JOURNAL OF CRITICAL REVIEWS

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

OPTIMIZATION OF SENTIMENT ANALYSIS USING DEEP LEARNING TECHNIQUES

Ms. Alka Singh[1], Mr. Pitamber Adhikari[2]

[1]Dept. of Computer Science and Engineering, Noida Institute of Engineering and Technology, Greater Noida, Uttar Pradesh

[2]Dept. of Information Technology, Noida Institute of Engineering and Technology, Greater Noida, Uttar Pradesh

Email Id- [1]alka@niet.co.in, [2]pitamberadhikari.12@gmail.com

Received: 02 November 2019 Revised and Accepted: 02 January 2020

ABSTRACT: Sentiment analysis is one of the most challenges in natural language processing (NLP). Recently, deep learning algorithms have present impressive results across various NLP tasks. The social networks, forums, user reviews, and blogs generate enormous a lot of data within the type of users' views, emotions, opinions, and arguments about the different social platforms, products, brands, and politics. Sentiments of users that are expressed on the web have a batter influence on the readers, product vendors, and politicians. The unstructured type of data from social media is required to be analyzed and structured and for this purpose, sentiment analysis has recognized significant attention. Sentiment analysis on social media, during which the task of extracting subjective information from e-commerce, social media have drawn great recognition from the data mining community. Social media give a useful insight not only into human ideas but also within the challenges incurred because of large amounts of huge data. These problems comprise the processing of large amounts of streaming data, also as automatically identifying human expressions within text messages.

KEYWORDS: Sentiment analysis, Social Media text, Machine Learning Classifier, Deep Learning, Product review

I. INTRODUCTION

Sentiment analysis present to the management of sentiments, opinions, and subjective text. Sentiment analysis presents the comprehension data relate to public views because it analyzes multiple tweets and reviews[1]. It's a verified tool for the prediction of many significant events like to box office performance of movies and elections. Public reviews are wont to evaluate a particular entity, i.e., person, product or location and could be found on different websites like Facebook, Twitter, Amazon, and LinkedIn. The opinions are often categorized into a negative review, positive reviews or neutral. The aim of sentiment analysis is to automatically determine the expressive direction of user reviews. The demand for sentiment analysis is raised because of the increasing requirement of analyzing and structuring hidden information that comes from social media within the type of unstructured data. However, the domain of the applications for Sentiment Analysis reaches far from that. It provides insight for businesses, giving them immediate feedback on products, and measuring the impact of their social marketing approach[2].

Within the same manner, it is often highly applicable in political campaigns or the other platform that concerns opinion. It even has applications to stock market prediction and algorithmic trading engines. Currently, Deep Learning (DL) algorithms have shown impressive performance in a Natural Language Processing (NLP) applications consist of sentiment analysis across various data sets. These models don't require to be provided with pre-defined features hand-picked by an engineer, but they will learn sophisticated features from the data set by themselves. Although every unit in these deep neural networks is fairly simple, by stacking layers of non-linear units at the back of every other, these models are capable of learning highly sophisticated decision boundaries[3]. Words are represented in a high dimensional vector space, and therefore, the feature extraction is left to the deep neural network. As a result, these models can map words with similar semantic and syntactic

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

properties to nearby locations in their coordinate system, in a way that's comparable to understand the meaning of words.

Architectures like Recursive Neural Networks (RNN) also are capable of efficiently understanding the structure of the sentences. These characteristics build deep learning models a natural suitable task like sentiment analysis. Due to the scarcity of opinion text documents available in digital form, very little research interest on linguistics within the last decade of the 20th century was witnessed. The escalation of social media networks on the web attract young researchers to define the extent of the granularity of text. The online text is assessed into three levels viz.[4]. document level, sentence level, and word level. In, the 4th level granularity is defined by using the Convolution Neural Network (CNN). This 4th level is the character level feature extraction method used for extracting features of every character window from the given word.

II. BACKGROUND

Machine Learning For Sentiment Analysis

The sentiment analysis is often defined as a view or an attitude toward an event situation. It often includes various kinds of personal feelings: happiness, tenderness, sadness, or nostalgia. One may define the sentiment analysis labels as a polarity such as positive and negative review, neutral, or various kinds of emotional feelings like as angry, happy, sad, and proud. The definition of sentiment analysis will affect the result of the sentiment, so, this paper'd like to define the sentiment analysis carefully[5]. There are studies that defined three or more sentiment labels such as opinion rating scores, emotional feelings, and a few research studies adopted two-dimensional labels like positive and negative reviews. Although there has been much performance improvement within the field of sentiment analysis, the binary classification of sentiment still remains challenging, for instance, the performance of current studies varied from 65%–80% regarding the characteristics of information. During this paper, this paper aim at the binary classification like a positive review or negative review, and therefore, the ternary classification such as positive review, neutral, and negative reviews[6].

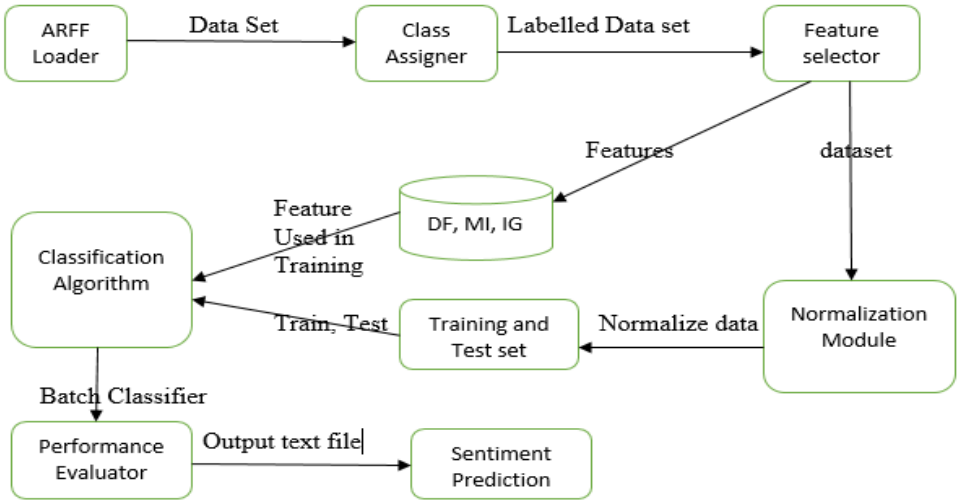

Fig.1: Architecture of Sentiment Analysis

The social media dispense their data conveniently and freely on the online website. This availability of information entices the interest of young researchers to plunge them within the field of sentiment analysis. People express their emotions like positive and negative reviews and perspectives on social media discussion forums. The business organizations employ researchers to research the unrevealed facts about their products and services[7]. Spontaneous and automatic determination of sentiments from positive and negative reviews is the most concern of public and private organizations. The machine-learning algorithm has improved the accuracy of sentiment analysis and expedite the automated evaluation of information recently.

The aim of this methodology was to induce the users' opinions and attitudes about hot events by using Convolutional Neural Network (CNN). The employment of CNN overcomes the issue of explicit feature extraction and learns implicitly through training data. To collect the information from the target, the input URL

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

and focused crawler are used, 2000 Twitter comments were collected as a corpus and divided into three labels, i.e., 280 neutral emotions, 350 negative emotions, and 450 positive emotions[8]. The proposed model has been compared with the previous studies as those had studies used CRF, Support Vector Machine (SVM), and extra traditional algorithms to perform sentiment analysis at a high price. However, the performance proves that the proposed model is affordable and sufficient to enhance accuracy regarding sentiment analysis.

Lexicon Dictionary

Lexicon dictionary as shown in Fig. 2 The Lexicon-based method is predicated on sentences or words and a collection of well-known emotions. In short, the dictionary is split into, dictionary-based approach and a corpus-based approach. The dictionary-based scheme discovers personal opinions within the document, then finds its origin of semantic within the dictionary. The available Lexicon dictionaries are SentiWordNet, WordStat Sentiment Dictionary, SenticNet and lots of more. However, the lexicon dictionary is often created manually. During this paper, the created dictionary is represented as below[9].

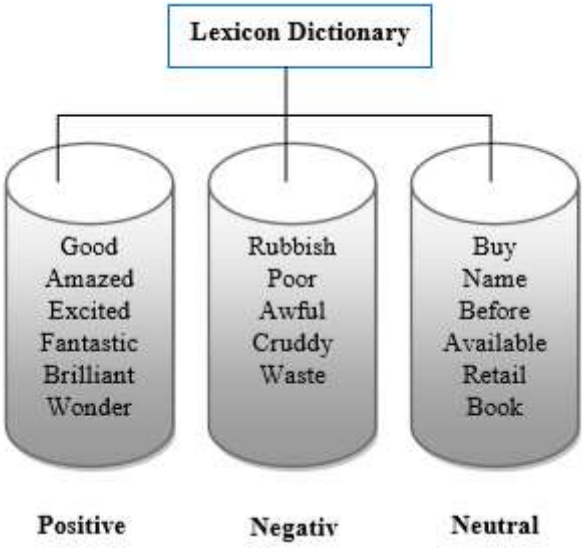

Fig.2: Lexicon Dictionary

Sentiment Analysis with deep learning

Recently, Deep Learning techniques delivered impressive performance in a Natural Language Processing (NLP) applications encompassing sentiment analysis across various data sets. Such models don't need any predefined features which are hand-picked by an engineer, but they might learn sophisticated features as of the data set by themselves. Although every unit in these Deep Neural Networks (NN) is fairly simple, by means of stacking layers of natural language units at the back of one another, those models are competent to find out highly sophisticated decision boundaries. Words are signified during a high-dimension vector space, and therefore, the feature extortion is left to the neural network[10]. As an outcome, those models could map words with identical syntactic also as semantic properties to adjacent locations in their reference system, during a way that's evocative of comprehending the words' meaning. Architectures like RNNs also are competent to effectively comprehend the sentences' structure. These build deep learning models the most effective appropriate tasks like sentiment analysis as shown in figure 3.

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

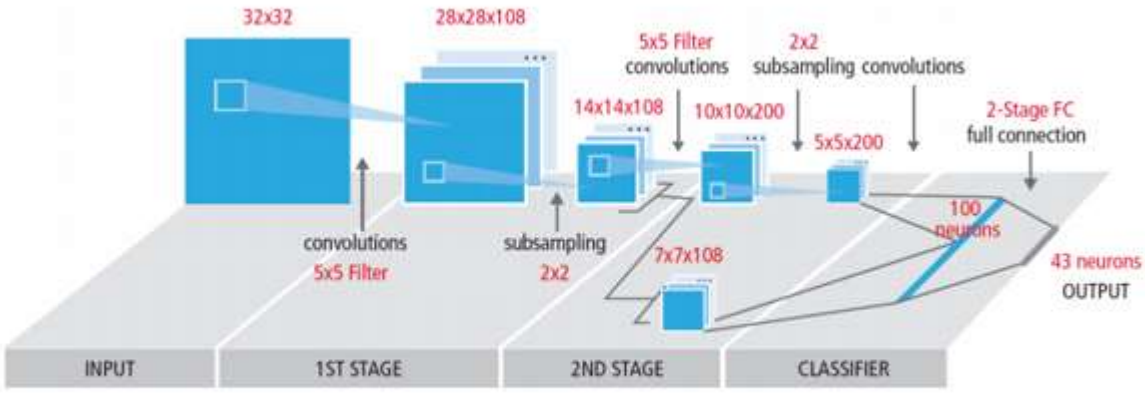

Figure 3 Sentiment Analysis with deep learning

Convolutional Neural Network (CNN)

Convolutional Neural Network (CNN) is a machine learning algorithm, like Artificial Neural Networks (ANN), consisting of neurons that are wont to train the system based on neuron weights biases. Each neuron accepts a number of entries, applies weighted and bias function passes those entries through the activation function, and responds with an output. In CNN, the input, additionally because the output data be three-dimensional[11]. The optimized data are responded to the input layer which again forwards it to the Convolutional layer. Within the Convolutional layer, the dot product of weight and input is added. Within the max-pooling layer, the amount of the data is reduced to extend the processing speed of CNN. On the opposite side, the dimensions of memory are decreased to protect the system from over lifting. After this, the data are passed to the fully connected layer, during which the class score be determined. With the suggested method, it had been viable to forecast user satisfaction on a product, happiness with a particular environment or destructive situation after disasters. Lately, Deep Learning (DL) was competent to solve problems in voice recognition or computer vision[12].

Convolutional Neural Network (CNN) worked fine for image recognition along with classification. An important reason to use a Convolutional layer for image classification and image classification was that the Convolutional layer could extort a part of features as of global information precisely and also, it had been competent to take the relations amongst those features. The above solution could attain the most accurate within the analysis alongside classification. For Natural Language Processing (NLP), texts' data features could even be extorted piece by piece. Regarding the relations amongst those features without considering the context or complete sentence might incorrectly interpret the sentiment analysis. And, it had been the foremost effectual method to perform image classification[13]. Convolutional Neural Network (CNN) comprised a Convolutional layer to extort information by a large scale of text, so sentiment analysis with CNN exhibited that it attained augmented accuracy performance on twitter sentiment analysis when contrasted to some traditional techniques just like the Support Vector Machine (SVM) and Naive Bayes Classifier as shown in figure 4.

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

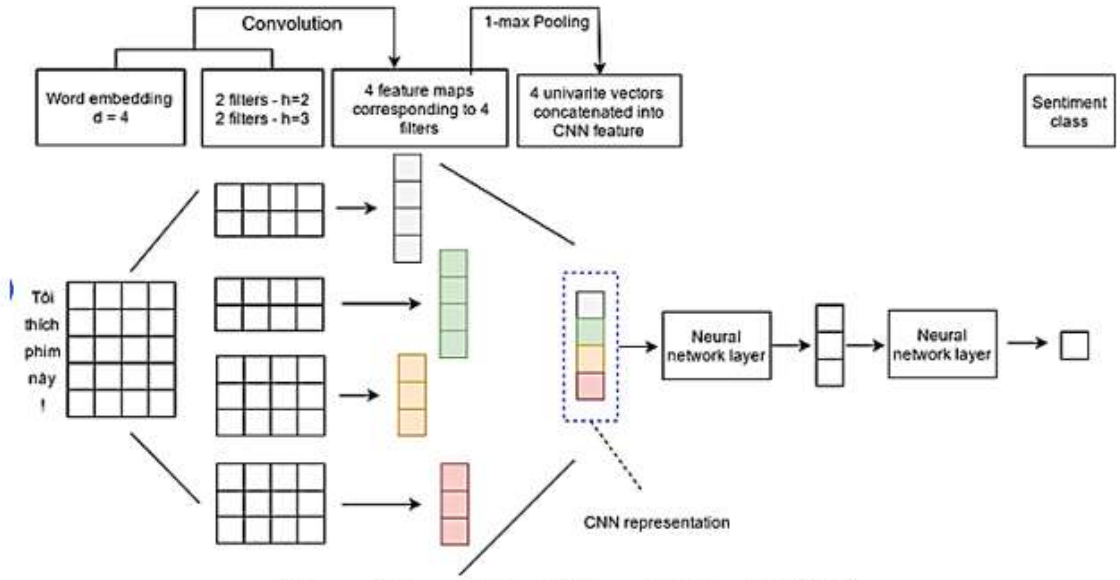

Figure 4 Convolutional Neural Network (CNN)

III. CONCLUSION

Sentiment analysis has proven to be effective while analyzing people's behavior by examining large social media data. During this, a completely unique method is intended to extract people's opinions on specific topics by relying on social media data. The demand for sentiment analysis is raised because of the necessity of analyzing and structuring hidden information, extracted from social media within the type of unstructured data. The sentiment analysis is being implemented through a deep learning algorithm. Deep learning techniques consist of various effective and important models, these models are wont to solve the type of problems effectively. Therefore, man-made features, which need to be carefully optimized to provide proper leads to the case of traditional models, aren't in the least necessary while using deep learning models. Although the widely popular traditional models like Naive Bayes and the support vector machine has proved useful for therefore long, the potential of the deep learning algorithm can't be overlooked. In fact, the latter promises to perform better than the previous with minimal constraints on the task or data for sentiment analysis.

IV. REFERENCES

[1] Q. Tul *et al.*, "Sentiment Analysis Using Deep Learning Techniques: A Review," *Int. J. Adv. Comput. Sci. Appl.*, 2017.

[2] O. Araque, I. Corcuera-Platas, J. F. Sánchez-Rada, and C. A. Iglesias, "Enhancing deep learning sentiment analysis with ensemble techniques in social applications," *Expert Syst. Appl.*, 2017.

[3] J. Singh, G. Singh, and R. Singh, "Optimization of sentiment analysis using machine learning classifiers," *Human-centric Comput. Inf. Sci.*, 2017.

[4] R. Arulmurugan, K. R. Sabarmathi, and H. Anandakumar, "Classification of sentence level sentiment analysis using cloud machine learning techniques," *Cluster Comput.*, 2019.

[5] A. Kumar and A. Jaiswal, "Image Sentiment Analysis Using Convolutional Neural Network," in *Advances in Intelligent Systems and Computing*, 2018.

[6] A. Chachra, P. Mehndiratta, and M. Gupta, "Sentiment analysis of text using deep convolution neural networks," in *2017 10th International Conference on Contemporary Computing, IC3 2017*, 2018.

[7] V. K. Jain, S. Kumar, and P. Mahanti, "Sentiment recognition in customer reviews using deep learning," *Int. J. Enterp. Inf. Syst.*, 2018.

[8] P. D. Mahendhiran and S. Kannimuthu, "Deep Learning Techniques for Polarity Classification in Multimodal Sentiment Analysis," *Int. J. Inf. Technol. Decis. Mak.*, 2018.

[9] S. Rani and P. Kumar, "Deep Learning Based Sentiment Analysis Using Convolution Neural Network," *Arab.*

ISSN- 2394-5125 VOL 7, ISSUE 1, 2020

J. Sci. Eng., 2019.

[10] D. Stojanovski, G. Strezoski, G. Madjarov, I. Dimitrovski, and I. Chorbev, "Deep neural network architecture for sentiment analysis and emotion identification of Twitter messages," *Multimed. Tools Appl.*, 2018.

[11] R. Kumar, H. S. Pannu, and A. K. Malhi, "Aspect-based sentiment analysis using deep networks and stochastic optimization," *Neural Comput. Appl.*, 2019.

[12] K. Chakraborty, S. Bhattacharyya, R. Bag, and A. A. Hassanien, "Sentiment Analysis on a Set of Movie Reviews Using Deep Learning Techniques," in *Social Network Analytics*, 2019.

[13] T. K. Hazra, Y. Bihani, and S. Mishra, "Sentiment learning using Twitter ideograms," in *2017 8th Industrial Automation and Electromechanical Engineering Conference, IEMECON 2017*, 2017.