A REVIEW ON SENTIMENT ANALYSIS USING MACHINE LEARNING

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Abstract- **Data Forecasting is a hot topic in research, whether in the financial or medical sectors, for example. The process of predicting future values based on data from the present and the past is known as forecasting. A forecast is only an estimate of some factor or incentive at some predetermined future date and age. Data forecasting can be used in a variety of ways, from weather forecasting to predicting whether a patient is at risk of developing a specific disease in the medical field. Data forecasting is simply using historical data to predict future trends. Forecasting is used by business people and companies to plan their budgets and future projects in order to maximize their profits, as well as to analyze their performance and potential risks. If the company's sales increase or decrease, investors try to predict whether that will have an effect on the company's stock price. Stock market analysts use forecasting to predict GDP, unemployment, or how it changes over a year in the Stock Market. For a statistician, forecasting is a tool that they use in every situation where they need to make predictions. This article contains a brief analysis of tweets using machine learning methodology.**

Keywords- **Sentiment Analysis, Twitter, Facebook, Instagram, Machine Learning, AI.**

I. INTRODUCTION

As we all know that everything cannot be predicted, but if factors that are related to what we want predict, and sufficient amount of data is there, then we can easily predict the thing. Data Forecasting has wide range of applications like as follow:

Egan Forecasting i.e. process of controlling the heat of building by calculating the demand of heat that should be supplied to the building according to climate and building requirement.

- Forecasting is used in stock market and foreign exchange.
- In business, to predict the customer demand according to the current market analysis
- For earthquake prediction etc.
- In supply chain management, which project should be at which time and at which place, it will help to maximize the profit.
- In Banking or financing, to check the defaulter risk i.e. either there is probability to have a risk like particular person who applied for a loan can be defaulter or not.
- In Sales Forecasting, predicting whether sales will increase or decreased in future.
- Political Forecasting, predicting the results of elections.
- Weather forecasting , flood forecasting.

II. RELATED RESEARCH

According to Shitole et. al. (2018 [8]), IoT-enabled framework that not only captures sensor information in real time, but also performs live human face acknowledgment to effectively monitor physical location is depicted in this paper. To perform multi-class classification, sensor data is synchronised with a recognised person's name on a class label. Researchers in this study show how to use supervised machine learning algorithms for cloud and local datasets to optimise person prediction using sensor data analysis. Based on macro average F1-score as a performance measure, Random Forest and Decision

Tree models outperform those using stratified 5 fold cross validation on very large datasets when evaluating model performance for imbalanced class datasets. It has been proven through experimentation that the Light Dependent Resistor (LDR) is the best sensor for predicting a person's identity using Decision Trees.

Ellen et. al. [9] A common Twitter sarcasm is to express a positive feeling while pointing out a negative aspect of the situation. The word "love" or "enjoy" is frequently used in sarcastic tweets, followed by an expression that denotes a negative activity or state (such as "taking exams"). In order to identify this type of sarcasm in tweets, we have developed sarcasm detection software Sarcastic tweets are used to train a novel bootstrapping algorithm that automatically learns lists of positive sentiment and negative situation phrases. Sarcasm recognition can be improved by identifying contrasting contexts using the phrases learned through bootstrapping.

In the words of Tekchandani et. al. 2016 [10], Opinions about a particular entity can be expressed in a few short messages via online microblogging on social networks. Popular microblogs like Twitter, Facebook, and the like exist, with Twitter garnering the most attention in research areas such as product reviews, movie reviews, stock exchange, and so on. Facebook is also popular. We used machine learning algorithms to predict the sentiment of tweets containing movie reviews extracted from Twitter. Using unigram, bigram, and hybrid features, we used supervised machine-learning algorithms like support vector machines (SVM), maximum entropy, and Nave Bayes to sort the data into categories. SVM outperformed other classifiers with a remarkable accuracy of 84% for movie reviews, according to the results.

Prakruthi et. al. 2018 [11] Natural language processing, text analysis, computational linguistics and biometrics can all be used to analyse emotional states and subjective information. Sentiment analysis refers to this application. To express their feelings

about a product or service on Twitter is one of the most common ways to do so among the many popular social media platforms out there. Using sentiment analysis on tweets is a great way to figure out whether or not a person has a positive, negative, or neutral viewpoint. Evaluating a person, trend, product, and/or brand is the focus of this paper. Using the Twitter API, tweets can be retrieved directly from Twitter and a sentiment classification can be built for each one of them. Histogram and Pie chart visualisation techniques are used to show positive, negative, and neutral remarks about the findings of the analysis.

David et. al. 2010 [13] Social media has proven to be a reliable source of product marketing information. Using this unique source of data, a number of business areas benefit from quick access to customer feedback. A methodology for identifying topics associated with customer sentiment is presented in this paper in order to achieve this goal. Sentiment analysis begins with a Fisher Classification-based approach. Topics within sentiment categories are then identified by taking into account specific mutual information and word frequency distribution. In order to support a company's business, it's important to provide an overview of the overall sentiment as well as relevant information (such as why). We use data from Twitter advanced search to demonstrate this methodology on a specific product line.

Alrence et. al. [13] Social networks for business have seen a surge in popularity in recent years due to the potential for growth that they offer. In order to better understand their market and enhance their brand, companies can learn more about how customers feel about their products and services. As a result, companies constantly rethink their marketing strategies and campaigns in order to better meet the needs of their customers. The vast amount of data in social networks can be harnessed and used by social analysts to mine critical information for strategic decision-making. Finding patterns and trends using machine learning techniques and tools is key to making informed decisions. The authors of this paper chose a well-known food brand in order to analyse a stream of Twitter comments from actual customers. It

was decided to examine a number of metrics for data classification and clustering in this study." The polarity lexicon of English tweets, whether positive or negative, can be discovered using a Binary Tree classifier fed data from a Twitter API. In order to find tweets with business value, a k-means clustering technique is employed. It is the goal of this paper to discuss the technical and business aspects of text mining Twitter data and to make recommendations for the future development of this rapidly emerging area.

Amir et. al. 2017 [14] On Twitter, assessing people's political sentiments has shown that it could be an excellent resource for doing so and that it mirrors what is happening in the real world. In many systems and tools for mining public opinion, people's attitudes toward products, people, or topics, as well as their characteristics or features, are provided to users. But even though it appears to be a simple task, training a successful model to conduct election sentiment analysis on tweet streams is empirically challenging, making it difficult to use sentiment analysis to predict election results. Here, we'll discuss some of the issues we encountered while using Kno.e.sis'sTwitris system to monitor the 2016 presidential election. The opinions of movie-related Twitter users are a valuable resource that should be studied. Businesses and organisations always want to know what the general public and moviegoers think of their films, and moviegoers want to know what other people think before they buy the products they see. In this study, sentiment analysis was used to determine whether a tweet had a positive, negative, or neutral outlook. For its accuracy, Naive Bayes Classifier was the best option. It was combined with Information Gain as a feature selection method in order to increase the run time efficiency. A dataset of tweets from 12 popular movie titles was used in the experiments, and the proposed techniques had an accuracy of 82.19% with a threshold of 0.006 as the ideal gain.

Ajit et. al. 2019 [16], state that IoT-enabled system that not only captures sensor data but also performs live human face recognition to effectively monitor physical location is described in this paper. The data used to train supervised machine learning algorithms is a combination of live sensor data, the name of the human face recognised or unknown, and an additional manually introduced class label. Face recognition is evaluated using Decision Tree (DT), K-Nearest Neighbors (KNN), Naive Bayes (NB), and Logistic Regression (LR) (LR). DT has the highest True Positive Rate, Positive Predictive Value, and Area Under the Receiver Operating Characteristics (ROC) curve for face recognition prediction of whether the recognised face is true or false, according to these results.

Sahar et. al. 2019 [17] People from all over the world now use social media sites to exchange ideas and knowledge. Take the social media site Twitter, for example, where users can send and read 'tweets', or short messages, and engage in conversations with other users. Users post their thoughts on everything from brands and places to their daily routines. Using this massive platform, companies can gather data on consumer perceptions of their products. Using real-world Twitter data, this paper aims to show how a sentiment analysis model can be built. Because Twitter data is so unstructured, it's difficult to do any meaningful analysis on it. This is not the first time supervised and unsupervised machine learning algorithms have been used together, but our model is. Sentiment analysis is carried out in the following manner: The tweet was retrieved directly from the Twitter API, cleaned, and then discovered. Data were then fed into several models for training purposes. The extracted tweets were classified as either positive, negative, or neutral based on their sentiment. In order to determine which fast-food chain is more popular, data was gathered on two subjects: McDonald's and KFC. We used a variety of machine learning algorithms. Cross validation and f-score were used to verify the accuracy of the models' output. In addition, our model performs well when mining Twitter-extracted texts. Basit et. al. The term "bias" refers to a person's predisposition to have an opinion on a subject. It can be either positive or negative, depending on your perspective. The power of the media to shape public opinion makes determining a TV talk show host's bias an intriguing subject for

research. To determine if there is any bias in the talk shows hosted by various TV hosts, we are monitoring Twitter tweets. A popular microblog service and social network, Twitter is used primarily for tweeting about current events. In this case, we use sentiment analysis to assess the host's level of bias. The sentiment analysis can be used to determine the tone and content of the tweets. Support Vector Machines and Nave Bayes are used to identify the host's bias based on tweets from users. Emoticons, on the other hand, are frequently used to express feelings on social media. Therefore, we look at the frequency of emoticons in the recent Twitter data set. Analyzing the bias through emoticons and sentiment polarity is then carried out.

The 2020 [19] team of Singh, et. al. are Emotions can now be expressed on social media sites like Facebook and Instagram via web-based platforms like Twitter and so on. It's common for people to post their thoughts and musings on Twitter in the same way that they post other tweets. We see this as an exciting and attractive way to express ourselves because the number of inspections is steadily rising, necessitating the need for a summary of surveys to provide useful data from the large number of them. It's nearly impossible to sift through all of the data and find what's relevant or useful. The comparison and analysis of various sentiment analysis techniques is the subject of this paper. It provides a comprehensive review of recent and past studies on sentiment analysis, as well as challenges and future approaches.

Alaria et. al. 2016 reviews are extremely important in determining a product's quality in today's world. In addition, this will be advantageous to other customers who are contemplating the purchase of a similar product in the future. It is important for consumers to decide whether or not to watch a movie based on the reviews, as well as for producers to know what the general public likes. It takes a lot of time to manually evaluate each individual review on a variety of websites, including bookmyshow, yahoo, and other social networking sites. As a result, automating the move review analysis is how we addressed this issue in this paper. SentiWordNet has been used for

feature-level sentiment analysis in conjunction with conjunctions handling, negation handling, intensifier handling, and more.

In the year 2020, researchers Masood, et. al. Research into how to classify people's emotions is an on-going project that has applications in a wide range of fields. In the past, many researchers have proposed methods for accurately detecting emotions. Syntactic and semantic features are more important than other aspects of the documents. These features are effective, but they disregard the user's previous feelings. It is our hypothesis in this study that past sentiments help the classifier link the user's history with the current tweet more effectively. As a result, machine learning algorithms can use data from previous activities to infer the current mood. For this purpose, we propose three sliding window features for the time series data to accumulate sentiments from the past. The Context-aware Sliding Window (CSW) features proposed in this paper are applied to a variety of machine learning and deep learning algorithms. Additionally, we present a temporal dataset of user tweets manually annotated by nine human annotators. The proposed dataset includes 4,557 tweets from 36 people. In comparison to six current best practises, the results show significant improvements.

There are a number of studies that have been done on this topic Amolik, et. al. 2016 [22] Analyzing the emotions and opinions conveyed in written material is a primary focus of sentiment analysis. Opinion mining is another name for sentiment analysis. In order to find and justify a person's emotional response to a given piece of content, sentiment analysis is used. Tweets, blogs, and status updates, among other forms of social media, contain enormous amounts of sentiment data. Data generated by a large number of people can be useful in expressing the general public's sentiment. Slang words, misspellings, and repeated characters make Twitter sentiment analysis more difficult than broad sentiment analysis. We are all aware that each tweet on Twitter has a character limit of 140 characters. As a result, it is critical to determine the correct meaning of each word. As part of our research, we've developed an extremely

accurate model for analysing the sentiment of tweets about recent movie reviews, be they from Bollywood or Hollywood. Using feature vectors and classifiers such as Support vector machine and Nave Bayes, we are correctly classifying these tweets as positive, negative, and neutral in order to give the sentiment of each one.

Sonawane et. al. 2016 [23], When it comes to data, the web is awash with it, and it's only going to get more so in the future as web technology continues to advance. When it comes to online education and discussion, the Internet has become an invaluable resource. People are flocking to social networking sites like Twitter, Facebook, and Google+ because they allow them to share and express their opinions on a variety of topics, engage in dialogue with people from all over the world, and post messages across the globe. Sentiment analysis of Twitter data has gotten a lot of attention. When it comes to sentiment analysis, this survey is focused primarily on Twitter data, where opinions are highly unstructured, heterogeneous and can be either positive or negative or neutral in some cases. Existing techniques for opinion mining such as machine-learning and lexicon-based approaches are reviewed and compared in this paper, along with evaluation metrics. We study twitter data streams using a variety of machine learning algorithms, such as Naive Bayes, Max Entropy, and Support Vector Machine. Sentiment Analysis on Twitter has also been discussed in terms of its challenges and applications.

As a result of the findings of the current study, the authors conclude that [25] In today's world, we practically exist solely through the medium of social media, where we share our thoughts and experiences on a variety of topics that are close to our hearts. Because of this, Twitter has become awash in data in the form of user-generated opinions. It's also possible to use all of these tweets or opinions in various aspects of life and business for the benefit of human beings in the long run. In order to provide useful information about a particular subject, opinions expressed on social media platforms such as Twitter and Facebook should be better organized. Sentiment

analysis is critical in this situation. A method to automatically analyse the sentiment of tweets posted by Pathao (a popular ride-sharing service in South-East Asia) users has been presented herein. To classify tweets as negative or positive, we've combined data mining with text mining and computational intelligence.

III. FORECASTING METHODS

Various forecasting methods are defined as follow:

3.1.1 Quantitative and Qualitative Methods

Qualitative methods are subjective in nature. They are based on the judgment and opinion of the customer. If analyst doesn't having any past data, then this method is beneficial. This method is mainly used for long range decisions. Example: Historical life cycle analogy, informed judgment and opinion, market research and Delphi Method.

Quantitative methods are used to predict on the basis of past data. This method is used only if past data is available and some of pattern in which data exist in future also must be known. This method is used for short range decisions. Examples are straightforward and weighted N-Period moving midpoints, last period request, basic exponential smoothing, multiplicative occasional lists and toxic substance process show based gauging.

3.1.2 Average Approach

In this method, average of the past historical data is taken to predict the all future values. This method is applicable in any kind of data where historical data exist. If we want to predict the unobserved values i.e. value that is not specified in the dataset, we can predict by taking the mean of the all known values.

3.1.3 Naïve Approach

This is most efficient prediction model in terms of cost. This model is basically used for the time based data. Using this model, prediction accomplished is equivalents to the as of recently analyzed information. This technique works exceptionally well for money

related and financial matters time arrangement, which by and large have design that is hard to foresee precisely and dependably.

3.1.4 Float Method

A change in naïve technique is to enable the expectation to increment or lessening with time, where the measure of variety after some time i.e. called the float is set to be the normal change in the past information

3.1.5 Time arrangement strategies

Time arrangement strategy use past information to anticipate the future results. These methods include:

- Weighted Moving average
- Extrapolation
- Exponential smoothing
- Karman filtering
- Auto Regressive Integrated Moving Average (ARIMA)
- Seasonal ARIMA(SARIMA) and ARIMARCH
- Auto Regressive Moving Average (ARMA)
- Linear prediction
- Moving average
- Growth curve (statistics)
- Trend estimation

3.1.6 Casual/Economic Forecasting Methods

Some of the forecasting methods that are used to identifying the factors that affects the variable which is being predicted. Like change in weather can affect the sales of umbrella etc. and sale of sweater can also be dependent on the weather. Every casual method doesn"t follow the strict algorithm. Some of algorithms may be depends on the relationships between the variables of the past historical data.

3.1.7 Judgment Methods

Judgment methods are based on the judgment and opinion estimates. This method is basically used where there is lack of historical data or some unique and new market strategies are followed. Various Judgment methods are:

- Delphi Method
- Composite method
- Cooke"s method
- Scenario Building
- Technological forecasting
- Forecast by analogy
- Statistical surveys

3.1.8 Artificial Intelligence Methods:

- Support Vector Machine
- Artificial Neural Network
- Data Handling Group Method

IV. TWITTER SENTIMENT ANALYSIS

Some 25% of online adults use Twitter according to Pew Research Center findings. A global total of 313 million monthly active Twitter users is the result of this figure. Tweets are limited to 280 characters on the free, real-time messaging service (which was increased from 140-characters in November 2017). As a result, Twitter has seen substantial growth despite its 280-character constraint. The use of Twitter by Dell to notify customers of future product reductions, for example, has proven to be a great success. Twitter's business value is also appreciated by many marketers because it makes it simple for businesses to find out what customers are saying about their products.

Because of Twitter's great acceptability around the world, this project focuses on using its data. As mobile technology has proliferated, it has opened up a whole new world of views and perspectives that were previously unavailable. The ideas and feelings expressed on Twitter, when gathered and studied, can reveal a wealth of information about a people. By gaining a deeper understanding of their target market, companies can benefit from this information. A deeper understanding of a population can help governments make better decisions for that group. A topic modelling and lexicographical strategy will be

used to assess sentiment and opinions in English text in order to determine a general sentiment, such as positive or negative, during the course of this research, in order to obtain tweets as the basis for data. Using social media, this application may be utilized to get a sense of what people are thinking and feeling.

V. DISCUSSION &CONCLUSION

This Opinion mining can be used in a variety of contexts. Use it for advertising, hotspot identification in discussions, web crawlers, recommendation systems and email filtering, as well as for questions and notes. Using opinion mining to improve human–computer interactions, corporate intelligence, opinion surveys, government intelligence, citation examination, etc. is the most intriguing use of opinion mining in daily life. Opinion mining's potential uses can be better understood by looking at the example questions that go along with it.

> ➢ In general, what are people's opinions on government strategies?
> ➢ Which aspects of a product are most popular or least popular with the general population?
> ➢ Is there anyone in the general race body that is a good competitor?
> ➢ What may be the reason for a decrease in sales?

When it comes to opinion mining there are some issues that need to be overcome, such as detecting which sections of text are opinions and identifying the opinion-holders. Human surveys, feelings, and emotional exchange are all part of the scope of a sentiment analysis. All of us have our own thoughts and concerns regarding a given issue or topic. Inaccurate, irrelevant, or ambiguous information can all be found in opinionated text. It is much more difficult to depict opinions than fact.

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