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Opinion Mining on Social Reviews- A Survey

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ABSTRACT: Social networking site have become a part of life of the users and many other social networking sites are emerging nowadays. In some of the social networking sits such as Face book and twitter, users express their emotion, share some information with friends and also put their views on the products. Opinion Mining (OP) is an ongoing studies discipline in text mining. Sentiment Analysis is a kind of natural language processing that identifies the emotion of the public approximately a distinct brand. Sentiment Analysis is broadly applied to feedbacks and social networking sites for a spread of applications, from retailing to client service. The primary focus of the survey is to find such a technique that effectively performs sentiment analysis on the data sets. A technique will be used to categorize the text as positive, negative and neutral in a rapid and detailed manner.

KEYWORDS: Sentiment Analysis; Opinion Mining; Natural Language Processing; Aspect Based Opinion Mining, Sentiment Classification Techniques.

I. INTRODUCTION

Data Mining is one of the interesting fields; its aim is to retrieve the useful information from the chunk of database. There are many streams in the data mining one of the stream is opinion mining. Opinion mining is not a new trend; in earlier days people used to communicate with each other and get the opinion. Opinion mining refers to a use of natural language processing that analysis the public's opinions, sentiments and thought towards the associate object or a specific product. The objects can be corresponded to a peoples, topics or events. The topic is possibly lined by the feedbacks. The OM and SA two expressions are compatible. Opinion mining analyzes and extracts public's opinion concerning an object where as the sentiment expressed in an every text is identified by sentiment analysis and then analyzed. The objective of SA is to search out viewpoints, and establish feelings that specify and segregate the polarity.

Opinion Mining can be deliberated as a categorization process. The classification levels in SA are Document Level, Sentence Level, and Aspect-Level. Document level Sentiment Analysis classifies the opinionated document as positive or negative opinions. It considers complete document as a one data unit. Sentence level Sentiment Analysis classifies sentiment expressed in every sentence. The primary step involves identifying if the sentence is subjective or objective. Aspect level sentiment analysis classifies the sentiment with regard to the entities of particular aspect.

Lexicon Based Approach, Machine Learning Approach and Hybrid Approach are the sentiment classification techniques. The Lexicon-based approach depends on a sentiment lexicon, which is a set of precompiled and known sentiment terms. Lexicon-based approach is than fragmented into corpus-based and dictionary-based technique which uses semantic or statistical procedure to encounter the sentiment polarity. The ML algorithms are applied to the machine learning approach which makes use of the semantic characteristics. The combination of above two approaches is the hybrid approach. It is very common with sentiment lexicons which play a key role in most of the methods. Machine Learning approach can be branched into supervised and unsupervised learning method. The large number of labeled training documents is used by the supervised method. Naive Bayes Classifier, Support Vector Machine, Maximum Entropy and Neural Networks are some of the supervised classifiers. When it is difficult to find the labeled training document unsupervised method is used. Building Resources (BR), Emotion Detection(ED), and Transfer Learning (TL) are the fields in SA which is attracting the researches in the recent year. Building Resources intents at creating corpora, lexica in which based on their polarity opinion expressions are annotated, and in some cases as dictionaries. Emotion Detection extract and analyze emotions, the emotions in the sentences can be implicit or explicit. The data from one domain is analyzed and then used the results in target domain is called cross domain classification or Transfer Learning.



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II. LITERATURE SURVEY

This section deals with the literature of aspect-based opinion mining approaches and analyses of these approaches.

Naveen Kumar Laskari, Suresh Kumar Sanampudi [1] has given a brief introduction about aspect based opinion mining. Sentiment analysis or opinion mining is becoming an important task both from commercial and academics standpoint. The opinion is evaluated to its positivity, negativity and neutrality with respect to the complete object or document in sentiment analysis process. But for many applications this level of analysis does not provide the necessary information. Aspect -based sentiment analysis introduces a set of problems which requires deeper knowledge of NLP and also generates rich sets of results. The work is divided into two phases. Phase-1 extraction of aspect terms into aspect categories. In phase-2 identification of polarity of the aspect terms and polarity of the aspect categories of each sentence. These phases are divided into four sub tasks namely Aspect Term Extraction (ATE), Aspect Term Polarity (ATP), Aspect Category Detection (ACD), Aspect Category Polarity (ACP). Here the current work is done as a part of the aspect based sentiment analysis by annotation process for specific to a particular application. The limitation is researchers could not able to apply methods across all the data sets, because of not matching of aspect words in cross domain framework has not been defined. A framework can be designed for Aspect Based Sentiment Analysis through which sentiment analysis can be done for any domain data sets. So for most of the work carried out with respect to Opinion Mining and Aspect Based Sentiment Analysis with machine learning techniques only, moreover Deep Learning is becoming a prominent area for the research. Deep learning techniques can be implemented towards the Sentiment Analysis and Aspect Based Sentiment Analysis.

Wala Medhat, Ahmed Hassan, Hoda Korashy [2] has given extensive analysis of the latest updates in the sentiment analysis field. The fields relating to the SA techniques are explained such as transfer learning, emotion detection, and building resources which are drawing the attention of the researchers in the recent years. The central objective of this survey paper is to give complete image of SA techniques and the fields related to the SA technique. It also aims to give the sophisticated categorization of a vast number of current articles and the explanations of the current trends of the research in the sentiment analysis; it also presents an analysis of the SA algorithms as well as the applications. Benchmark data sets specifically in reviews like IMDB which have been used for the algorithm evaluation is also discussed.

The conceptual model for sentiment analysis is given by Bing Liu and Lei Zhang [3] which formulates the difficulties, and produces a common framework to consolidate the distinctive research directions. The broadly studied topics of sentiment and subjective classification are analyzed, which conclude whether a report or sentence is assertive, and whether it accomplishes a positive or negative aspect. The full powers of the abstract model that achieve the feature based sentiment analysis are discussed. The issue of determining the comparative sentences is briefly introduced. At last in this paper, they explained the aspect spam that is progressively becoming a significant problem as more number of people is liable to the viewpoints on the social networking sites for decision making. They also explained some of the basic algorithms and conclude that all the sentiment analysis tasks are very challenging.

Chinsha T C, Shibily Joseph [4] the main aim of their work was to mine opinions at aspect level. The goal of aspect opinion mining algorithm is to detect aspect words, aspect opinion and their sentiment orientation. For opinion mining process they have used aggregate score of opinion lexicon, syntactic dependency, SentiWordNet as well as aspect table. The aspect based opinion mining for restaurant reviews, was the main focus of their work and automatically finds the important aspect and opinion of a restaurant by analyzing the reviews, sentiment profile of each restaurant is created which is then used by the traveler to correlate and select the restaurant at a specific place. SentiWordNet is a two word idioms and semantic rules together for opinion mining which a distinct approach is proposed for sentiment analysis. The limitation of their work is only explicit aspects are deliberated and word sense disambiguation is avoided. The various types of sentences like conditional, comparative sentences in order to enhance the efficiency of opinion mining is the later work included in their research.

Sentiment Analysis is addressed as a broad range of field in natural language processing, computational linguistic and text mining according to Mostafa Karamibekr, Ali A. Ghorbani [5]. They have focused on the classification of sentiments in social networking sites. The two main approaches are Bag of words (BOW) and Feature Based Sentiment (FBS). For social issues they have developed a verb oriented approach. The algorithm for sentiment calculation of a document, isolating as well as measuring an opinion structure, sentiment calculation of an opinion structure have been proposed. In two ways they have shipped out their work. A statistical study on the difference between products to gather with their services and social problems are conducted at first. Second, they proposed a mechanism for opinion



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mining on social issues. Improving accuracy using the different methods is the future work. They planned to work more on a new sentiment analysis tools.

Wei Yen Chong, Bhawani Selvaretnam, and Lay-Ki Soon [6] presented the initial study on sentiment analysis by using the tweeter data sets. Their study was to design a model which extracts emotions located in the subjects of the tweeter data sets. Sentiments are detected based on specific subject using Natural Language Processing techniques. The research is carried out in three steps namely subjectivity classification, semantic association and also classification of the polarity. To describe the linguistic connection over sentiment lexicon and subjects the experiments requires the lexicon. By evaluating emotions in the lexicon which are associated to the subjects the polarity of tweets are classified. One of the limitations in the preprocessing is, the disorganized tweets have to be converted into proper sentences, which is quite difficult and also not effective and moreover large amount of training data is required.

Chetan Kaushik and Atul Mishra [7] found a technique which can easily accomplish the opinion mining on huge data sets. The positivity, negativity as well as the neutrality of a document is classified using a technique which can perform in a speedy and authentic manner. The polarity score is calculated using the algorithm. The hash tags are introduced to extract the sentiments from the emotion which is an extensible and feasible lexicon based approach. This approach achieved good speed and efficiency, but it cannot scale the huge data sets for better performance. The target of their work is to perform opinion mining rapidly so the huge data sets can be handled efficiently. The work is explained by presenting a technique which increases the efficiency at dealing with the issues like circumvent expressions and implicit sentiments which still needs to be resolved.

Alessia D'Andrea, Fernando Ferri, Patrizia Grifoni and Tiziana Guzzo [8] presented a various approaches used in the sentiment classification as well as the various tools used for the analysis of the sentiments. The techniques are classified (1) with respect to features and also on the advantages/limitations (2) tools are classified on the basis of various techniques used for analysis of the sentiments. The steps used in the classification of sentiments are also presented in their work. The sentiment polarity is predicted by employing machine learning mechanism. The widely utilized tool for recognizing the polarity of the feelings is deliberated in their work. The different approaches and tools analyzed can be applied in different fields. The forthcoming challenge is to employ the classification approaches and tools for the reviews in the decision forms and to overwhelm the uncertainty which corresponds to a specific situation.

Ms Kranti Ghag and Dr. Ketan Shah [9] have discussed the various techniques used to carry out the sentiment analysis which does not use the lexicon for recognition of polarity. The tagged reviews which are nothing but the training sets are not used. A study on various approaches in sentiment analysis is displayed in the paper. The analyzed approach is then distinguished with respect to the use of lexicon, language dependency along with prerequisite of training set. The techniques are summarized and also analyzed. The common disputes is encountered and discussed. But the major challenge is generalized dynamic features vector construction. Majorly sentiment analyzers are language dependent among surveyed techniques. The existing techniques are not generalized enough to be language independent. There is a need to work towards a generalized sentiment analyzer, without the training data set. Language generalization and handling negation are major challenges.

Stefano Baccianella, Andrea Esuli, and Fabrizio Sebastiani [10] have presented a lexical resources SentiWordNet3.0 explicitly devised for supporting opinion mining and sentiment classification application. The SentiWordNet3.0 is an improved version of SentiWordNet1.0 it is a lexical resources publicly available, but now it is permitted to use for the research purposes including a varieties of a research projects in all over the world. They have mainly focused on SentiWordNet3.0. The short history about SentiWordNet and the four distinct forms of SentiWord Net the steps and process involved in generating SentiWordNet are discussed. The effect brought by estimating SentiWordNet3.0 in contrast to a fragment of WordNet3.0 is stated. The precision is achieved for about 20% by using the SentiWordNet1.0. Senti-Lexi has been proposed by G. Vaitheeswaran and L. Arockiam [11] to provide a better accuracy. They have applied the proposed method on the twitter data sets. The Senti-Lexi based approach is used to compute the sentiment knowledge on tweets by using lexicon based approach. The smiley's are emotions change the polarity of the sentences. The polarity calculations are used to enhance the emotions. The existing sentiment dictionary was built with the unigram pattern. One of the issues is, it is difficult to find polarity of the sentiment word with bigram patterns that has a negation word. To solve these issues, they built three new dictionaries for the proposed work. They are as follows: Emotion dictionary, Sentiment dictionary and Negation dictionary. To gain the better accuracy they included the unigrams and bigrams along with the emotions. They presented a unique lexicon based model for analyzing the sentiments on a tweet. The methodology diagram discussed delivers a big picture for data. To provide the better accuracy then the existing work, a new approach Senti-Lexi along with emotion and negation text has been introduced.



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By adding emotions to the proposed approach an 8% increase in accuracy is resulted. The disadvantage is when the positive emotions are expressed along with the negative statement it resulted in the bad polarity of the sentences. So it creates the context dependent problem between words and emotions. By considering and solving the context dependency problem in sentiment analysis results in better accuracy.

III. METHODOLOGY

The survey methodology consists of the detailed definition to the FS and SC algorithms.

A. FEATURE SELECTION IN SENTIMENT CLASSIFICATION

Sentiment analysis work is treated has a sentiment classification problem. The first step involves selecting and extracting the features. The present features are as follows:

- a. Frequency and Terms presence:** The features are individual word n-grams with their frequency counts.
- b. Parts of speech:** The identification of nouns, verbs, adjectives, adverbs, etc since they are significant indicators of reviews.
- c. Phrases and Opinion words:** Words like pleasant or unpleasant, positive or negative as well as hate or like are greatly used to articulate the opinions. Without using the opinion words some phrases deliberates opinion.

B. FEATURE SELECTION METHOD

Lexicon-based and statistical methods are Feature selection method. The lexicon based method starts with a tiny set of 'seed' words again they bootstrap the set through on-line resources or synonym detection to get a larger lexicon. The document is treated, as a string which retains the series of text in the report or either as group of words. Stemming and removing of stop-words are commonly used feature selection process. The most used statistical methods in FS are Latent semantic Indexing (LSI), Chi-square, and Point-wise Mutual Information (PMI).

C. SENTIMENT CLASSIFICATION TECHNIQUES

It can be split into, lexicon based approach, machine learning approach and hybrid approach. The Lexicon-based approach depends on a sentiment lexicon, which is a set of precompiled and known sentiment terms. Lexicon-based approach is then fragmented into corpus-based and dictionary-based technique which uses semantic or statistical procedure to encounter the sentiment polarity. The ML algorithms are applied to the machine learning approach which makes use of the lexical features. The combination of above two approaches is the hybrid approach. It is very common with sentiment lexicons which play a key role in most of the design. Machine Learning approach can be branched into two sorts: supervised and unsupervised learning method. The huge amount of labeled training archive is used by the supervised method. Unsupervised approaches are helpful when it is challenging to search the labeled training document. Lexicon based approach relies on searching the opinion lexicon because it is used to analyze the text. Dictionary-based and Corpus-based approaches are the two methods in Lexicon based approach. Dictionary-based approach relies on discovering the opinion seed words, and then searches for the glossary of their synonyms and antonyms. Corpus -based approach starts with a seed list of opinion phrase, as well as in a huge corpus it searches for other opinion phrases in order to find the opinion phrase with respect to context specific orientation.

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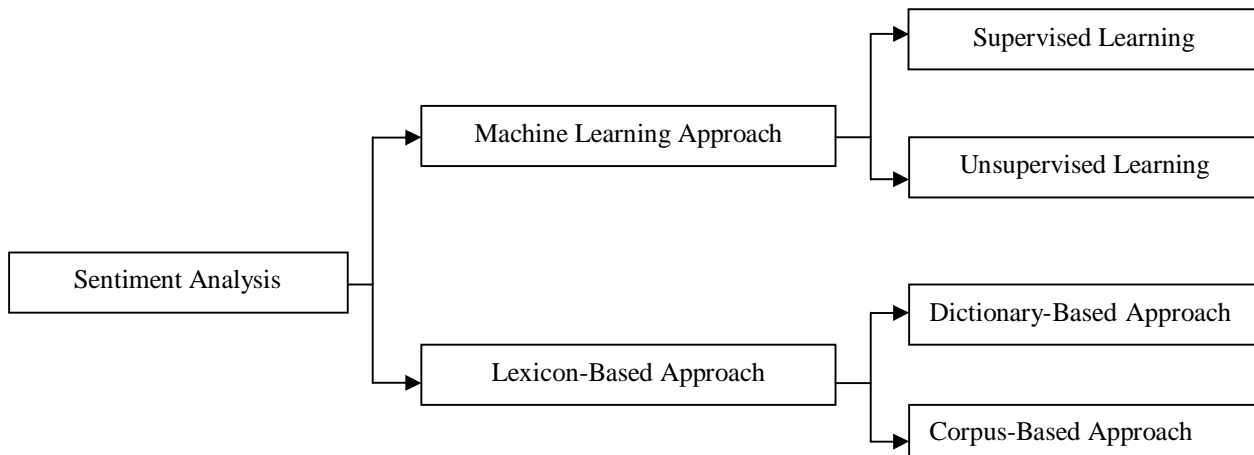


Figure 1 Sentiment Classification Techniques

i. Machine Learning Approach:

It includes machine learning algorithm to deduce, the sentiment by training on a familiar dataset. This approach to sentiment classification is supervised and permits effective text classification. Machine learning classification necessitates two different sets of documents, specifically for training as well as testing. Automatic document classification employs the training data set in order to find out and differentiate attributes of documents and a test set is used to check the performance of the automatic document classification. There are many machine learning techniques are accepted to segregate the opinions. Naive Bayes classifier, Support Vector Machine (SVM), Maximum Entropy as well as Artificial Neural Networks (ANN) are some of Machine learning techniques that are used to achieve the great success in text categorization.

A. Naive Bayes Classifier:

In Machine Learning, it belongs to a group of probabilistic classifier which is based on employing the Bayes theorem. It describes supervised learning process and also statistical process for analysis. The classifier is able to fix diagnostic and predictive dilemma. This classification is named after Thomas Bayes, who proposed Bayes theorem. It is baseline classification algorithm. It considers that the classes for classification are independent. Bayesian classification produces pragmatic learning algorithms along with prior knowledge to aggregate the observed data. It provides a helpful context for compassionating and evaluating many learning algorithms.

B. Maximum Entropy Classifiers:

One more important classifier is the Max Entropy Classifier. The idea behind this classifier is that it should choose the best systematic models that gratify the inclined constraints. These are aspect based models. The attributes are used to trace the dissemination over distinct category by using the logistic regression. These models are also known as Gibbs, log-linear, exponential and multinomial logic models, that implements a machine learning technique for prediction and classification which has been strongly enforced to the areas that computes vision and economic science. In NLP the ME techniques are used for sentence boundary detection, part of speech tagging, parse selection, ambiguous name resolution and also for stochastic attribute-value grammars.

C. Support Vector Machine:

It is a supervised learning approach with several suitable qualities which makes it a seductive algorithm. It accomplish classification more exactly than most of the other algorithms in certain applications. The SVM is referred as the accurate method for text classification in several studies. It is linear learning method that discovers an optimal hyper-plane to isolate two classes. As a supervised classification approach SVM attempt to maximize the size to the adjacent training point from one or the other class in request to conclude better generalization/classification efficiency on test data.



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D. Artificial Neural Network:

The features from the linear combinations of input data are acquired, and next the output is modeled as a non linear function which is the main concept of neural network. It is generally depicted by a network diagram that is composed of nodes aliened by directed link networks. Nodes are constituted in the form of layers. The neural network subsist of three layers an input layer, a hidden layer as well as an output layer of the nodes in most of the neural network structure. Since the nodes are linked to one direction is called as a feed-forward network. Every connection has an associated density, whose charge is predicted by reducing an overall error function in a gradient descent preparation procedure.

ii. Lexicon Based Approach:

Lexicon based approach deals with computation of sentiment polarity for input text using opinion orientation and subjectivity of the text. This approach calculates sentiment polarity for the reviews. It mostly works on the precondition in which polarity of an archive or else any of the clauses is the total of polarities of the distinctive phrases as well as words. It is cleft into dictionary based and corpus-based approaches. Corpus-based approach is branched into Statistical and Semantic methods.

A. Dictionary-Based Approach:

Utilizing a dictionary to consolidate the sentiment words is a straightforward means as most of the dictionaries (e.g. Word Net) list analogues and antonyms for a specific word. So the easy procedure which is adopted in this approach is to use a few seed sentiment words to bootstrap based on the analogue and antonyms framework of a lexicon. The method works in the following ways: A limited set of sentiment words (seeds) with known positive and negative orientation is aggregated first automatically. Then by finding in the Word Net for their respective analogues and antonyms the algorithm produces a set. The newly constructed words are aggregated to the list of seeds. Then the next iteration is processed. When no more new words can be constructed then the process ends.

B. Corpus-Based Approach:

The two main sequences were the corpus-based approach is applied are as follows: (a). A list of seed of known sentiment words are given, other sentiment words as well as their orientation from the domain corpus is identified (b). The sentiment lexicon is adapted to new one by utilizing the domain corpus for sentiment analysis operations in the domain. One of the complicated issues is, when building a rule for particular sentiment dictionary, over the same domain the same word can be positive from one context but it can be negative in another. If a large corpus is accessible then this approach is used to build a sentiment dictionary. The Statistical and Semantic methods are the two branches of corpus-based approach. In Statistical approach the word occurrence frequency is studied in a large annotated corpus of the text in order to recognize the polarities of the words. Among the positive text, if the word occurs more repeatedly then the polarity is recognized as positive. If the word occurs more frequently among the negative text, then the polarity is identified as negative. The sentiment values are directly given by the semantic approach. The word similarity is computed by relying on the different principal. For the semantically close words it also gives the similar sentiment values. To calculate the sentiment polarities between the words Word Net supports distinct kinds of semantic relationships.

IV. CONCLUSION

The comprehensive summary of the last updates in the sentiment analysis is explained in the survey paper. In the survey several recently proposed algorithms improvement and numerous reserve applications, square measure are investigated and conferred in brief. The survey paper is categorized based on the contributions within the numerous SA techniques. The data's are used from the different blogs and forums in the SA. The media information plays a significant role in articulating the public's opinions on a certain product. A broad analysis is required for using the social networking sites and also a blogging sites as a source of data. For the algorithm evaluation benchmark data sets are used. The context of the text as well as the user preferences are considered in many of the applications. So research is needed for context-based SA. Using NLP tools to strengthen the SA process has drawn the attention of the researchers and still some enhancement is required. Since most of the work is carried out with respect to Aspect Based



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Sentiment Analysis with machine learning techniques only. Lexicon based approach plays a major role in SA process to analyze the domain-dependent data sets. The future work is applying a lexicon-based approach to avert the need to create a labelled training set. The main drawback of machine learning models is the dependence on labelled data. It is also very difficult to obtain the sufficient and correct labelled data. The lexicon based approach can be easily accepted as well as it can be modified by a humans and it is considered as a significant advantage and also found that it is easier to produce a convenient lexicon, and then group and label relevant corpus. The further work in this field is enforced with an intension to produce exact decisions and end results.

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