IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

FINANCIAL MARKET PREDICTION TECHNIQUES: REVIEW

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Abstract: Sentiment analysis has seen an incredible growth within the past few years. Sentiment analysis or opinion mining may be a process of collecting users' opinion from user generated content. It's various applications, like stock exchange prediction, products' review collection, etc. an outsized amount of labor has been wiped out this field by applying sentiment analysis to varied applications. the most goal of this paper is to review the varied methods used for sentiment analysis. Further we explain the overview of varied related papers and their performances.

Keywords: Support Vector Machine; NaiveBayes; K-Nearest Neighbour.

1. Introduction

With the event of technology, social media is increasingly employed by people to share their views, consult for reviews, etc. This information are often used for several purposes, one among them being opinion mining. Sentiment analysis refers to identifying whether the given piece of knowledge is positive or negative. A basic task in sentiment analysis is classifying the polarity of a given document-whether the opinion is positive or negative. Advanced polarity classification looks at emotion states like angry, sad, happy, etc. [1]. The older methods for collecting sentiments were both tedious and fewer accurate. Thus, views shared by people on social media are far more accurate than that collected from questioners, which is typically crammed with reluctance and without personal interest [2]. Also, an automatic system is far easier to analyze than manual survey. the varied opinions shared on social media can influence the buying patterns of consumers [3]. It also can be employed by businesses to enhance their products [4]. Various methods and algorithms are often wont to perform sentiment analysis supported application and dataset involved. [5] Uses social media services namely twitter to predict future stock prices. Here, they used machine learning algorithm to classify data and estimate future stock prices, and therefore the reduced programming model was used for calculation. On the opposite hand,[6] uses a lexicon based approach for sentiment analysis of stories comments. Here the polarity is provided using Lexicon based approach and, these results are then fed to machine learning algorithms, namely, SVM and K-nearest neighbor. Sentiment analysis belongs to the domain of opinion mining, and hence is additionally mentioned as opinion mining. variety of terms are utilized in sentiment analysis as defined by Pang and Lee [7].

Sometimes, the term sentiment analysis also can be used because it includes tongue processing. Polarity may be a term that defines whether a terms or sentiment is positive negative or neutral. Subjectivity includes classifying a given text as subjective or objective. Sentences indicating facts are objective, while sentences with sentiments are usually subjective in nature. for instance, "Suppose he did lie beside Lenin, wouldn't it be permanent?" may be a subjective statement. Sentiments are often explicitly stated within the sentence, for instance, "the movie was fantastic", are often inherent nature.

Sentiment analysis of stock exchange helps people to form informed decisions, whether to take a position during a business. Stock analysis refers to analyzing the trade of an enterprise or a corporation. Analysis shows that, online sentiment can help to predict subsequent market activity. Positive sentiments increase stock value of a corporation while negative remark decreases it. Stock price depends on new information significantly. the various information sources are people's opinion in social media, news, articles etc.

2.Challenges and Applications

Sentiment analysis or opinion mining can have various applications like movie reviewing, stock exchange prediction, product feature reviews etc. the varied challenges [8] are:

- Finding the right dictionary: it's difficult to seek out the foremost accurate dictionary that contains all required words, and typically we will overcome this problem by creating our own dictionary supported the need .
- Detection of sarcasm in statements: it's difficult to detect sarcasm and supply it an appropriate polarity value.
- Detection of faux reviews: internet contains spam content also . Effective Sentiment classification requires this spam content to be eliminated before processing. this will be done by identifying duplicates, by detecting outliers. [10]
- Use of orthographic words: orthographic words like too, veeery, etc. are difficult to polarize.
- Use of abbreviations: short forms like u for; you', 4 for 'for' are difficult to supply polarity for.

3. Methodology

Sentiment analysis are often administered at three levels, namely, document level, sentiment level, and aspect level [11]. Sentiment analysis includes three main steps, identification, classification, and aggregation [12].

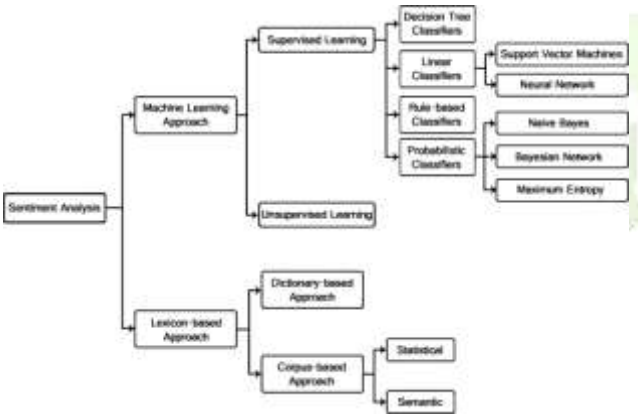

Figure 3.1. Sentiment classification techniques

Dictionary Based

A sentiment dictionary are often wont to identify polarity of given word during a text. during this method, a predefined dictionary is first created manually employing a set of seed words [9]. The polarity of text can then be assigned as positive, negative, or neutral supported these predefined dictionaries. This method uses word count, frequency of occurrence and other methods to supply polarity to given data [13]. the utilization of this approach for sentiment analysis are often explained as follows [14]: seed words with predefined polarity values are collected manually. An algorithm is then applied, which searches dictionaries like wordnet to seek out more words of comparable nature. These new words can then be added to the list and process are often iterated till no new words are found.

Supervised Learning

Supervised learning provides polarity to new data supported a training dataset. The training data consists of input file and output variables. One common method under supervised machine learning is using support vector machine (SVM). The support vector machine contains an algorithm that recognizes patterns from the given data and groups similar group members using the concept of decision plane [15]. SVM can give an accuracy up to80% with the right dataset [16].

4. Results and Discussions

Paper	Summary	Performance
Sentiment Analysis on News Articles for Stocks [17]	This paper analyses the sentiments of data collected from news articles. To get the news links, the Bing API was used and a sentiment dictionary was then used to analyse the articles.	Accuracy for normal equation- 53.2%, and for gradient decent- 59.5%.
Stock Trend Prediction Relying on Text Mining and Sentiment Analysis with Tweets [18]	This paper deals with the feature sparse problem resulting from sentiment analysis using tweets. In order to overcome this, a model called text-sentiment-based stock trend prediction model was used. This model uses an SVM classifier model.	An accuracy of 90.34%.
Twitter mood predicts the stock market [19]	This paper is used to check whether or not the moods of people correlate to the Dow Jones Industrial Average (DJIA) value.	An accuracy of 87.6% was obtained and Mean Average Error was reduced by more than 6%.

Collective Sentiment Mining of Micro blogs in 24-hour Stock Price Movement Prediction [20]	This paper is used for collective sentiment analysis to predict and analyse the stock price change for the next day. it includes the use of a two-stage process which uses NLP approach and a statistical analysis approach.	An accuracy of 71.84% for Positive sentiments and 74.3% for negative
Stock Price Prediction using Linear Regression based on Sentiment Analysis [21]	This paper stresses on the fact that according to efficient market hypothesis (EMH) stock prices depend on a number of factors, one of them being peoples' opinion or sentiment. This paper surveys the Indonesian stock market using sentiment analysis.	The Random model algorithm yields an accuracy of 60.39% and the Naïve Bayes algorithm gives 56.50% accuracy.
Machine learning in prediction of stock market Indicators based on historical data and data from Twitter sentiment analysis [22]	This paper tests the assumption of increasing accuracy of stock market prediction by analysing the psychological moods of twitter users. Eight different emotions can be analyzed lexicon-based approach to classify peoples'psychological states.	The accuracy rate of 64.10% was achieved using Support Vector Machine Algorithm to predict DJIA indicator.
A Hybrid Approach to Sentiment Analysis of News Comments [23]	This research uses two main algorithms, that is, Support Vector Machine (SVM) and K-Nearest Neighbour (KNN), to perform sentiment analysis of news comments.	The accuracy of 60.96 for SVM
Prediction Relying on Text mining and Sentiment Analysis with Tweets [24]	This paper focuses mainly on the twitter feature sparse problem and also the unreliability of using average sentiment score. This is overcome using a hybrid approach consisting of entiwordnet to give additional weightage. SVM cross validation is used.	Accuracy without Feature Selection (FS) was 53.62%, whereas with FS, an accuracy of up to 84.06% Was obtained.
Stock Trend Forecasting Method Based on Sentiment Analysis and System Similarity Model [25]	This paper proposes a system wherein the Bayesian classifier is used based on the system similar model to predict stock movement. The system is tested using inter cross and turnover test.	An accuracy of up to 78.5% is obtained
Stock market forecast using sentiment analysis [26]	In this paper they have used twitter and BSE to calculate public moods and used granger causality to predict the results, they also implemented SOFNN (Self organised fuzzy neural network) for decoding non-linear time series.	An accuracy of 75.56% was obtained

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