

LSTM and Bi-LSTM Deep Learning Technique for better Tourism Services in future by analyzing Hotel Reviews

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ABSTRACT

One of the worthwhile aspects of the arena economy is tourism. Tourism plays a very important part in the economy of any country. Tourists make extensive use of mobile devices and e-tourism services throughout their journeys. On the internet, there is a significant growth of opinions and reviews, which always contain product and service evaluations, as well as thoughts about events and people. Online booking of hotels has been tremendously increased in past few years using e-commerce technologies. Tourist's reviews are having great importance to know the positive and negative points of current tourism industry so that we can work on these gaps to improve the current tourism services. It is possible to use the results of tourist's behavior analysis to improve the existing tourism services. In this paper, in order to detect customer sentiments in form of positive and negative reviews, the sentiment analysis has been used. In context of that, the online data in form of hotel reviews is fed to classical algorithms or techniques of machine learning and same data is given as input to deep learning method called LSTM and further the results are compared between these two where LSTM outperformed traditional machine learning algorithms like the Nave Bayes and Random forest algorithms. Here to improve the text classification, polarity analysis has been done by taking data of hotel reviews given by customers. Using the Long Short-Term Memory (LSTM) deep learning method, the sentiment expression is employed to categorize the polarity of the textual content evaluation on a scale of dreadful to favorable. The purpose of this research is to depict how accurate and efficient results come in to picture when we use deep learning method rather than traditional machine learning methods. While using sentiment analysis, deep learning LSTM proposed model delivers higher accuracy in results of hotel reviews.

Keywords: Classical Machine learning techniques, Deep Learning algorithms, Customer Hotel Reviews, Online Tourism, Deep learning LSTM and Bi-LSTM technique.

INTRODUCTION

Everything is based on the internet in the age of current science. Because of improved quality and faster logistic systems, online buying has grown more convenient and popular. Shopping and reserving on the internet is really convenient. People can easily make a reservation without having to leave their homes. People can give reviews, which is one of the most beneficial aspects of online-based job. Recognizing reviews allows others to more quickly grasp others emotions and determine the reasonableness of various things. The hotel evaluation examined the use of Deep Learning to forecast business. Due to a lack of analysis and customer sentiment, many start-up enterprises have failed. The most important way to optimize a business website is to conduct a sentiment analysis.

As it is well known, the internet is one of the most widely used forums for expressing individual viewpoints. This platform investigates a variety of fields to allow anyone to share their thoughts, opinions, or feelings.

It could be in the field of film, news, products, tweets, and so on. Anyone can express their feelings in any field by writing a review. As maximum people access services online and share their feelings. As a result, the database of these reviews is growing and getting more and more day by day.

Emotions play a vital role in interpersonal contact and communication. The informal type of writing challenge for researchers is the communication of emotions via text messaging and personal blog postings. The examination of sentiments is a recent innovation that has gained a lot of traction. We can get high-quality material via Opinion Mining. Early study in this field relied heavily on product evaluations and the categorization of feelings as positive, negative, or neutral.

The value of online reviews is critical: they are the key to your hotel's internet presence - a valuable license for customers satisfaction, which leads to increased business and money. Precise administration of brand on online portals will reassure potential consumers and encourage them to book hotel without hesitation. The classification of reviews in order to gather insights from them has become a significant element of the hotel business.

Customer reviews tell the tale of how they feel about the services provided by the hotel. Sentiment research benefits the hotel industry in a variety of ways, from preventing a dwindling reputation in the market to better understanding how customers feel about their accommodations. Because there are so many reviews available on various web platforms, hotel operators can no longer rely on their own analysis. They require automated systems that are accurate, dependable, rapid, and efficient that can deliver superior findings to help them make better business decisions [1].

Sentiment analysis is required in order to check whether a review depicts a good, negative, or neutral opinion about the hotel and its services. Hotels may save an incalculable amount of time by using sentiment analysis to classify customer data such as reviews, ratings, and comments on social media platforms. Hotels use sentiment analysis to monitor their brand value on web portals, get knowledge from consumer feedback, and then use that information to enhance themselves.

Many rule-based methods for sentiment analysis using Natural Language Processing (NLP) techniques such as parsing, stemming, and tokenization, as well as manually generated rules, are given for computing the polarity score. To begin, two lists of different word parameters must be defined. After that, a rule-based system can be fed to established word lists, and the model verifies the number of positive, negative, and neutral reviews separately and it will be returning a negative sentiment if it detects more negative words than positive ones, and vice versa.

Tourists are used to using online services such as booking hotels, trips, and other connected services. Tourists also provide feedback after using the services, which can be good, negative, or neutral. Tourists can access a variety of information sources online, as well as share their perspectives and experiences through this medium. Customer feedback is very important in terms of customer satisfaction and e-business in the tourism industry since it shows where the industry falls short in providing high-quality services to customers. Due to technological advancements, both the production and consumption of

information plays an essential role. However, if we look at the data on the internet, we can see that it is in such vast quantities that human processing is nearly impossible.

As a result of the quick shift in data, new emergent technologies have been launched, such as sentiment analysis, which is used to investigate the relationship and significance of tourist evaluations. Furthermore, deep learning algorithms such as RNN, CNN, and LSTM are used to assess these sentiments for effective processing. As a result, when dealing with complex data and large amounts of it, clarity is essential, which these strategies can provide [2]. The evolution of business strategy, e-commerce, e-business, and marketing are all dependent on tourist experience and input. There are several flaws in the existing system that act as a barrier to accessibility. Deep learning techniques can be used to break through these boundaries, allowing for more accurate and efficient outputs.

This will also aid in the forecasting of the tourism industry's future based on client happiness. Deep learning and neural network designs have been described in the field of artificial intelligence.

These models have been shown to be useful in a variety of situations. Deep learning, a machine learning technology that uses neural networks as a mechanism, is a highly effective and dependable technique for breaking down current tourism industry constraints. All challenges that we experience in existing systems may be handled by Recurrent Neural Networks (RNN), Long-Short-Term Memory (LSTM), and Attention Mechanism, which will be described further in this paper. As a result, the primary goal of the improved tourism business model described in this research utilizing deep learning technique is to remove these barriers. As a result, from the perspective of the tourism business, the concept of customer happiness is important. The concept is to determine how and which approach should be used to improve e-business in the tourism industry by ensuring consumer satisfaction through high-quality tourism services. However, because various flaws, gaps, and obstacles remain in traditional tourism models, clients may experience complications and problems in accessing services

This further demonstrates that the results are unreliable for judging customer perception based on their online experiences and feedback. So, in this study, the deep learning technique has been proved to produce correct results, and when compared to existing techniques, the output in the future will be much better, which will undoubtedly improve tourism industry. As a result, it is utmost importance to recognize tourists' reviews that must be met in order for the tourism industry to succeed in the future.

RELATED WORK

After reading several research articles, it became clear that Sentiment Analysis is a worthwhile endeavour. It can be used for a variety of purposes, including improving customer experience, resurrecting brand value, monitoring social media comments, and so on. In addition, a number of aspects of sentiment analysis are retrieved in order to gain comprehensive insights into what's going on throughout your business channels.

Many writers in current science work on sentiment analysis. R. K. Bakshi discusses sentiment analysis and how to do it on human opinion in his article. L. Yang then performed a deep learning analysis on an e-commerce review. In that situation, the accuracy of CNN and GRU technology was outstanding, but another e-commerce review does not have a decent analysis in CNN algorithm. The author, Hemalatha S., defines the concept investigation as audits on eateries on cuisine, administration, cost, and feeling.

Machine Learning computations in the Python nltk library can be quite useful in any such NaturalLanguage Processing investigation, and the library has been extensively used in this work

Zeenia Singla examines e-commerce reviews and she illustrates her methods by describing surveys aseffective for completely assessing an item and empowering better-dynamic for customers . In her research,Charu Nanda examines sentiment analysis on Hindi language film audits . People are becoming morefamiliar with online audits as they use them to make decisions. Artificial Intelligence will be used to makethe majority of decisions in the future (AI). Similarly, many creators do customer audits at various times. In this way, the future of the company can be predicted. The author, Hui Yuan, created a novel socialmedia analytics framework based on Apache Spark for predicting and visualizing customers' opinionorientations based on their associations with other consumers whose opinions are known. They deploycutting-edge collective classification (CC) techniques to analyze client sentiment. This method takes intoaccount both the user's local and relational features. Some authors contribute to this analytical system byproviding comments and reviews in a variety of languages. They are delicious when it comes to e-commerce sentiment analysis.

HOTEL REVIEWS SENTIMENT ANALYSIS

The process of capturing the emotional coloration behind the text is known as sentiment analysis. It detects, extracts, and studies customers' perceptions of a product or service using natural language processing (NLP) and machine learning. As a result, this form of analysis is frequently referred to as opinion mining or emotional AI.

Opinion mining's purpose is to determine the text's polarity, or whether it's positive, negative, or neutral.

Sentiment analysis classifies emotions in text using machine learning. It's an opportunity for businesses to learn how people feel about a brand, a product, or a service. In the field of tourism sector, online reviews can provide information about liking or disliking of customers regarding products and services that can lead to improvements. By paying close attention to client input, you can stand out in a crowded market and offer unforgettable experiences.

The relevance of internet hotel review sites is becoming increasingly obvious in recent years. Users use of these sites reviews has a significant impact on their purchasing decisions, therefore reviews are valuable toboth firms and researchers [3]. Both text reviews and numerical hotel ratings are widely used by researchers as representations of a customer's sentiment and opinion on the majority of review sites, and both information sources are widely used by researchers as a representation of a customer's sentiment and opinion on the majority of review sites.

Sentiments can be communicated in a variety of ways. It can be expressed through feelings, judgments, vision or insight, or consumer perspectives. Sentiment analysis can be carried out in a number of ways. The amount of time available to commit to sentiment analysis and its value to an ongoing project determine the level of sentiment analysis. Second, the review is phrase-by-phrase. A subject and an object are always present in a sentence.

The subjective component of the statements is then categorized as negative, positive, or neutral. Another level is the function level, which is the highest standard and considers words and sentences. It takes

word and determines its meaning with an emotion. The word is then classed as negative, positive, or neutral. As a result, the comments that are the most deceiving can be removed.

The process of capturing the emotional foundations of a text is known as polarity analysis. Natural language processing (NLP) and machine learning are used to detect, extract, and analyze customerperceptions of a product or service. As a result, opinion mining is a term used to describe this type of study.

SENTIMENT ANALYSIS WITH LSTM

The neural network referred to as Long Short-Term Memory appears to be quite recurrent. within the current RNN stage, the output from the previous step is employed as input. Its 'internal states memory' outperforms others when it involves processing sequences. it's the capability of preserving a state across time. LSTM may store knowledge for an extended period of your time by default. In sentiment analysis, processing, prediction and classification of statistical data is done. In RNN, there is a shortcoming that leads to lacking of gradient vector with time so instead of this method, LSTM technique which is further extension of RNN is used in this paper. In LSTM, the center layer is a hidden gateway. The hidden layer is employed to decide which facts should be remembered and which should be saved for long-term learning. The effect of the intermediate layer that collects data from the input layer is displayed in the output layer. Memory blocks in the LSTM layer are blocks that are repeatedly connected. These blocks are often compared to the differentiable memory chips of digital computers. All contain one or more repeatedly connected memory cells as three multiplier units (inputs, outputs, and hidden layers), allowing continuous analog write, read, and reset operations.

LSTM's Basic idea:

The cell kingdom, the horizontal line jogging through the top of the picture, is the key to LSTMs. The mobile country resembles a conveyor belt in appearance. With only a few tiny linear interactions, it flows straight down the entire chain. It's incredibly simple for records to simply go along with the flow, unmodified. The LSTM has the ability to remove or add records to the cell state, which is tightly controlled via gate systems. The sigmoid layer produces numbers between 0 and 1, indicating how much of each factor should be allowed through. A cost of zero approach allows nothing to pass through, but a value of one allows everything to pass through. Gates are a technique to allow or disallow records to pass through. A sigmoid neural network layer and a factor sensible multiplication operation make them up.

Long Short Term Memory networks, or LSTMs for short, are a type of RNN capable of learning long-term dependencies. All recurrent neural networks are made up of a series of repeated neural network modules. This repeating module in modern RNNs will have a simple structure, such as a single tanh layer. LSTMs have a chain-like shape as well, however the repeating module has a unique shape. Instead of a single neural network layer, there are four layers that interact in a completely different way[4].

METHODOLOGY: MOVING TOWARDS LSTM FROM RNN THEN TO BI-LSTM

For the analysis of consumer sentiment, various types of algorithms are employed in this paper. The analytical component of research effort is dependent on evaluating or designing an algorithm. A dataset for the business sector and a dataset from various websites, as well as some procedures, can be generated through the effort. Natural Language Processing is particularly effective in the machine learning

component in the present day. In that circumstance, sentiment analysis is critical to any company's future success. In this strategy, we first collect data and then process it for the purposes of our algorithm. Deep learning techniques such as LSTM and Bi-LSTM are used to train these data, with prediction accuracy of 84 % and 85% respectively. Finally, use machine learning methods such as Naive Bayes, Random Forest classify the reviews and compare their accuracy levels. Sentiment analysis is the process of identifying, extracting, qualifying, and studying affective states using natural language processing, text analysis. Sentimental Analysis is used by a variety of companies to better understand their customers' reactions to their products. It offers businesses with automatic client feedback, allowing them to take appropriate action to improve the services they now deliver. Analyzing enormous amounts of textual data becomes incredibly challenging because we are already surrounded with unstructured data [5]. Organizations, on the other hand, can use sentiment analysis to categorize these texts. The goal of sentiment analysis is to predict the polarities of a piece of text's sentiment (positive, negative, or neutral). Natural Language Processing (NLP), Computational Linguistics, and Data Mining are some of the areas it crosses. In the realm of sentiment analysis, deep learning has recently proven to be a major success. The methods Naive Bayes and Random Forest are used for sentiment analysis in this paper. Deep learning-based emotion classification algorithms, especially the Convolutional Neural Network (CNN) or Recurrent Neural Network (RNN) supported by, are consistent with the recent and are traditional lexicon-based or another machine learning-based. It exceeded the emotion classification model study [6].

Hotel reviews are provided to the machine as input data in this model, and RNN is employed as the key deep learning technology to train the model. Because it employs the LSTM approach in a bidirectional manner, this model will be extremely efficient. LSTM is an RNN extension that produces superior results.

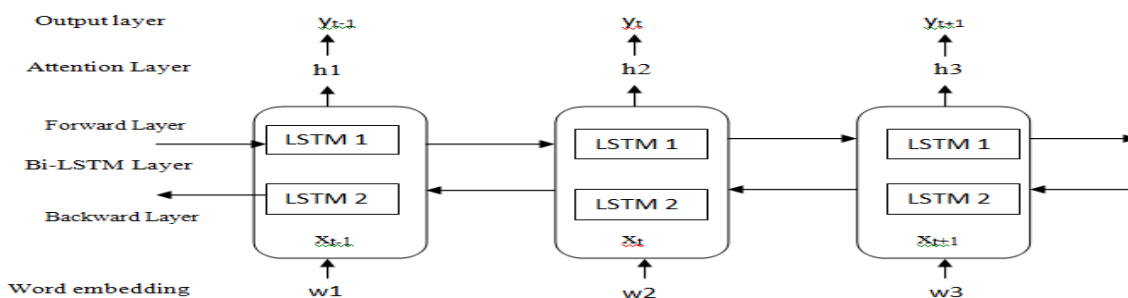


Fig1: Bi-LSTM Technique of Deep Learning for Hotel Reviews Analysis

Bi-LSTM is divided into two types: forward LSTM and backward LSTM. In comparison to traditional machine learning algorithms, feelings are assessed more accurately thanks to the hidden layer mechanism, concatenation feature, activation, and implementation of Bi-LSTM. While CNN excels at processing image data, RNN excels at processing textual data, which is the model's primary goal. Long Short-Term Memory (LSTM) is an architectural extension of a recurrent neural network (RNN) used to improve the accuracy of time sequences and their long-range relationships compared to simple RNNs.

LSTM RNNs have been found to outperform Deep Neural Networks and regular RNNs in sentiment analysis. First, a basic LSTM is constructed and its performance is evaluated. LSTM layer results into increased accuracy in subsequent phases. The bidirectional LSTM layers allow data to travel both forward and backward in the network.

We show that a layered deep LSTM with bidirectional connections performs better in terms of accuracy than the simpler LSTM variations used here. The complex data provided in bulk are often resolved, filtered, and analyzed with remarkable clarity using our deep learning Bi-LSTM model. By applying deep learning, which provides highly accurate and efficient results, we can bridge the general gaps and limitations of tourists' views on the convenience of access to services. As a result, a bidirectional LSTM network (Bi-LSTM) was deployed to extract contextual information from the functional sequence while handling forward and backward dependencies. In addition, Bi-LSTMs allow you to act forward using forward LSTMs that process sequences in chronological order and reverse LSTMs that process sequences in reverse order. As a result, the output is a concatenation of forward and reverse LSTM states.

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MACHINE LEARNING ALGORITHMS USED FOR HOTEL REVIEWS: NAÏVE BAYES AND RANDOM FOREST

Machine learning is a method of teaching a computer to learn without programming it. Statistical and predictive analytics are built in so that computers can recognize different patterns and derive hidden insights from the data provided. This is often achieved by defining how to incorporate the latest trends into new designs. Unsupervised machine learning algorithms, on the other hand, are widely used in different industries to group different special categories of data. The importance of classification in sentiment analysis cannot be exaggerated [7]. The classification step in posture analysis uses machine learning techniques to train and develop classifiers using pre-classified samples from a database called training datasets. After learning the pattern, this classifier can classify previously unlabeled data. On the other hand, the accuracy of the classifier is usually determined by the data used for training. Therefore, it is clear that supervised machine learning algorithms are preferred for sentiment analysis.

Method 1: Naive Bayes

It's an approach based on the prediction independence option of the Bayes Theorem. A genetic learning model is a term used to describe the model. To put it another way, this classification technique assumes that each class feature is independent of the others [8]. Even if all the attributes are linked, each contributes to posterior probabilities. Name-based classifiers are especially useful for large datasets and are relatively easy to create. As a result, even the most sophisticated classification algorithms cannot keep up.

$P(h/d) = (P(d/h) \cdot P(h)/P(d))$ where $P(h/d)$ =posterior probability

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$P(d)$ =predict or prior probability

Method 2: Random Forest

As the name implies, a random forest consists of a number of individual decision trees that act together as an ensemble [9]. For each tree, Random Forest produces a category prediction, so the class with the most votes is the model prediction. Random Forest can be a supervised learning algorithm. Often, you create a forest from a set of decision trees trained using the bagging method. The main idea of the bagging method is to combine many learning models to improve overall performance. Random forest is a classification and regression technique that can be used together. This algorithm works by modifying a sample decision tree and using a majority vote to get the output from each tree. This is also the best option. During the training process of building trees and generating categories based on the predictions of individual trees. It is superior to decision trees to avoid the possibility of overfitting the training set [10]. Random forests add randomness to the model to allow trees to grow. Instead of trying to find the most important features when splitting a node, look for the simplest features from a random feature set. As a result, there is a lot of volatility that leads to a better model. As a result, the strategy of splitting nodes in a random forest evaluates only a random subset of features. Instead of looking for the highest possible threshold, the uses a random threshold for each feature to make the tree even more random.

DEEP LEARNING ALGORITHM USED FOR IMPROVED TEXT CLASSIFICATION

Deep learning structures require massive quantities of information to offer correct results; as a result, statistics is fed in as massive datasets. When processing information, synthetic neural networks are capable of classify information with the solutions they get from a sequence of real or fake binary questions the usage of very complicated mathematical calculations. For example, a facial reputation application works with the aid of using mastering to apprehend and apprehend the outlines and features of faces, then the maximum critical components of faces, and subsequently basic representations of faces. Over time, this system trains and the opportunity of solutions increases [11]. In this case, the facial reputation application will appropriately perceive faces over time. A neuron withinside the human mind gets lots of alerts from different neurons. In an accurate synthetic neural community, alerts journey among nodes and assign suitable weights to them. A heavier weighted knot exerts greater effect on the subsequent layer of knots. The closing layer compiles the weighted inputs to provide an output. Deep mastering structures require effective hardware due to the fact they method a massive quantity of information and contain diverse complicated mathematical calculations. However, despite such superior hardware, education a neural community can take weeks.

Method 1: Convolution Neural Network (CNN)

CNN is basically a deep learning method that takes an image and assigns appropriate weights to different objects. The pre-processing effort required is significantly less than with other classification algorithms. The amount of data required by the CNN is significantly reduced. Simple techniques require manual filter engineering, but CNN can learn these properties with sufficient training. The ability of convolutional neural networks to train multiple filters in parallel, especially for training datasets, under the constraints of certain predictive modeling problems, such as: Image classification is a distinguishing feature of them. As a result, the input photo has very accurate characteristics that can be recognized from any position. This is a more complex version of traditional neural networks, where each layer contains neurons associated with the neurons in the lower layers. The input layer neurons and the local connections and outputs between them are measured by the CNN. The CNN then applies the filter and learns the filter scale based on the task at hand. In this case, a filter is used to classify the sentences [12]. CNN is based on a hierarchical concept that acts like a goal-achieving process. We start by creating a network and proceed to create a fully connected layer that contains all the interconnected neurons and whose outputs are processed.

Method 2: Recurrent Neural Network (RNN)

RNNs are very important deep learning techniques that process large amounts of input data. Attention Prior to the advent of models, RNNs were quality recommendations for working with sequential data. Specific parameters for each element of the sequence may be required in the deep feed forward model. Nor can it be generalized to a variable length sequence. Neural networks mimic how the human brain works in AI, machine learning, and deep learning, enabling computer programs to recognize patterns and solve common problems. RNNs are a type of neural network that can be used to model sequence data. Formed from feedforward networks, RNNs behave like the human brain in motion. Simply put, recurrent neural networks can predict sequential data in ways that other algorithms cannot. All inputs and outputs of a standard neural network are independent of each other, but in certain situations, such as predicting the next word in a phrase, the previous word is needed and the previous word needs to be remembered [13].

The result is an RNN that uses a hidden layer to solve the problem. The most important component of an RNN is the hidden state, which stores certain information about some sequence. RNNs can store all information while performing calculations. Performing the same task on all inputs or hidden layers produces the same results, so use the same settings for each input. The input layer x receives and processes the neural network input before passing it to the middle layer. The middle layer h often has several hidden layers, each with its own activation function, weights, and biases. Use a recurrent neural network if the different parameters of the different hidden layers are unaffected by the previous layer, that is, the neural network has no memory.

Various activation functions, weights, and biases are standardized by the recurrent neural network so that each hidden layer has the same properties. Instead of creating many hidden layers, we can create one and loop as many times as we need.

Method 3: LSTM and Bi-LSTM

Tourism must rely on public demand to survive. It is a company that prioritizes consumer wants over their needs. As a result, industry participants use technology and technology to enable their customers to receive better service at lower costs. Some of these strategies can be supported by technology. Computers can easily uncover the relationships between the components that drive this seasonal demand by analyzing raw historical data and accurately estimating future trends. The hotel strives to provide services at the lowest possible cost while maintaining a profit margin to attract as many customers as possible. Leverage seasonality, hotel history, local events, local competition, third-party promotions, real-time external events to mine data and offer the best possible price for each service. Can give you a competitive edge. Deep learning and machine learning are paving the way for industry-wide innovation. They are investigated and implemented in new areas every day. This is an interesting area with many untapped potentials and the ability to change the face of the industry. The demand for sentiment analysis is increasing due to the need to analyze and organize hidden social media information in the form of unstructured data. Sentiment analysis is done on hotel dataset using deep learning techniques. Deep learning is a collection of well-known and effective models that can be used in a variety of scenarios. This study considers a series of studies to better understand why deep learning applications are so successful in sentiment analysis. Due to the high accuracy of sentiment analysis and deep learning, many issues have been resolved and fixed.

RESULTS DEEP LEARNING ALGORITHM USED FOR IMPROVED TEXT CLASSIFICATION

Deep learning structures require massive quantities of information to offer correct results; as a result, statistics is fed in as massive datasets. When processing information, synthetic neural networks are capable of classify information with the solutions they get from a sequence of real or fake binary questions the usage of very complicated mathematical calculations. For example, a facial reputation application works with the aid of using mastering to apprehend and apprehend the outlines and features of faces, then the maximum critical components of faces, and subsequently basic representations of faces. Over time, this system trains and the opportunity of solutions increases [11]. In this case, the facial reputation application will appropriately perceive faces over time. A neuron withinside the human mind gets lots of alerts from different neurons. In an accurate synthetic neural community, alerts journey among nodes and assign suitable weights to them. A heavier weighted knot exerts greater effect on the subsequent layer of knots. The closing layer compiles the weighted inputs to provide an output. Deep mastering structures require effective hardware due to the fact they method a massive quantity of information and contain diverse complicated mathematical calculations. However, despite such superior hardware, education a neural community can take weeks.

Sentiment evaluation is a famous technique for figuring out the thoughts or sentiments found in a textual content in NLP. As a part of patron reviews, clients can use social media to specific their reviews on merchandise or services. Dissecting this assessment has end up a critical element of organization evaluation due to the fact net commercial enterprise is developing at an exponential price in brand new techno-pleasant aggressive sector. A huge variety of algorithms had been determined as an end result of latest study. One of the maximum essential tactics is deep learning. One of the maximum essential tactics is deep learning.

One of the best deep learning techniques is long short-term memory (LSTM) and bidirectional LSTM, which have shown 84% and 85% accuracy rates for consumer emotion recognition, respectively. Use the machine learning techniques of Nave Bayes and Random Forest to find a dataset of hotel reviews. Random Forest has an accuracy of 81%, while Naive Bayes has an accuracy of 76%. Deep learning is used in the tourism sector to improve performance and collect and anticipate customer feedback. In the naive Bayes model, the imbalanced dataset has little effect, but in the deep learning model it does. Imbalanced Impact Use LSTM datasets to mitigate the impact of imbalanced datasets. When I employed the Dropout rate in the LSTM model, the imbalanced data set had less of an impact on our model. To improve performance, we may use hyper parameter optimization. In terms of accuracy, the LSTM-based deep learning approach outperforms the Nave Bayes and Random Forest machine learning algorithms.

LSTM is highly effective deep learning neural network approach for analyzing the polarity of visitor opinions expressed in comments or online reviews. The suggested LSTM-based deep learning model is shown in Figure 2. As can be seen, LSTM layers have been combined with a number of additional hidden layers resulting in more efficient and clear results.

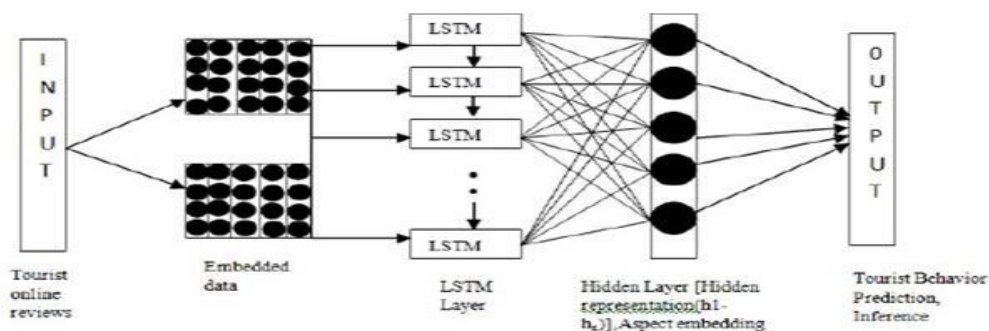


Fig2: Proposed LSTM Deep Learning Model for Hotel Reviews Analysis

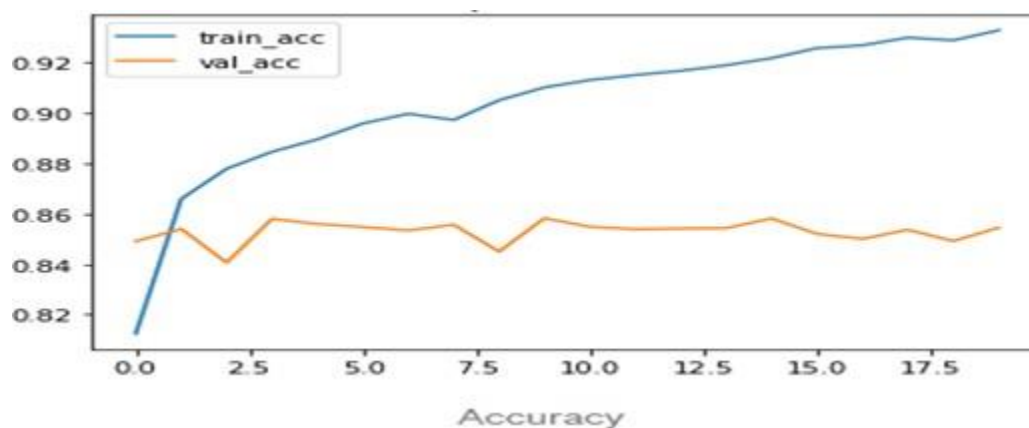


Fig3: Accuracy Graph of LSTM Model

CONCLUSION

Here this paper deals with proposed extremely efficient LSTM and Bi-LSTM techniques of Deep learning that gives high accuracy results when work on hotel reviews dataset. Hence here the proposed framework has been shown so that we can categorize hotel reviews as positive and negative reviews depending upon the feedback given in the hotel data. So here the optimum future technique is determined by comparing classical and neural network strategies.

Strategy or method could be powerful simplest while it's going to assist to present increasingly more readability in remarks given with the aid of using the customers.

The proposed technique of LSTM and Bi-LSTM performs much better than classical previous work based traditional algorithms like Random forest and Naïve Bayes. Deep learning method applied on large dataset gives better results. Once the model is trained and tested against data then according to effective results, we can conclude that LSTM works so effective on dataset as compare to classical machine learning techniques. This excessive accuracy consequences given with the aid of using LSTM and Bi-LSTM deep getting to know techniques cause deliver advanced outcomes.

This will definitely help hotel industry and indeed tourism industry in context of understanding clear expectations and demands of travelers or customers in future.

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