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FEATURE BASED OPINION MINING AND SENTIMENT ANALYSIS : A SURVE

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ABSTRACT

When a product is bought by the consumer, everyone thinks that what others think about this product, what other people's opinion about this product, what is the rating of this product and so on. Opinion Mining is a technique which is used to extract the reviews which are available online and classify them such as the reviews are positive, negative or neutral. Opinion mining is useful for both customers as well as manufacturers, customers can use it for taking good decisions about purchasing and manufacturers can use it by locating the area of improvement such as by reading the reviews of individuals from blogs, e-commerce sites and social networking sites. Basically opinion mining is done at three levels –sentence level, document level and feature based. Feature based opinion mining is used to reviewing the opinions for each feature of the product and then summarizing the polarity as positive negative and neutral.

Keywords: classifier, feature extraction , opinion mining, opinion summarization, sentiment analysis

I. INTRODUCTION

In the recent years, when a person buy something, he is curious to know that what other people thinks about this piece of information, what others opinions about the product which he want to buy, etc. Basically opinion mining is the best way to know the opinions, feelings and emotions of others on a product. Opinion mining is the part of web mining or we can say that opinion mining is sentiment analysis which uses text analysis and summarize the reviews available on the blogs, forums and web the main goal of opinion mining is to differentiate the emotions or feelings which is expressed in reviews and categorize them into positive, negative or neutral, which is easily understandable by users." An opinion has three main elements, i.e.

• The opinion source: author of the review

• Target of the Opinion: object or its feature

• Opinion polarity: positive or negative

All of these elements are vital for opinion identification.

Opinion mining is the problem of recognizing the expressed opinion on a particular subject and determining the polarity of an opinion"[1]. Sentiment Analysis (Opinion Mining) is the process of detecting the contextual polarity of twitter posts, News, Blog and some other text articles. In other words, it determines whether a piece of writing is positive, negative or neutral. An alternative term is opinion mining, as it derives the opinion, or the attitude of tweet. A common use case for this technology is to discover how people feel about a particular topic.

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Sentiment analysis is one field of NLP which is attracting great attention from researchers. News and blogs are usually good sources of data for sentiment analysis, wherein people can express their thoughts and opinions on such forums.

II. LEVELS OF OPINION MINING

Opinion mining is categorized into three levels-

Document level-

In the document level opinion mining, the whole opinion is treated as a paragraph or document and th

polarity of paragraph is checked as positive, negative and neutral.

Sentence level-

In the sentence level opinion mining, the whole opinion is divided into sentence-by-sentence and then the polarity of each sentence is checked as positive, negative and neutral. After that, the total result is summarized up.

Feature level –

In the feature based opinion mining, firstly the features are extracted from the reviews and after that the polarity of opinions based on that particular feature is checked as positive, negative and neutral. Due to this, we can find that which features are liked or disliked by the peoples.

Mainly, in this paper we focus on the feature based opinion mining. Feature-level opinion mining is the extraction of people's opinions on particular feature of the product. sometimes, people uses the different words or synonyms to represent the same feature so, to make the summarization of opinions easy, we have to grouped the synonyms into one feature group. Three tasks of feature based opinion mining are

1. Identify and extract the product features F that have been commented on by an opinion holder.
2. Determine whether the opinions on a particular features are positive, negative and neutral.
3. Group features synonyms.

In this feature based opinion mining some features are explicitly defined while others are implicitly defined which are

based on emotions, using slangs and short-hands, due to this the relationship between the features and opinions becomes complex After summarizing the opinions, it becomes easy for peoples to gathering useful reviews on a product.

II. APPLICATIONS

Sentiment analysis is receiving an increasingly growing interest from the natural language processing community, which is particularly motivated by the wide-spread need for opinion based applications, such as product reviews, entity tracking and analysis and opinion summarization. Sentiment mining has become a useful tool for the commercial activities of both companies and individual consumers. They want to sort out opinions about products, services, or brands that are scattered in online texts such as product review articles or forums[2]. In the following paragraphs we sum up a few important applications of sentiment analysis.

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a) Sentiment analysis can be used for determining critics' opinions about a given producst by classifying online product reviews from websites such as Amazon and C/Net, RottenTomatoes.com and IMDb, and can also prove very helpful for opinion oriented questions in question answering.

b) Tracking the shifting attitudes of the general public toward a political candidate by mining online forums is also a useful application. It can furthermore be used to alert customer services of dissatisfied customers that utter their frustrations on forums or discussion boards. Tracking trends of bloggers is also becoming a valued research field, since it can be used for research in trends or consumer preferences.

c) Sentiment analysis can also be helpful for recommendation systems, since those systems should not recommend something that receives negative feedback, and for the development of new kinds of search engines.

d) The detection of "flames", overly heated or antagonistic language, in e-mails or on social networking websites will also benefit from sentiment classification. Monitoring newsgroups and forums, where fast and automatic detection of flaming is necessary, will also see spectacular improvements.

e) Sentiment analysis that is becoming hugely necessary is that of opinion spam detection. While e-mail and Web spam are quite familiar, opinion spam is still new to the genral public. Because of the enormous growth of user-generated content on the Web, it is now a common practice for people to find and read other's opinions. Opinion spam refers to human activities that try to deliberately mislead readers or automated opinion mining systems by giving undeserving positive opinions to some target objects and/or by giving unjust, malicious or false negative opinions to other objects.

III. CHALLENGES

There are various Challenges which are explained below:

A. A word may have different meaning in different contexts. It gets difficult to understand that in which context a word has been used [3].

B. Sometimes people express their opinions by using informal language, based on emotions, by using slangs and short-hands which are harder to detect.

C. One of the biggest problems in the field of Computational Linguistics is ambiguity. There are three areas in which we have to solve ambiguity [4]:

- Semantically,
- Lexically and
- Syntactically ambiguous text.

D. Another problem is inference, the process of drawing conclusions by applying certain clues to observations or hypotheses. Inference has been a popular field of research, and applications such as expert systems and business rule engines have followed

E. Sometimes a lot of fake or spam reviews are available online which are harder to find out.

F. Domain-independence is one of the biggest problems in machine learning and classification. A carefully selected feature set can produce very high accuracies for a certain corpus, but perform very poorly when applied to another kind of corpus. Finding innovative and effective approaches to overcome this problem is a valued research field.

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IV. RELATED WORK

Over the past couple of years, many papers, books and dissertations have been written about opinion mining. While some researchers focus on more specific tasks such as finding the sentiments of words, subjective expressions, subjectivity clues etc. as

WojciechGryc, and KaroMoilanen et. al. (2014) [5] In this paper, automatic computational analysis and categorization of political texts with respect to the rich array of personal sentiments, opinions, stances, and political orientations expressed in polarized political discourse. This study focuses on political blog analysis and draws on a corpus of 2.8 million blog posts by 16,741 bloggers crawled between April 2008 and May 2009. We focus on modeling blogosphere sentiment centered around Barack Obama during the 2008 U.S. presidential election, and describe a series of initial sentiment classification experiments on a data set of 700 crowd-sourced posts labeled as 'positive', 'negative', 'neutral', or 'not applicable' with respect to Obama. Our approach employs a hybrid machine learning and logic-based framework which operates along three distinct levels of analysis encompassing standard shallow document classification, deep linguistic multi-entity sentiment analysis and scoring, and social network modeling.

Hassan Saif ,Yulan He et. al. (2014) [6] In this paper, most existing approaches to Twitter sentiment analysis assume that sentiment is explicitly expressed through affective words. Nevertheless, sentiment is often implicitly expressed via latent semantic relations, patterns and dependencies among words in tweets. In this paper, we propose a novel approach that automatically captures patterns of words of similar contextual semantics and sentiment in tweets. Unlike previous work on sentiment pattern extraction, our proposed approach does not rely on external and fixed sets of syntactical templates/ patterns, nor requires deep analyses of the syntactic structure of sentences in tweets. A paper is developed with tweet- and entity-level sentiment analysis tasks by using the extracted semantic patterns as classification features in both tasks. We use 9 Twitter datasets in our evaluation and compare the performance of our patterns against 6 state-of-the-art baselines. Results show that our patterns consistently outperform all other baselines on all datasets by 2.19% at the tweet-level and 7.5% at the entity-level in average F-measure.

Li Dong, Furu Wei, et. al. (2014) [7] In this paper, recursive neural models have achieved promising results in many natural language processing tasks. The main difference among these models lies in the composition function, i.e., how to obtain the vector representation for a phrase or sentence using the representations of words it contains. This paper introduces a novel Adaptive Multi-Compositionality (AdaMC) layer to recursive neural models. The basic idea is to use more than one composition function
and adaptively select them depending on the input vectors. This paper present a general framework to model each semantic composition as a distribution over these composition functions. The composition functions and parameters used for adaptive selection are learned jointly from data. This paper integrate AdaMC into existing recursive neural models and conduct extensive experiments on the Stanford Sentiment Treebank. The results

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illustrate that AdaMC significantly outperforms state-of-the-art sentiment classification methods. It helps push the best accuracy of sentence-level negative/positive classification from 85.4% up to 88.5%.

FangtaoLi , Sheng Wang et. al (2014) [8] In this paper, probabilistic topic models have been widely used for sentiment analysis. Our proposed method uses the tensor outer product of text topic proportion vector, user latent factor and item latent factor to model the sentiment label generalization. In this paper, we propose a novel supervised user-item based topic model, which can simultaneously model the textual topics and user-item latent factors for sentiment analysis. This model can be considered as integration between supervised LDA (sLDA) and Probabilistic Matrix Factorization (PMF). The sentiment label is generated by the tensor outer product of user latent factor, item latent factor and textual topic proportion vector.

LinhongZhu , Aram Galstyan et. al (2014) [9] In this paper, we study that there has been a significant growth in the use of social media platforms such as Twitter. Spurred by that growth, companies, advertisers, and political campaigners are seeking ways to analyze the sentiments of users. We proposed a novel tri-clustering framework, making use of mutual dependency among features, tweets and users. An analytical algorithm with fast convergence to solve the proposed objective function in the offline tri-clustering framework is developed. We further investigated how the proposed framework can be extended to online setting by considering the dynamic evolution of features and sentiments of users.

Lei Zhang, Riddhiman Ghosh et. al (2015) [10] In this paper, with the booming of micro blogs on the Web, people have begun to express their opinions on a wide variety of topics on Twitter and other similar services. Sentiment analysis on entities (e.g., products, organizations, people, etc.) in tweets (posts on Twitter) thus becomes a rapid and effective way of gauging public opinion for business marketing or social studies. However, Twitter's unique characteristics give rise to new problems for current sentiment analysis methods, which originally focused on large opinionated corpora such as product reviews. In this paper, we propose a new entity-level sentiment analysis method for Twitter. The method first adopts a lexicon based approach to perform entity-level sentiment analysis. The unique characteristics of Twitter data pose new problems for current lexicon-based and learning-based sentiment analysis approaches. In this paper, a novel method is proposed to deal with the problems. An augmented lexicon-based method specific to the Twitter data was first applied to perform sentiment analysis.

MACHINE LEARNING TECHNIQUES

Model	Concept	Extensions	Accuracy	Advantage	Disadvantage

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SVM(support vector machine)	**Based on decision plane that defines the boundaries of decision.**	**1-Soft Margin 2-Non Linear 3-Multi Class Su**	**With unigram 82.9%**	**1-Low dependencies on data set 2-good for experimental result**	**1-Reads preprocessing for missing values 2-Interpretation is difficult**
MLP(Multilayer perception	**In this 1 or N layer exist for input or output. Also called feed forward neural network**	**2 phase 1-forward phase input layer to output layer 2-Change the weight and bias value error**	**84.25 % - 89.50%**	**1-Act as a universal function 2-Can learn each relationship**	**1-Needs more time for execution 2-Considerd as a complex black box**
Naïve Bayes Classifier	**For 2 event conditional prob.- P(e1/e2)= P(e2/e1)P(e1)/e2**	**Used Accuracy Precision Recall Relevance**	**Got 0.79939 accuracy.**	**1-Easy to implement. 2-Efficient computation.**	**Assumptions of attributes being independent which may not be necessarily valid.**

V. PROPOSED METHODOLOGY

In this research methodology , the opinions of movie reviews are mined on the bases of optimal features and SVM(Support

Vector Machine) classifier. The support vector machine has been developed as robust tool for classification and regression in noisy, complex domains. The two main features which are used by support vector machine are generalization theory and kernel functions. In this we will do the improvement of the support vector machine technique by removing noise from the data sets and increase the efficiency of this technique. The proposed methodology is easily explained by the following block diagram as shown in figure 1.

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A. DATASET

Firstly, the dataset is collected from different websites such as blogs, social networking sites, e-commerce sites etc. The database for movie reviews is online available on KDD-UCI (Knowledge Discovery Database) dataset, from where we can collect the database easily.

B. PRE-PROCESSING

After the database is collected, pre-processing of the stored data is done. It removes the unnecessary information from the downloaded data. Basically pre-processing is done to speed-up the flow of process.

The pre-processing approaches are:-

1. **Stemming**-. Stemming process removes the prefixes and suffixes from the given words in English, and convert the words into base word. For example, organize, organizes, organizing etc. are stemmed to the base word, 'organis'.
2. **Stopping-** A stop-word list is maintained to perform stopping. Stop-word list contains the prepositions (e.g. beside, in, on) and determiners (e.g. a, an, the) etc. Stopping is the process of removing the most common words according to a stop-word list to decrease the size of document.

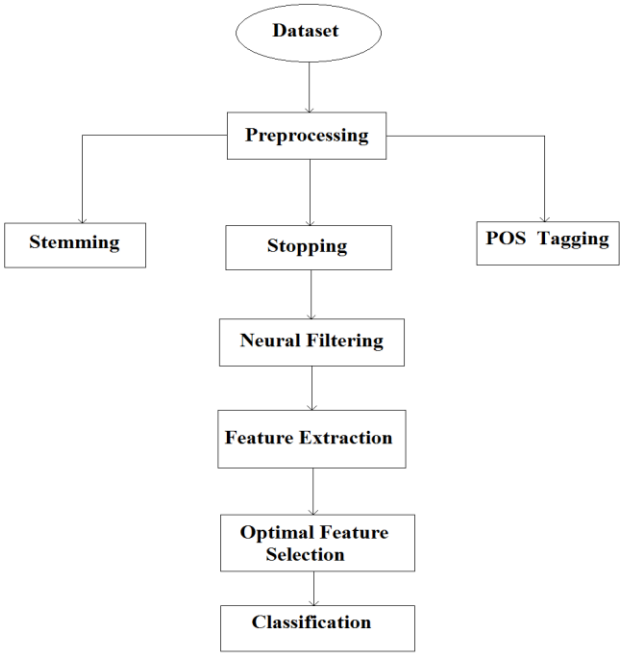

Figure 1: Proposed Methodology

3. Part of Speech Tagging- It is a preprocessing technique which is used to read the text documents and marks a particular part of speech to each word such as nouns, pronouns, verbs, adverbs etc. for example, the text "I love my India" will be tagged as "I(LS-List item maker) love(NN-Noun) my(PRP-Personal Pronoun) India(NN-Noun)".

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C. NEURAL FILTERING

Neural filtering focuses on the tagged words which are nouns or adjectives. For each noun and adjective word, the sentiment score is calculated according to Senti-Word-Net dictionary and the words whose score is neutral or 0 are filtered or neglected. By filtering the words which have neutral or 0 score , the time efficiency will increases as size decreases.

D. FEATURE EXTRACTION

After the preprocessing and neural filtering phase, the feature extraction is analyzed. Feature extraction is used to examine the data to find out the common detectable patterns that influence the polarity of document. These examined features are-

Positive Sentiment Words- The words which have a positive sentiment score according to SentiWordNet dictionary. For example, wonderful, best etc.

Positive Sentiment Bi-grams- The two consecutive words and both of them have the positive sentiment score according to the SentiWordNet dictionary. For example, "enjoying and mind-blowing".

Positive Sentiment Words with Adjective- In this the positive sentiments words are coupled with adjective. For example, "An amazing well-scripted story" .

Negative Sentiment Words- The words which have negative sentiment score according to the SentiWordNet dictionary. For example, dirty, unpleasant, terrible etc.

Negative Sentiment Bi-grams- The two consecutive words and both of them have the negative sentiment score according to the SentiWordNet dictionary. For example, "sulky and boring" .

Negative Sentiment Words with Adjective- In this the positive sentiments words are coupled with adjective. For example," A gloomy weak-scripted story" .

E. OPTIMAL FEATURE EXTRACTION

Optimal feature extraction is used to reduce the large dataset of feature extraction. For this technique a **chi-square method** is used. A chi-square method is a statistical method which is used to relate the perceived data with the data we expected to acquire or get. In this method, the expected data is subtracted from the perceived data then by taking square of it and by dividing expected data of all categories we can calculate the chi-square statistics.

F.CLASSIFICATION

Classification is the implementation of an algorithm. In this, we create our result table, in which we define the reviews of the different classifiers such as Decision Tree, Random Forest, Naive Bayes, K-Nearest Neighbor etc. The classification which we used in our proposed methodology is implemented to increase the accuracy level of online movie reviews.

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VI. CONCLUSION

Feature based opinion mining is useful for both customer as well as manufacturer. Customers can use it for making good decisions about purchasing and manufacturer can use it by locating the area of improvement such as by reading the reviews of individuals. The performance of feature based opinion mining is measured by precision, recall and accuracy. We will increase the accuracy of feature based opinion mining by providing a mechanism for fake or spam opinion detection. The proposed work is focused on the improvement of the support vector machine technique by removing noise from the data sets and increase the efficiency of mining techniques.

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