

A Comparative Study of Traditional Machine Learning and Deep Learning Approaches

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Abstract: Emotional intelligence is the test of individual's evaluations, thoughts, and behaviours. This widely recognized problem is vital in enterprise and way of lifestyles. It offers many complicated researches however guarantees a first rate know-how for everybody interested in emotional assessment and social evaluation. The essential motive of this paper is to perceive emotional polarity which include appropriate, horrible and emoji instance the use of consumer opinions of numerous products. Opinion mining on e-trade web sites performs an important position in buying decisions and lets in builders to increase their products and advertising plans. However, it turns into very tough for customers to apprehend and examine the real mind of the person. This is why we want an automatic method. Most researchers have used progressive gear to make computerized drawings of line drawings. One of the well-known devices getting to know techniques is the use of help vector system (SVM). Weighted Support Vector Gadget (WSVM) is an improved model of traditional SVM for sensitivity problems and deep gaining knowledge of techniques (bidirectional encoder). Representation of Transformers and Long-Term Memory) for the assessment of desires has been organized. The take a look at effects show that the proposed WSVM and LSTM techniques carry out better in the inference method no matter the proposed model.

Keywords: Machine learning, sentiment analysis, support vector machine, opinion mining, WSVM, LSTM.

I. INTRODUCTION

Data forms the idea of choice-making in almost each organization. Most agencies have commenced out to comprehend that

analyzing and analyzing this statistics can be useful to their organization [1]. In this context, many guarantees (NLP) had been made in an enterprise to explore this

massive statistics. Emotional analysis is one of the important capabilities of NLP, wherein emotions are analyzed and labelled into first-rate or negative feelings. The maximum annoying a part of the assessment technique is identifying the information needed for training. With the increasing call for social media and the Internet, human beings are dropping their Internet education. Although such mind may have an effect on the popular future, they may be used to improve the industrial business enterprise by using improving customer delight. Many researches have been done inside the vicinity of sentiment evaluation in brand new years and have specifically focused at the analysis of large texts, such as messages and tweets. Comments represent e-book evaluation content fabric, whilst tweets are distinctive and confined to 100 and fifty characters steady with sentence. Tweets are not comments; however there are different methods to gather information. Previous studies on sentiment length have tried to correctly catalog special manufacturers of fact-checking on Twitter. These studies use stylish learning algorithms which includes Naive Bayes, Maximum Entropy, and Support Vector Machine (SVM). Nasukawa et al. [4] Presents a sentiment analyzer that extracts sentiment from net records for a subject. Gamon [5] studied

automatic sentiment evaluation of customer comments records and concluded that the features of deep linguistic evaluation frequently assist to classify humans into quarter no.

The branch of reviews is a -edged branch, which we hooked up advertising and marketing and advertising as super and terrible. In this check, we compare numerous instructional device and deep gaining knowledge of techniques for the effectiveness of institution idea in literature. The material used for this opposition is tweets in English. Our research is stratified, with facts pre-ordered the use of diverse textual content mining standards. Then, inside the 2D section, we created many garments with smart device to research info and examine techniques to clear out mind from Twitter posts into fact. The normal goal of those studies is to find out the method maximum appropriate for any character or organisation wishing to assess the emotions contained inside the facts.

III. LITERATURE SURVEY

The purpose of this study is to extract critiques and evaluations from patron opinions. Opinion mining is likewise known as opinion analysis. It is one of the most researched areas in archival research in current years. Despite the top studies,

the answers and the neighbourhood regulations have now not met the purchaser's disposal. The primary problem is inside the idea of new algorithms that manipulate the thoughts. There are many (perhaps endless) precise evidences that could translate these thoughts into conversations with humans. Some of the prevailing tasks for measuring sentiment from customer reviews are proven underneath:

Abdalgader et al. (2020) Determining sentence polarization in context dates back to the beginnings of word computing, text mining, and sentiment evaluation. Because of its vital function in determining the way of natural speech, it's miles one of the maximum tough problems facing these research. This paper offers a specific utility for the dictionary-primarily based word itself-subject polarity approach on various gadgets of human expression. In this paper, they use a version of the complete description polarity dedication method, which calculates the semantic dating among the means enlargement of the goal phrase and the association synonym growth that consisting of the synonyms of all the surrounding sentences. Or women. Content textual content. The polarity of the person speech is decided while the semantic interplay between these critical entities is obvious.

Unlike the approach for deciphering the one of kind terms as the maximum critical phrases, the approach used does no longer rely upon the estimation of marital reputation within the framework of the evaluation period. . It also relies upon on the scale of the semantic verbal exchange at the time. This has brought about quite a few researches and the use of true and fake words. This is regular with human being's know-how of remembering the overall context wherein the phrase seems. In the equal manner, you may improve the overall performance usually through joining the first step. The relative importance of poor words in a supervisor's particular context changes whilst determining his or her wondering. The presentation of the results of the achievement became executed by the usage of all of the methods of figuring out the difference lexical polarity actually for the assessment procedure, which turned into evaluated in one of a kind files of products through independent and non-prevent evaluation requirements.

D. Kwak et al. (2019), global virtual analysis plays an important function in promoting international verbal exchange between purchasers and influencing consumers. E-commerce giants who include Amazon, Flip kart and many others offer a platform for clients to enjoy

their enjoyment time and provide a clear knowledge of the overall performance of the product to the patron. In the future. It is important to research the superb or awful critiques with a purpose to extract the useful information from the various reviews. Sentiment analysis is a mathematical approach of extracting private information from text. More than 4000,000 reviews are divided into strong and susceptible evaluations by way of studying critiques in the submitted pictures. Naïve Bayes, Support Vector Machine (SVM) and Decision Tree have been used to document some of the distinctive instructions. Type assessment is completed by way of 10-fold validation. Zhao et al. (2018) Product reviews are precious belongings of goal users, helping them makes choices. For this purpose, several vote casting techniques are proposed, with the competition of the evaluation sentences being considered (for example the highest or the worst) is a nature the maximum dull layer. Recently, deep know-how has emerged as a promising approach to remedy troubles related to wondering. The network apprehended, via nature, learns a useful characteristic without human effort. However, accomplishing deep information is dependent on the size of the general mastering fabric. We are developing a

completely unique framework for in-depth evaluation of products the use of ratings.

III. PROPOSED MODEL

In this paper, we suggest getting to know sentiment-unique word embedding model for sentiment analysis from consumer reviews. The word2Vec version is used to extract the features from the customer opinions in WSVM based sentiment analysis of product opinions in E-trade sites. The proposed model trendy structure for the sentiment evaluation shown in discern.1. This version divided into three primary elements of pre-processing, characteristic extraction the use of Word2Vec model, and sentiment class using WSVM set of rules.

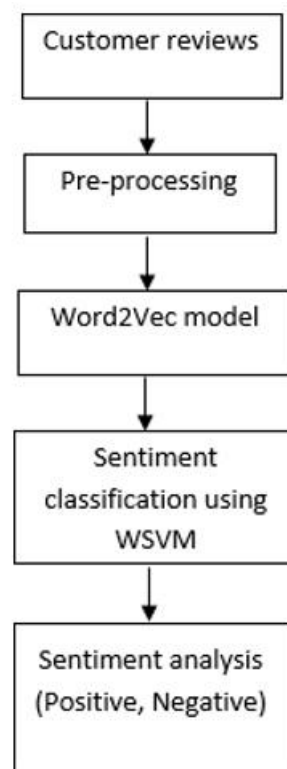


Fig.1 System architecture

A detailed description of all the steps in the proposed model flow chart is given below.

a) Pre-processing

First of all before starting on the main page. Some of the moves on this phase are carried out by way of tokenization, maintenance and instances. In tokenization, every revision is divided into smaller portions referred to as tokens or sentences. One of the first steps inside the case of folding is the dedication to update all characters within the revised textual content with a decrease quantity. Whereas, during the cleaning method, outside characters are left out, which includes symbols, numbers, and HTML code? In this observe, we do not use the stemming and filtering function due to its theoretical ineffectiveness in preceding research.

B) Feature extraction the usage of Word2Vec version after the first segment is completed; we create a vector representation of words the use of Word2Vec. First, the Word2Vec model generates training instructions. Then examine and define the vector

Illustration for each word. There are mastering algorithms in word2vec, of direction. Continuous time between phrases (CBOW) and cross-gram [46]. In

this analysis, CBOW is used. In CBOW, a phrase vector is created by predicting each matching phrase primarily based on adjoining phrases. The end result of the word vector can be reduced in size into notation form. The Word2Vec model can regularly help enhance normal class overall performance because in Wor2Vec the same sentences have matching vectors.

Algorithm 1:

Step1: Initialize $P(\text{pos}) = \frac{\text{num_popositii(positive)}}{\text{num_total_propozitii}}$

Step2: $P(\text{neg}) = \frac{\text{num_popozitii(negative)}}{\text{num_total_propozitii}}$

Step3: Convert sentences into words

for each class of {pos, neg}:

for each word in {phrase}

$P(\text{word} | \text{class}) <$

$\frac{\text{num_apartii(word} | \text{class})}{\text{num_cuv(class)} + \text{num_total_cuvinte}}$

$P(\text{class}) - P(\text{class}) * P(\text{word} | \text{class})$

Return $\max(\{P(\text{pos}), P(\text{neg})\})$

b) Sentiment classification using WSVM:

Starting with the development of the price feature, WSVM goals to growth the classification and reduce the type errors to attain fashionable accuracy. While evaluating the SVM time penalty is every day, whilst the C fee is determined and all

getting to know points are treated the same throughout the college, WSVM evaluates the time effort to decrease the effect of crucial factors (together with speech and noise). . The restricted optimization trouble is formulated as follows.

$$\text{Minimize } \Phi_w = \frac{1}{2} w^T w + C \sum_{i=1}^n W_i \epsilon_i$$

Database:

CustomerReviewTableRT

Output: *Positivereviews* $p = \{p_1, p_2, \dots\}$,

Negativereviews $n = \{n_1, n_2, n_3, \dots\}$,

ReviewR $= \{r_1, r_2, r_3 \dots \dots r_n\}$

Step1:

Dividecustomerreviewsintowords $i = \{w_1, w_2, w_3 \dots\}, i = 1, 2, \dots, n$

Step2: *if* $w_i \in RT$ *return* $+ve$ *polarity* *and* $-ve$ *polarity* *Minimize*

$$\Phi_w = \frac{1}{2} w^T w + C \sum_{i=1}^n W_i \epsilon_i$$

Step3:

Calculateoverallpolarityofaword $= \log(+ve \text{polarity}) - \log(-ve \text{polarity})$ Subject to $y_i(\langle w, \phi(x_i) \rangle + b) \geq 1 - \epsilon_i, i = 1, \dots, l, \epsilon_i \geq 0, i = 1, \dots, l$

(2)

Notice that we assign the weight W_i to the point from the x_i records inside the above formula. Hence, the formula becomes duplex.

$$W(\alpha) = \sum \alpha - 1 \sum \alpha \alpha y y K(x, x) \quad (3)$$

Step4: *Repeatstep2 untilendofthewords*

Step5: *Addthepolarityofallwordsofreviews*

i. e. totalpolarityofareviews

Step6: *Basedonthatpolarity, review canbepositiveornegative*

Step7: *Repeatstep1 untilR=NULL*

c) Long Short-Term Memory

Long-term brief-time period reminiscence (LSTM) networks are a kind of recurrent neural network (RNN) able to managing long-term expectancies. RNNs consist of a device of symmetric neuronal groups, and those recurrent gadgets have the equal structure because the non-uniform structure. LSTM gives a similar association for businesses; however, repetition has a distinctive effect. LSTM modules are broadly used for coding devices. The LSTM version architecture has 4 layers: an instruction embedding layer, an LSTM layer, a full link layer, and a sigmoid activation layer. This specially works in place of creating a random neural community.

The preparation embedding layer is a unique illustration of the practice log version. It can take snap shots of a part

of speech in a sentence and display lexical thoughts and so on. The embedding layer also defines links in different contexts.

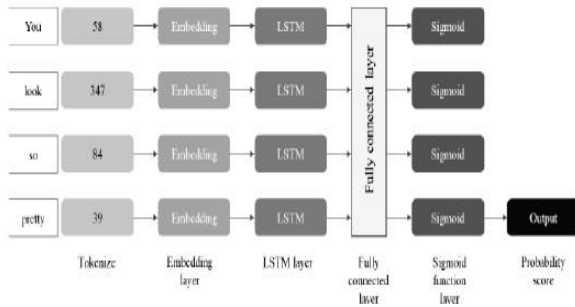


Fig.2 LSTM model architecture

The LSTM and completely connected layers are used for added duties, consisting of statement labels making the cryptographic attribute a area of expertise. RNN makes use of the encompass assertion and the previous hidden state to determine the next hidden state for every volume within the collection and each key-word inside the sentence. The mathematical equation for LSTM operations is confirmed beneath:

$$h_t = \sigma(W_i X_t + U_i h_{t-1} + b_i)$$

IV. PERFORMANCE METRICS

To evaluate and anticipated proposed version performance for sentiment analysis for purchaser opinions at the product, we are using styles of performance metrics which includes precision and remember. Here each metric has its own operation for the

estimation of proposed work overall performance.

Precision:

A Precision is a measure of how much detailed in order is given, and is the degree to which precision is applied.

$$Precision = \frac{TP}{TP + FP}$$

Recall

A recall specifies that the system is only able to retrieve relevant features and opinions.

$$Recall = \frac{TP}{TP + FN}$$

Expected Results

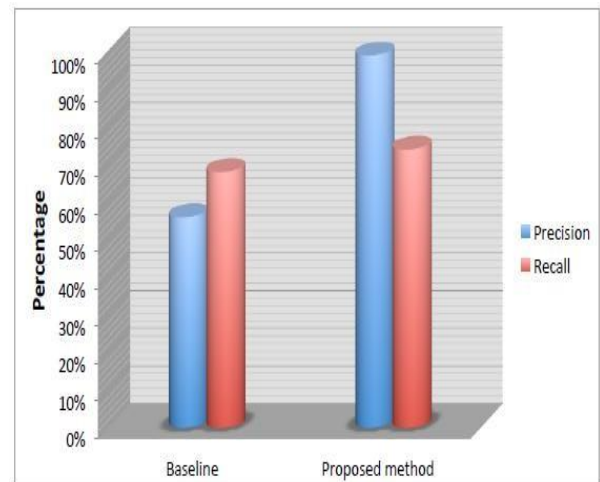


Fig.3 Feature extraction performance for proposed method

As proven within the figure three, we have taken experiment on specific products. And the precision and recall calculated for each baseline version (Existed) and the proposed version. The graph shows that the proposed version

provides better precision and don't forget quotes in percent whilst in comparison with baseline model.

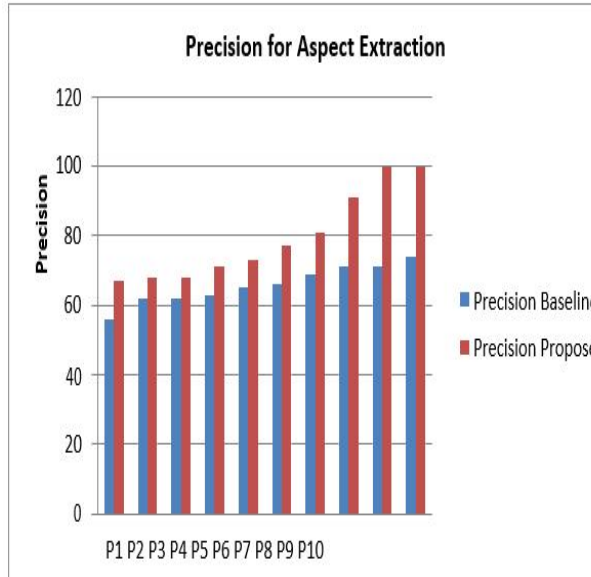


Fig.4 Precision for feature extraction of proposed method Vs Baseline

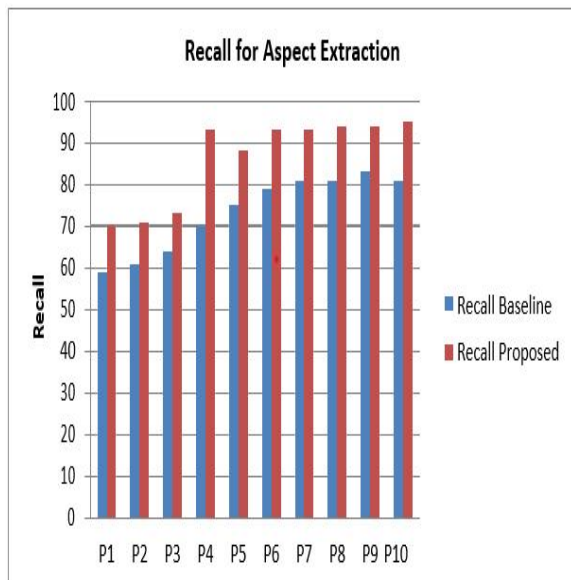


Fig.5 Recall for feature extraction of proposed method Vs Baseline

As show inside the determine four and 5 the experimental taken on the ten special merchandise and overall performance

calculated for each baseline version and proposed model. The proposed supplied higher precision and consider charges even as in contrast with baseline model.

V. CONCLUSION

In this paper, we have were given made a comparison of a selection of understanding located as well as deep reading strategies for the principle of sophistication. These techniques have been applied to the Twitter dataset to class’s sentiments efficiently. Data-pushed techniques are Weighted Support Machines (WSVM) at the same time as deep studying techniques use LSTM. We conclude that both strategies work well for organization wondering. However, the results of character classifiers on sentiment evaluation showed that BERT and LSTM can accumulate higher accuracy (9-ninety five% better) for sentiment type than SVM and Multinomial Naive Bayes. In addition, the accuracy of the assessment additionally may be stepped forward the use of fashions collectively with LSTM-fashion Gated Recurrent Units (GRU). This could be achieved inside the destiny and may enhance the accuracy of the elegance.

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