Reader Perspective like The dollar price increases with the Indian currency unit. Concern document has both meaning the positive and negative along with variation of values from one person to another person. Sentence having a positive connotation to exporter, while the same sentence has a negative connotation to the importer.
- Spam sentiments are Sentiments posted by an alternative or competing company to increase their product value or their company value among customers.

II. COMPUTATIONAL APPROACHES

➢ *To carry out Sentiment Analysis, there are two Different Approaches which are as follows:*
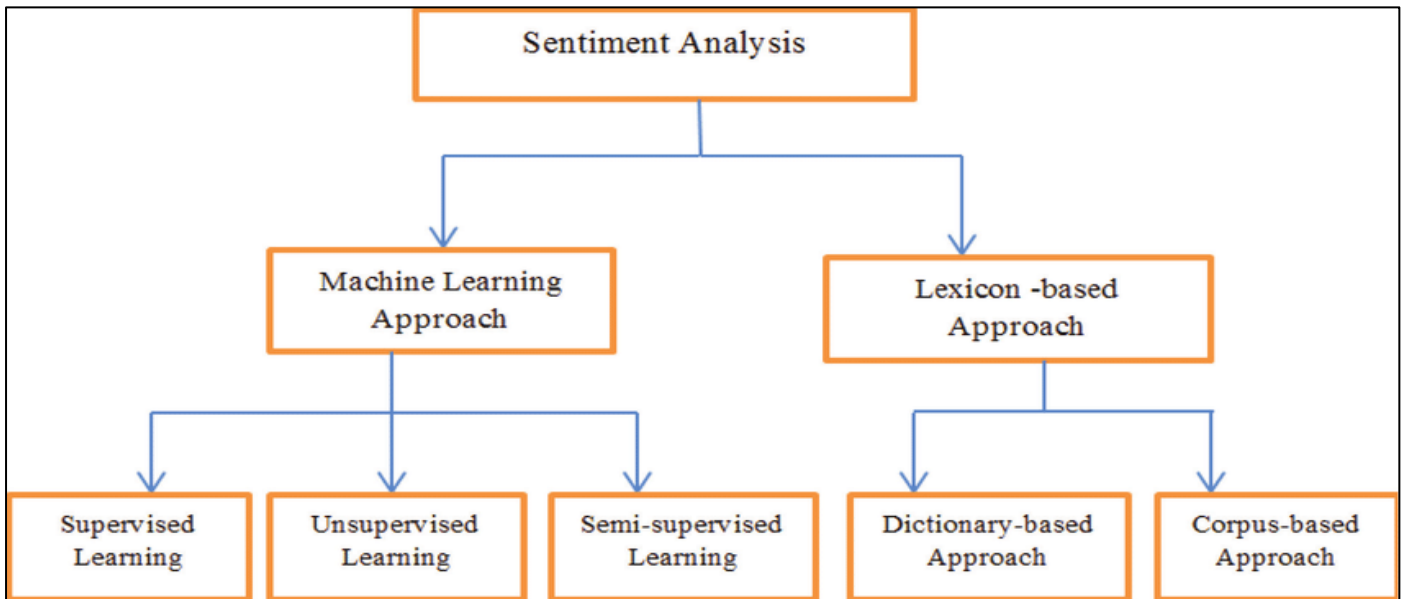

Fig 1 Approaches of Sentiment Analysis

➢ *Machine Learning*

Machine learning could be a data analytics approach that automates the analytical model. There are algorithms that are used iteratively to discover from the available data, which helps the system to appear beyond views with no outside [10]. In machine learning, the machine learns from the preceding data, and on the basis of the preceding data, it produces reliable decisions making outputs. there are two styles of machine learning approaches.

- Supervised Learning: In supervised learning, we've got the computer file (x) and output data (y) and an algorithm is understood which must map the functions of given data with desired data. In supervised learning there are again differing kinds of supervised learning like Decision Tree classification, support vector machine, Naïve Bayes, Neural network etc
- Unsupervised learning: It is work with no labeled answers. The foremost example of this system is cluster analysis. There are different types of clustering methods like Partitioning method, Density based method, Hierarchical method etc.[16]

➢ *Lexicon Based Approach*

One more way to deal with sentiment examination includes the calculation of feeling of the semantic direction of the word or expression that happens in the text. During this approach Each word is assigned an emotion score from both the positive and negative dictionaries. These words are then compared to the emotional value of the word or sentence. [17]

III. RELATED WORKS

Mondher Bouazizi Et Al [30] portray a system towards arranges the messaes that is gathered from different social destinations into numerous opinion classes. In this examination paper analyst arranges tweets into seven classes.

Wanxiang Che Et Al [31] portray a structure forsentence pressure strategy include based feeling investigation. The specialist portray syntactic pressure procedure for more effective than extractive pressure method

Tang et al. [32] talk about four issues connected with assessment mining i.e., arrangement of abstract,Order of feeling by word, grouping of opinion by archive, and examination of assessment. For the order of subjectivity, they underlined approaches like ward closeness, the NB classifier, the numerous NB classifier, and the cut-based classifier.

Lu Lin et al. [33] proposed a structure to take advantage of conclusions in the field of microblogists and afterward build a continuous examination framework to screen the spread, variance of sentiments and consuming suppositions in Weibo.

ElRahman, et al [34] worked on twitter data set to find the popularity of res taurant using machine learning approaches. they mainly focus on polarity to find the appropriate results.

Ramanathan et al [35] focus on opinion or feedback in tourism mainly in oman tourism. For this they used the twitter data set and proposed a lexicon based approach for finding better reults.

The information from the paper is extricated and the essential review discoveries are dissected and coordinated into a Table I.

Table 1 Previous Research Papers

S.N.	Author Name	Tools/Method Used	Description	Dataset
	Previous Research Papers Summary			
1	Tang et al., 2014)	SVM, Na-ive Bayes and NB-enhanced SVM, Recursive Auto encoder	The unified model combining the syntaxic context of words and sentence feeling information gives the best result in both experiments.	Twitter
2	Pablo et al (2014)	Naïve Bayes	The system uses a basic rule that looks for polarity words in the tweets/texts analyzed. It reaches 63 percent of F-score.	Twtter
4	ÁlvaroCuesta et al (2014)	The creators propose an open system to gather and investigate information from Twitter's public streams consequently. Naïve Bayes and ngrams	Utilization of ten-fold cross-validation to keep away bias due to train-ing set partition. Parameters such as variance of accuracy, variance of F-measure,Recall were used for the assessment.	Twitter
5	Bian et al (2015)	NLP and SVM	The SVM evaluation was performed using parameters such as the below-curve area (AUC) value and the receiver operating characteristics (ROC) curve. The average forecast accuracy over the 1000 iterations was estimated at 0.74, with an average AUC value of 0.82.	Twitter
6	Skuza et al (2015)	Tweets were gathered more than multi months' time frame from second January 2013 to 31st March 2013.	Huge amounts of information likewise prompted the choice to apply a decreased rendition of the Naive Bayes calculation.	Twitter
7	AltugAk ay et al. (2016)	Network based analysis, T F-IDF score, k-means clustering	Informal communities permit the impacted populace in light of perceptions got from client conduct in misery related informal communities.	User behavior in Depression Forum
8	Yimin Ho u, et. al. (2016)	Designed computational framework composed Feature extraction, Feature screening, Selection and Classification	It is justifiable that there are different elements that could impact watchers like or aversion of the trailer. To address inclination question. In view of mixed media highlights to figure out clients Like or Dislike of film trailer.	Movie trailer
9	Suman, Gupta & Sharma (2017)	Machine learning	Relate the progression of stock cost	Stock Twists
10	Yuliyanti, Djatna & Sukoco. (2017)	AI and Dictionary based	Achievement level of the local area advancement program	Twitter
11	Hassan et al (2017)	Machine learning	Find the downturn level of an individual	Twitter and newsgroup
12	Karamollaoğlu, Doğru, Dörterler, Utku & Yıldız (2018)	Lexicon-based	Measure the insight or impacts of the peculiarities	Twitter
13	Mansour. (2018)	Lexicon-based	Most client view ISISas a danger and dread	Twitter
14	Poecze et al (2018)	Machine learning	Upgrade brand correspondence and grasping customer criticism	Facebook page of YouTube Gamers
15	Martin-Domingo et al (2019)	Machine learning	Analyse airport service quality	Twitter
16	Nandal et al. (2020)	Aspect level Machine learning used in Aspect	In this paper Support Vector Machine (SVM) used with diverse kernels like linear, RBF, linear kernel	Amazon reviews

		level Sentiment analysis	and polynomial	
17	Adoma et al. (2020)	Machine learning	Worked on different seven types of Emotion Detection like fear, Happy, sorrow, , irritation etc with 79% Accuracy	ISEAR
18	Mukherjee et al. (2021)	Deep Learning and Machine learning	In this, Author apply different Machine learning and Deep Learning models with reversal process and got Accuracy up to 95.30%.	Amazon Cellphone reviews
19	Kumar and Sachdeva (2021)	Deep Learning and Machine learning	Here author addressed Cyber victimization Identification using My Space dataset with 93.9% accuracy.	MyS- pace data dataset
20	Liu et al. (2022)	Machine learning	In this paper Hybrid Sentiment Analysis model used for sentiments classification and find multimodal reactions.	IEMO CAP
21	Mewada and Dewang(2023)	Deep Learning and Machine learning	BiLSTM used for features with probability with 91.9% Accuracy but not find strong with handling anonymous documents samples	IMDB

IV. CONCLUSION

As per the studied of various review paper of Classification Techniques and Approaches associated with sentiment Analysis, We conclude that Survey analysis, analyzes the classification techniques which present a good performance compared with existing approaches and some classification techniques have some limitations. Combination of different techniques to beat the drawbacks and advantages of increase the performance of sentiments analysis. So we suggest that Hybrid techniques are more useful to find the appropriate results.To improve performance measurements in future, further effort will be required.

REFERENCES

[1]. M.R. Saleh, M.T. Martín Valdivia, A. MontejoRáez, and L.A. Urena Lopez. 2011.Experiments with SVM to classify opinions in different domains, Expert Syst. Appl. 38, 14799-14804

[2]. Bing Liu.2012 Sentiment Analysis, Mining opinions, Sentiments, and Emotions.

[3]. J. Bollen, H. Mao, X. Zeng, Twitter mood predicts the stock market, J. Comput. Sci. 2, 1-8. (2012)

[4]. W. Medhat et al., Sentiment analysis algorithms and applications: a survey, Ain Shams Eng. J. (2014).

[5]. Ravendra Ratan Singh Jandail., A proposed Novel Approach for Sentiment Analysis and Opinion Mining, International Journal of UbiComp (IJU), Vol.5, No.1/2, April 2014

[6]. Yuliyanti, Siti, Djatna, Sukoco Taufik, and Heru. (2017) "Sentiment Mining of Community Development Program Evaluation Based on Social Media." *TELKOMNIKA (Telecommunication Computing*

[7]. Martin-Domingo, Luis, Juan Carlos Martin, and Glen Mandsberg. (2019) "Social Media as a Resource for Sentiment Analysis of Airport Service Quality (ASQ)." *Journal of Air Transport Management*.

[8]. Mansour, Samah. (2018) "Social Media Analysis of User's Responses to terrorism using sentiment analysis and text mining." *Procedia Computer Science* 140: 95–103.

[9]. Hassan, Anees Ul, Jamil Hussain, Musarrat Hussain, Muhammad Sadiq, and Sungyoung Lee. (2017) "Sentiment Analysis of Social Networking Sites (SNS) Data Using Machine Learning Approach for the Measurement of Depression", in *International Conference on Information and Communication Technology Convergence (ICTC)*, Jeju, South Korea: IEEE.

[10]. Karamollaoğlu, H., İ A. Doğru, M. Dörterler, A. Utku, and O. Yıldız. (2018, 20-23 Sept. 2018). "Sentiment Analysis on Turkish SocialMedia Shares through Lexicon Based Approach", in *the 2018 3rd International Conference on Computer Science and Engineering*.

[11]. Poecze, Flora, Claus Ebster, and Christine Strauss. (2018) "Social Media Metrics and Sentiment Analysis to Evaluate the Effectiveness of Social Media Posts." *Procedia Computer Science* 130: 660-666

[12]. Suman, N., P. K. Gupta, and P. Sharma. (2017, 11-12 Dec. 2017). "Analysis of Stock Price Flow Based on Social Media Sentiments", in *the 2017 International Conference on Next Generation Computing and Information Systems (ICNGCIS)*.

[13]. AltugAkay, Andrei, and Bjorn – Erik Erlandsson 2016. Assessing Antidepressants Using Intelligent Data Monitoring and Mining of Online Fora, IEEE Journal of Biomedical and Health Informatics, Vo l. 20, No. 4.

[14]. Yimin Hou, Ting Xiao, Shu Zhang, Xi Jiang, Xiang Li, Xintao Hu, JunweiHari, Lei Guo, L. Stephen Miller, Richard Neupert, and Tianming Liu 2016. Predicting Movie Trailer Viewers Like/Dislike via Learned Shot Editing Patterns, IEEE Transactions on Affective Computing, Vo l. 7, No. 1.

[15]. Z. Jianqiang and G. Xiaolin 2017.Comparison research on text pre-processing methods on Twitter sentiment analysis,'IEEE Access, vol. 5,2870_2879.

[16]. Y. Liu 2017.Social media tools as a learning resource, J. Educ. Technol. Develop. Exchange, vol. 3, no. 1, 101_114.

[17]. T. Chen, R. Xu, Y. He, and X. Wang 2017. Improving sentiment analysis via sentence type classification using BiLSTM -CRF and CNN,' Expert Syst.Appl., vol. 72, 221_230

[18]. G.Vinodhini and R. Chandrasekaran 2017.A sampling based sentiment mining approach for e-commerce applications, Inf. Process. Manage., vol. 53,no. 1(Jan): 223_236,

[19]. G. Rao, W. Huang, Z. Feng, and Q. Cong 2018. LSTM with sentence representations for document-level sentiment classi_cation,'Neurocomputing, vol. 308(Sep): 49_57.

[20]. M. Tubishat, N. Idris, and M. A. Abushariah 2018. Implicit aspect extraction in sentiment analysis: Review, taxonomy, oppportunities, and open challenges,Inf. Process. Manage. vol. 54, no. 4(Jul): 545_563.

[21]. B. Ghaddar and J. Naoum-Sawaya 2018.High dimensional data classification and feature selection using support vector machines," Eur. J. Oper. Res.,vol. 265, no. 3(March): 993_1004

[22]. P. Karagoz, B. Kama, M. Ozturk, I. H. Toroslu, and D. Canturk 2019.A frame-work for aspect based sentiment analysis on turkish informal texts,"J. Intell. Inf. Syst., vol. 53, no. 3(Dec): 431_451

[23]. R. Priyantina, I. Teknologi Sepuluh Nopember, R. Sarno, and I. TeknologiSepuluh Nopember 2019. Sentiment analysis of hotel reviews using latentDirichlet allocation, semantic similarity and LSTM," Int. J. Intell. Eng. Syst., vol. 12, no. 4(Aug): 142_155

[24]. M. Al-Ayyoub, A. A. Khamaiseh, Y. Jararweh, and M. N. Al-Kabi 2019.A comprehensive survey of arabic sentiment analysis, Inf. Process.Manage., vol. 56, no. 2, (March): 320_342

[25].]. L. Li, T.-T. Goh, and D. Jin 2020.How textual quality of online reviews affect classification performance: A case of deep learning sentiment analysis, Neural Comput. Appl., vol. 32, no. 9(May): 4387_4415

[26]. V. Bobicev 2016 "Text classification: The case of multiple labels," IEEE Int. Conf. Commun., vol. 2(Aug): 39–42

[27]. P. Chikersal, S. Poria, E. Cambria, A. Gelbukh, and C.E. Siong 2015.Modelling Public Sentiment in Twitter : Using Linguistic Patterns to Enhance Supervised Learning 49–65

[28]. Ayush Dalmia, Manish Gupta, Vasudeva Varma 2015.Twitter Sentiment Analysis The good ,the bad and the neutral ,Association for Computation Linguistic.

[29]. Sneh Paliwal, Sunil Kumar Khatri and Mayank Sharma 2018 Sentiment Analysis and Prediction Using Neural Networks, Proceedings of the International Conference on Inventive Research in Computing Applications (ICIRCA),

[30]. Mondher Bouazizi, Tomoaki Ohtsuki. (2017).A Pattern-Based Approach for Multi-Class Sentiment Analysis in Twitter IEEE Access, Vol.5, 20617 – 20639.

[31]. Wanxiang Che, Yanyan Zhao, Honglei Guo, Zhong Su, Ting Liu.2015.Sentence Compression for Aspect-Based Sentiment Analysis," IEEE/ACM Transactions on Audio, Speech, and Language Processing, Vol.23, No.12, 2111 – 2124.

[32]. H. Tang. S. Tan. X. Cheng2009. A survey on sentiment detection of reviews, Expert system application 36,10760-10773.

[33]. Lu Lin, Jianxin Li, Richong Zhang, Weiren Yu and Chenggen Sun2014. Opining mining and Sentiment analysis in social networks: A retweeting structure-aware approach, In IEEE/ACM 7th international conference on utility and cloud computing 890-895

[34]. El Rahman, Sahar A., Feddah Alhumaidi AlOtaibi, and Wejdan Abdullah AlShehri. "Sentiment analysis of twitter data." 2019 international conference on computer and information sciences

[35]. V.Ramanathan and T. Meyyappan, "Twitter Text Mining for Sentiment Analysis on People's Feedback about Oman Tourism", the 4th MEC International Conference on Big Data and Smart City (ICBDSC),2019,pp. 1-5.

[36]. Nandal N, Tanwar R, Pruthi J (2020) Machine learning based aspect level sentiment analysis for amazon products. Spat Inf Res 28(5):601–607

[37]. Adoma AF, Henry N-M, Chen W (2020) Comparative analyses of bert, roberta, distilbert, and xlnet for text-based emotion recognition. In: 2020 17th International Computer Conference on Wavelet Active Media Technology and Information Processing (ICCWAMTIP), IEEE, pp 117–121.

[38]. Mukherjee P, Badr Y, Doppalapudi S, Srinivasan SM, Sangwan RS, Sharma R (2021) Effect of negation in sentences on sentiment analysis and polarity detection. Procedia Comput Sci 185:370–379

[39]. Kumar A, Sachdeva N (2021) A bi-gru with attention and capsnet hybrid model for cyberbullying detection on social media. World Wide Web 25(4):1537–1550

[40]. Ding Y, Yu J, Liu B, Hu Y, Cui M, Wu Q (2022) Mukea: multimodal knowledge extraction and accumulation for knowledge-based visual question answering. In: proceedings of the IEEE/CVF conference on computer vision and pattern recognition, pp. 5089–5098

[41]. Mewada A, Dewang RK (2023) Sa-asba: a hybrid model for aspect-based sentiment analysis using synthetic attention in pre-trained language bert model with extreme gradient boosting. J Super Comput 79(5):5516–5551