

# HOTEL REVIEW ANALYSIS FOR THE PREDICTION OF BUSINESS USING DEEP LEARNING APPROACH

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**Abstract:** *Sentiment analysis is a widely used topic in Natural Language Processing that allows identifying the opinions or sentiments from a given text. Social media is the scope for the customers to share their opinion over the products or services as part of customer reviews. Dissect this review has become an important factor for business analysis since online business is exponentially growing in today's techno-friendly competitive market. A large number of algorithms have been found in recent articles. Among those deep learning is an important approach. In the proposed methodology, long short-term memory (LSTM) and gated recurrent units (GRUs) have been used to train the hotel review data where the accuracy rate of identifying customer opinion is 86%, and 84% respectively. The dataset is also tested by using Naïve Bayes, Decision Tree, Random Forest, and SVM. For Naïve Bayes obtains an accuracy of 75%, for Decision Tree obtains an accuracy of 71%, for Random Forest the accuracy is 82% and for SVM our accuracy result is 71%. Deep learning is used to obtain better business performance and also get the review from customers and also to predict the sentiment about customer review. Our algorithm works properly and gives better accuracy.*

**Keywords:** *Natural Language Processing, Machine Learning, Deep Learning, Artificial Intelligent, LSTM, GRU.*

## I. INTRODUCTION

In the age of modern science, everything is based on online and on the internet.

Internet-based shopping has become easier and more popular because of better quality, and fast logistic systems. Internet-based

shopping and booking are very comfortable. People can easily make a booking without going outside. The most effective side part of online-based work is that people can give a review. Recognizing reviews allows others to easily understand the emotions of others and obtain the rationality result of different products.

In the hotel review, the prediction of business using Deep Learning was analysed. Many start-up businesses became failure due to lack of analysis and the sentiment of the customer. Sentiment Analysis is the most significant to improve a business site. Here, different type of data from social media as well as from the Hotel Management Website was collected using Unamo tools. And also, some supervised and unsupervised data is used to predict the best result. This article will help to improve the business. At present, online-based opinions can easily analysis with the help of Sentiment Analysis (SA). It is the management of sentiments, different opinions, subjective text, and different emoji used for giving reviews. People can easily get the comprehension information related to people reviews. Mainly Sentiment analysis is one kind of tool that helps to get the public sentiment. By capturing reviews of product or location or person might be found from a different internet-based site like Face book, Amazon. Sentiment Analysis is used to

increase the requirement of analysing and structuring hidden information which comes from social media in the form of unstructured data. A huge amount of data is used due to the capability of automation and can handle a huge amount of data. A different type of font of review are further classified [1].

Now a days, a business concern or a service-based firm needs feedback from its customers. Increasing of business are requiring for additional variety of services and products. So, the organization should hassle of concerning the reviews, and ratings given by its user to extend the business, as they are required for additional variety of services and products. The service-consumers will mention their feelings and reviews on online-portals [2]. By performing the opinion mining and sentiment analysis on these details we will predict the rating of that organization. One recommender system is required for generating the ratings in precise and correct manner. For a hotel business, reviews regarding numerous aspects like Cleanliness, Maintenance, Behaviour, Food, Hospitality, Room neatness, Response from the staff of Hotel, etc. plays a significant role for recommender system. The Customer's feeling with respect to a hotel depends upon the facilities they got from that hotel such as price, location, cleanliness, and facilities of

the hotel, services provided by the hotel like laundry, complimentary breakfast, free wi-fi, bar/lounge, babysitting rooms etc. The sentiments can be expressed in the form of excellent, good, average, poor, terrible etc. Basically, the customers want to convey their sentiment with these rating and review.

## **MOTIVATION**

If any business wants to sustain in the market for a longer period, then their customer's reviews are the key indicators for their business. In the future NLP plays very crucial role in business because in 10 out of 9 people using mobiles for their daily shopping, social media posts, movie ticket booking, hospital appointment, Hotel booking etc.

Every day petabytes of unstructured data generating in the web if we extract some useful information from that unstructured data that can be useful for business growth. So I take hotel domain to extract the information from the unstructured data (text reviews) and contribute my knowledge towards society development. While solving hotel review analysis problem I learn a lot and gain more knowledge.

## **II. LITERATURE SURVEY**

Lumi lee from china (2016)[3] enquired and analyzed 72 research paper related to the tourism and hospitality that was published in research journals between

January 2008 and December 2015. He analyzed and reviewed the topic related to characteristic of tourism and hospitality online reviews in different marketing segments and used heuristic systematic model (HSM) to divide and sum up the features that affect consumer's belief in previous HTOR studies. They believed that their suggested ideas will help in the identification of research topic in extended HTORs literature and pointing out possible direction for future studies.

Piang and bm. (2017) [4] offers a foundation for understanding the operational challenges and recognize several research paths for social media analytics in hospitality and tourism area. They comparatively examined information quality related to online reviews on entire hotel population in Manhattan, New York using three major online review platforms which are TripAdvisor, Expedia and yelp through text analytics. The authors state that there exists an enormous inconsistency in the representation of the hotel industry on these platforms. In addition, online reviews differ greatly in terms of their sentiment, semantic features, linguistic characteristic, rating and relationship between the features.

In our modern science, many authors work on sentiment analysis. R. K. Bakshi addresses his article about sentiment

analysis and how to do it on the opinion of humans. Later on,

L. Yang et al.[5] analysis on e-commerce review using the deep learning method. The author shows the CNN and GRU technology in that case accuracy was excellent but another e-commerce review is not a good analysis in CNN algorithm.

Hemalatha S et al.[6] the author describes the notion investigation are the audits on eateries about food, administration, cost, and feeling. Machine Learning calculations in the nltk library of python can end up being exceptionally valuable in any such exploration of Natural Language Processing and the library has been utilized broadly in this work [3].

Zeenia Singla et al.[7] also analysis on e-commerce review and she demonstrates her methodology portrayed characterization of surveys as useful to assess the item comprehensively, empowering better-dynamic for customers. These days, social sites like Facebook, Twitter are generally utilized for posting the clients audits about various things, for example, films, news, food, style, governmental issues, and considerably more.

Charu Nanda [8] writes in her research sentiment Analysis on film audits in the Hindi language is examined. Online audits received familiarity as individuals are making choices with the assistance of them.

In the future most of the choices are based on Artificial Intelligence (AI). Similarly, many creator examinations on client audit in the various cycles. In this manner, the business future can be anticipated [9]. Hui Yuan, the author designed a novel social media analytics framework on top of Apache Spark for predicting and visualizing consumers' opinion orientations based on their relationships with other consumers whose opinion orientations are known. For analysis of customer opinion, they use state-of-the-art collective classification (CC) algorithms. This algorithm considers not only user's local features but also their relational features. Some authors contribute to this analysis system about many other language comments and reviews [10]. They are delectable about e-commerce sentiment analysis.

### III. PROPOSED WORK

In the proposed system, different types of an algorithm are used for the analysis of sentiment of customer. In research work, the analytical part depends on evaluation or developing an algorithm.

Though the work, a dataset of the business sector and the dataset from the different website along with some procedure can be developed. In the modern era, natural Language Processing is mostly effective in the machine learning part.

and GRU where the prediction accuracy is up to 86% in different approach. These data are trained by deep learning algorithms such as LSTM.

In this paper, different types of an algorithm are used for the analysis of sentiment of customer. In research work, the analytical part depends on evaluation or developing an algorithm. Though the work, a dataset of the business sector and the dataset from the different website along with some procedure can be developed. In the modern era, natural Language Processing is mostly effective in the machine learning part. In that case sentiment analysis is most important in any business future. In this method, initially collect the data then process the data for our algorithm purpose. These data are trained by deep learning algorithms such as LSTM and GRU where the prediction accuracy is up to 86% in different epoch. Finally, classify the reviews in machine learning algorithms like Naïve Bayes, Decision Trees, Random Forest, and SVM and compare their accuracy level. Sentiment Analysis refers to the use of natural language processing, text, and emoji analysis to identify, extract, qualify, and study affective states. It is mainly applied to the voice of the customer like the customer opinion, survey response which will give in a different type of social media or sites. Initially,

collect some data from the dataset which is unsupervised through Unamo tools from social media. Later on, some unsupervised algorithms were used on those datasets for classification, and some supervised algorithms are utilized.

### **SYSTEM DESIGN**

This system initially inputs data from the database then we start our cleaning process of data. Meanwhile, remove the dataset's superfluous Attribute. Remove all white space, punctuation, links, and email addresses, implying the use of the lemmatization method and stemming. The data are trained by the algorithms such as GRU, and LSTM. Then our trained system is evaluated by testing the data. Finally, the customer's satisfaction was assessed.

### **Naïve Bayes Algorithm**

This algorithm is one of the popular classification machine learning algorithms that helps to classify the data, based upon the conditional probability values computation. It is the best algorithm for real-time Prediction, multi-class prediction, recommendation system, text classification, and sentiment analysis [20] use cases. By using this algorithm, it is easily to implement a huge dataset. The formula of the algorithm is:

$$P(c|x) = (P(x|c) * P(c)) / P(x)$$

Here,  $P(c)$  = the prior probability of class.

$P(c|x)$  = the posterior probability.

$P(x)$  = the prior probability of predictor.

$P(x|c)$  = the probability of predictor

**Decision tree :**

It is a supervised Machine Learning Algorithm that divided data at each row based on certain rules until the outcome is generated. This algorithm is adopted to solve the problem easily and it is easy to understand.

**Long Short Term Memory:**

LSTM is one kind of recurrent neural network which used in the field of deep learning. To work with data for a long period, LSTM is used to retain the information. Processing, predicting, and classifying based on time series data is performed by LSTM. Gated recurrent unit It is one kind of Long-Term Memory Algorithm with forget Gate. GRU gives the best performance for the less frequent dataset. In recurrent neural networks when vanishing gradient problems are shown GRU is used to solve a huge dataset.

**SYSTEM ARCHITECTURE**

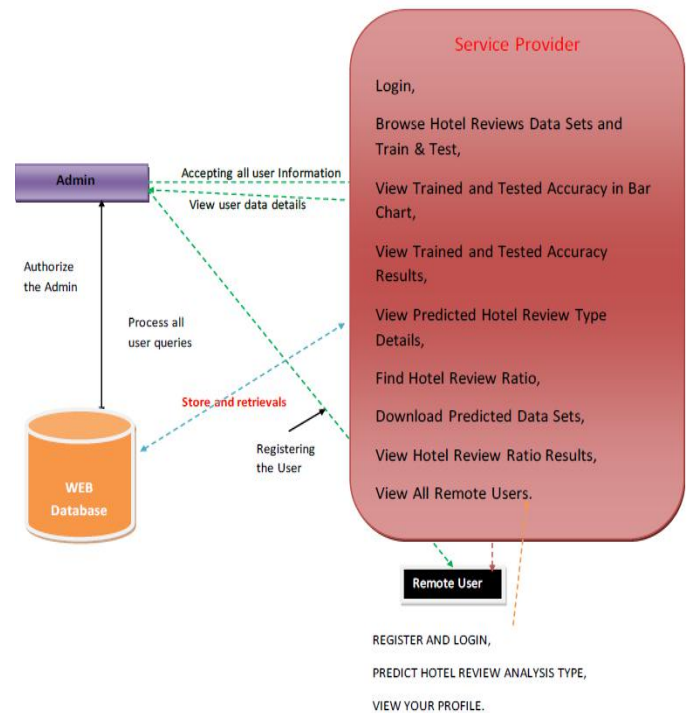


Fig.1 System architecture

**The above figure is the system architecture:**

- There are two sections like Service Provider and Admin
- Figure shows that Service provider takes care of whole details like Login, Browse Hotel Reviews Data Sets and Train & Test, View Trained and Tested Accuracy in Bar Chart, View Trained and Tested Accuracy Results, View Predicted Hotel Review Type Details, Find Hotel Review Ratio, Download Predicted Data Sets, View Hotel Review Ratio Results, View All Remote Users. Service provider provides services to the customer
- The new customer have to register and login to see the website, view the profile.



- Admin will login before Customer's login
- Web Database will process all user queries

**IV. RESULTS**

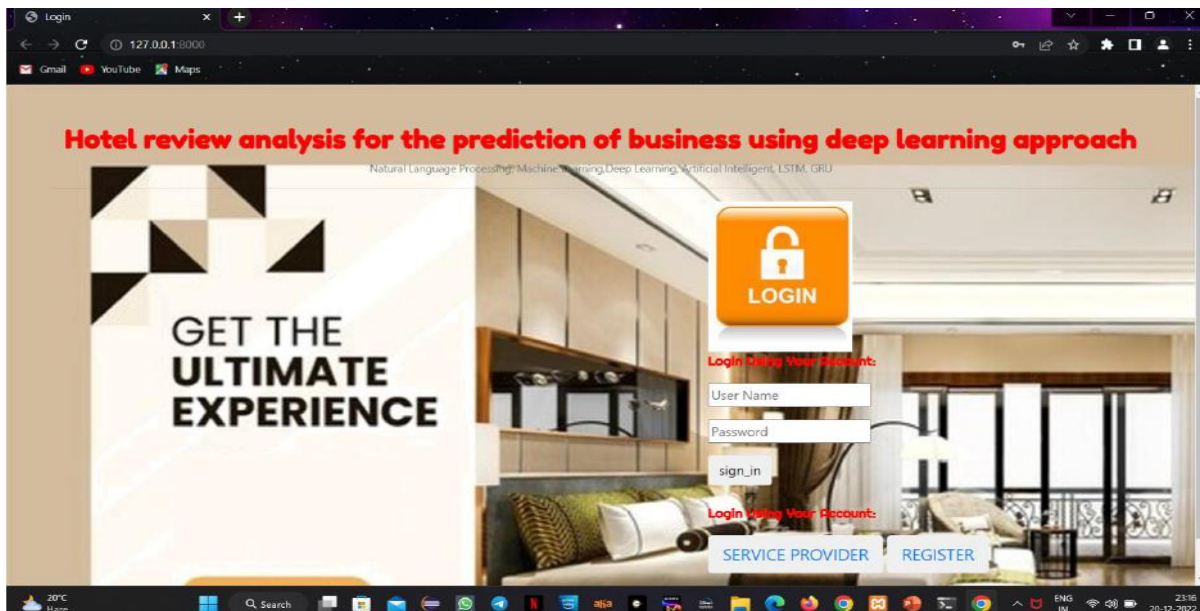


Fig.2 Hotel Review Analysis Server

In Above Screen, Below there is the ‘Service provider

In there Admin has to login not users. Enter User signup details and then click on ‘Register’ Button for user account creation

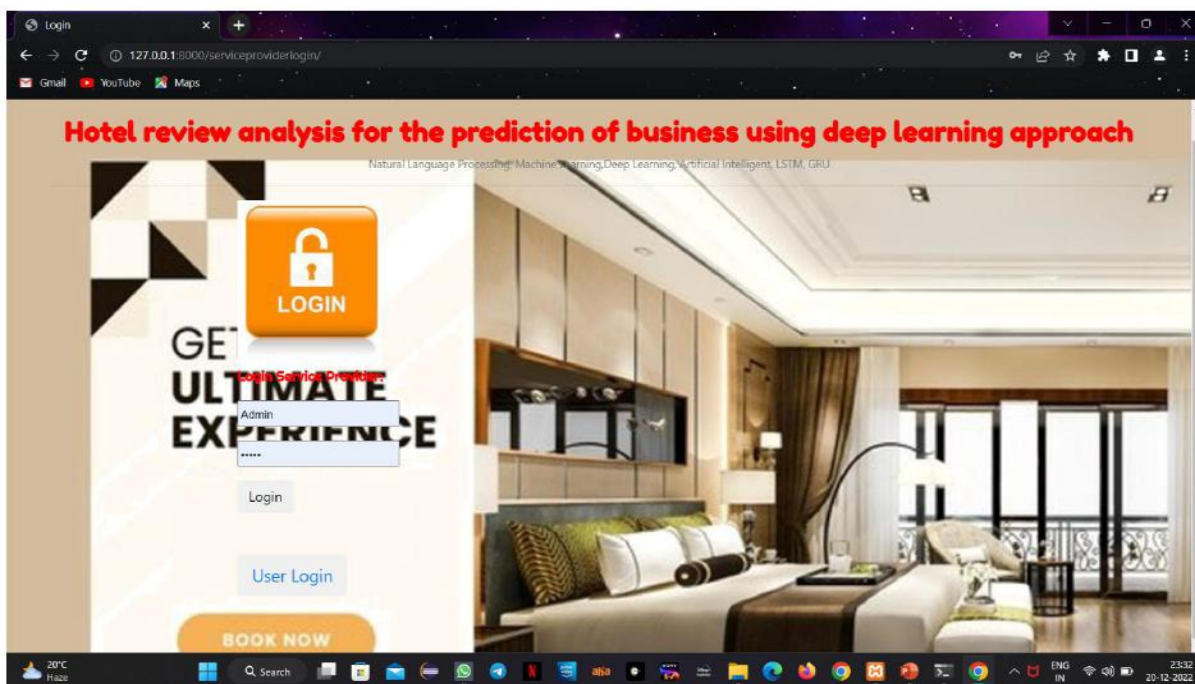


Fig.3 Admin signup page

Firstly, Admin has to login before the user. In the above screen shows Admin i.e Service provider is logging in

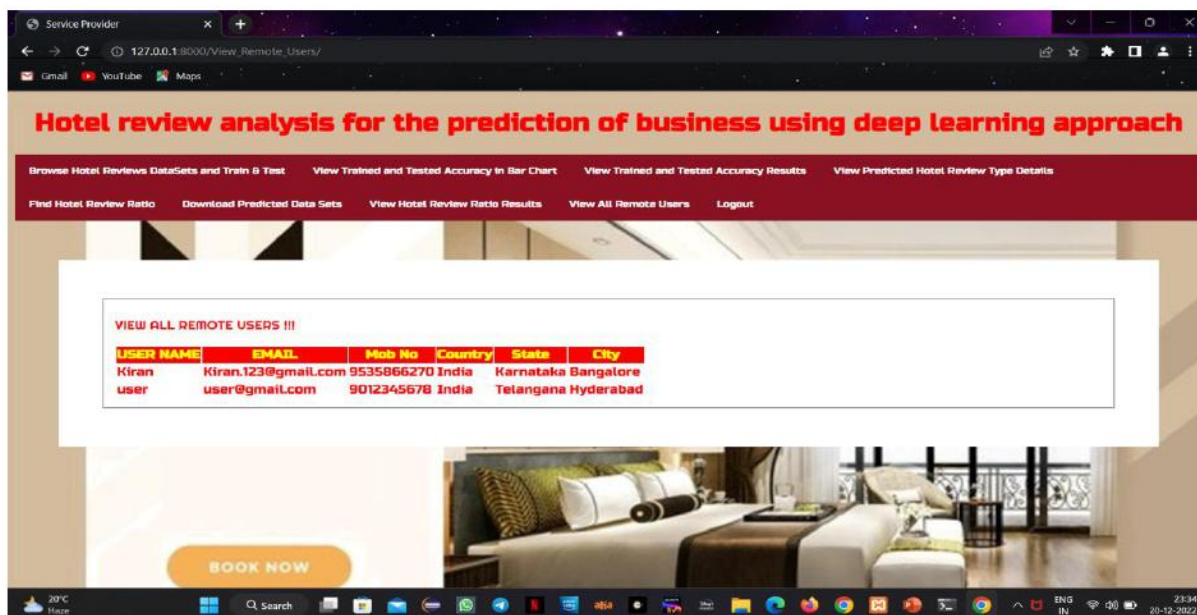


Fig.4 Admin Account

Admin i.e ‘Service Provider’ has Every User account details

Admin has Every Details Regarding Hotel Accuracy results, Ratio, Data sets etc

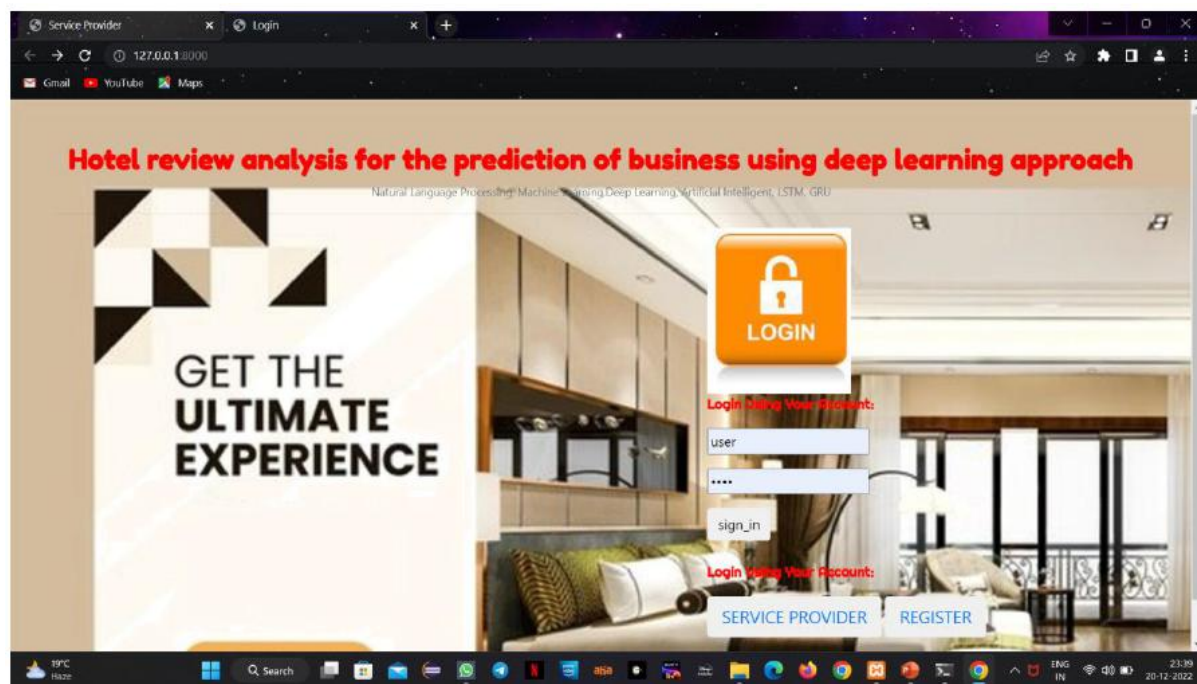


Fig.5 User login

After Admin login into website. Then only User can login

If You are a new user ‘Register’ And then Log into the website



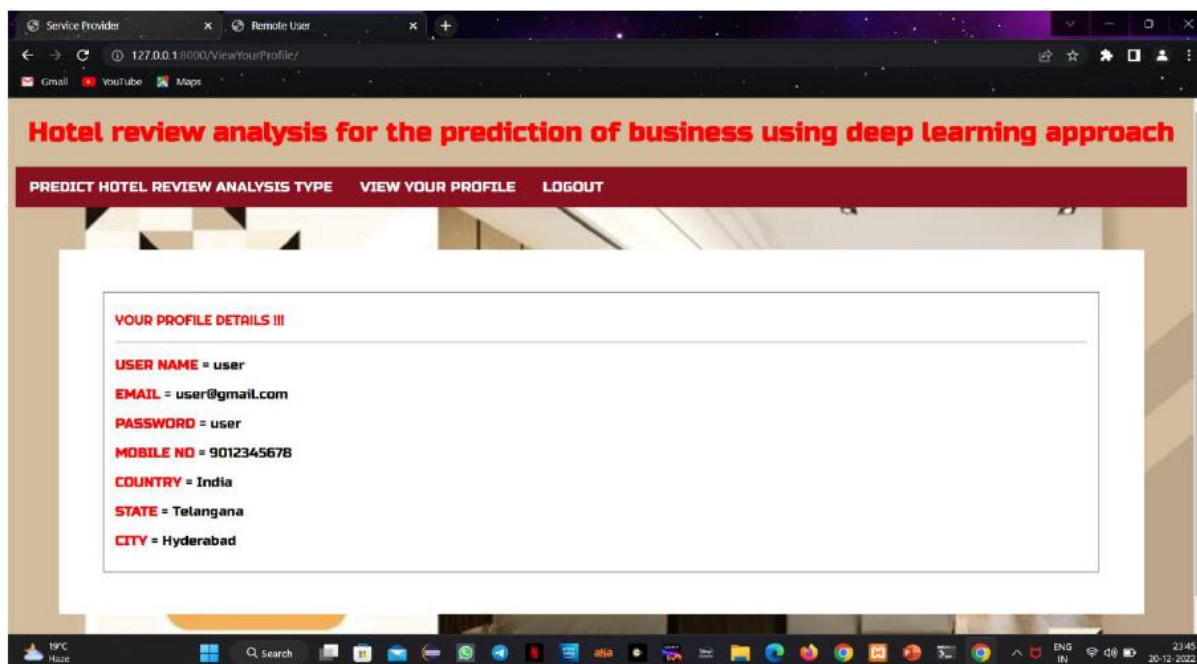


Fig.6 User account details

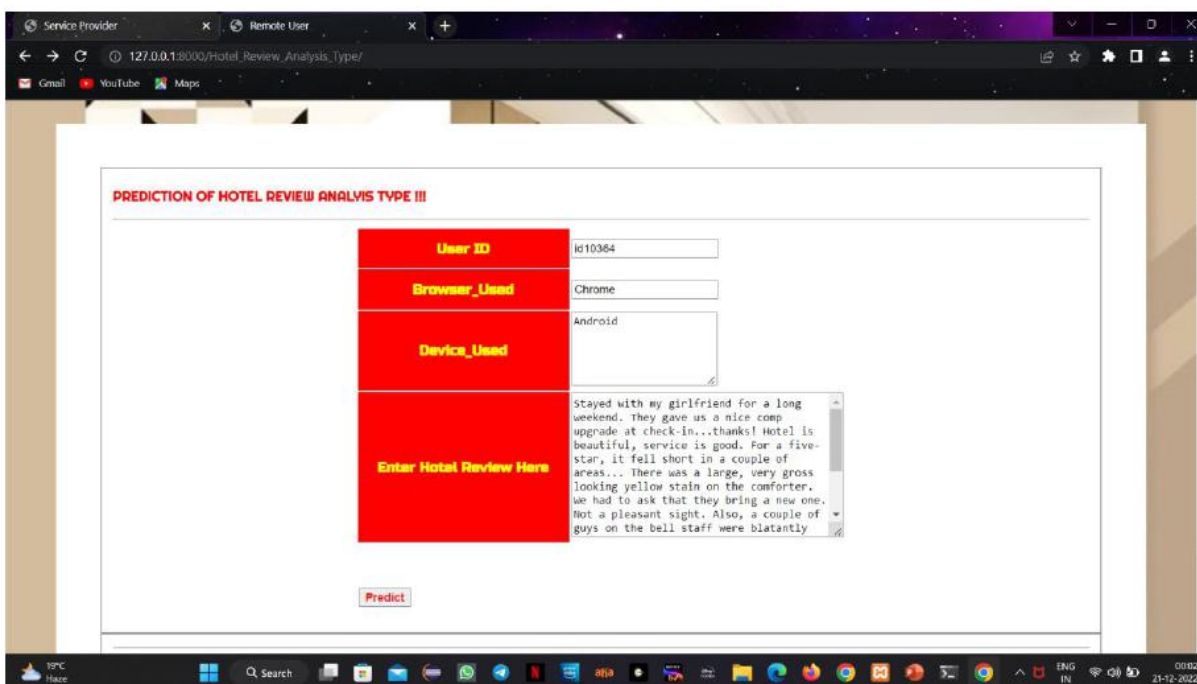


Fig.7 Predicting Customer review

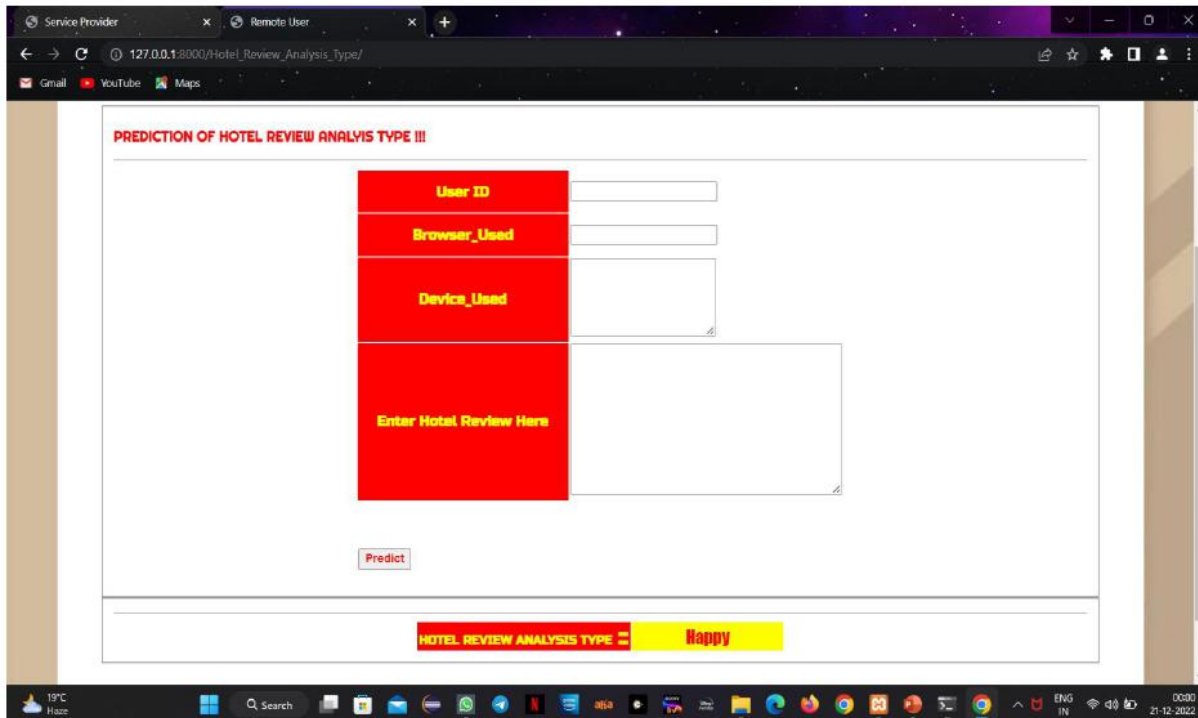


Fig.8 predicted review

- Reading those Lengthy reviews is the hardest thing
- After reading those lengthy review, we can't Predict whether it is good hotel or bad
- But Hotel review prediction web Application can predict whether it is a good one or not.
- In the above Screen Predicts in the above result.

## V. CONCLUSION

The present age is the modern age. Everything in the age is now technology dependent and every person in the country is able to familiarize themselves with this technology. With the help of that technology, online marketing has become popular in today's world, which has easily become popular among people. People are now getting a lot of things through their hands very easily. One part of online marketing is the online hotel booking

system. With this people can easily prebook the hotel of their choice and they can easily go to their hotel without having to bother to search for the place. It has become the most popular among people and this led to an increase in the number of people traveling around. And at the same time, they can able to view different beautiful places of the world by taking advantage of this hotel booking. In the future, many more features can be added to the project and ensure more popular things.

## REFERENCES

1. R. K. Bakshi, N. Kaur, R. Kaur and G. Kaur, "Opinion mining and sentiment analysis," 2016 3rd International Conference on Computing for Sustainable Global Development (INDIA.Com), New Delhi, 2016, pp. 452-455.
2. L. Yang, Y. Li, J. Wang and R. S. Sherratt, "Sentiment Analysis for E-Commerce Product Reviews in Chinese Based on Sentiment Lexicon and Deep Learning," in IEEE Access, vol. 8, pp. 23522- 23530, 2020, doi: 10.1109/ACCESS.2020.2969854.
3. H. S. and R. Ramathmika, "Sentiment Analysis of Yelp Reviews by Machine Learning," 2019 International Conference on Intelligent Computing and Control Systems (ICCS), Madurai, India, 2019, pp. 700-704, doi: 10.1109/ICCS45141.2019.9065812.
4. Z. Singla, S. Randhawa and S. Jain, "Statistical and sentiment analysis of consumer product reviews," 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Delhi, 2017, pp.1-6, doi: 10.1109/ICCCNT.2017.8203960
5. B. Seetharamulu, B. N. K. Reddy and K. B. Naidu, "Deep Learning for Sentiment Analysis Based on Customer Reviews," 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Kharagpur, India, 2020, pp. 1-5, doi: 10.1109/ICCCNT49239.2020.9225665.
6. Rahul, V. Raj and Monika, "Sentiment Analysis on Product Reviews," 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), Greater Noida, India, 2019, pp. 5-9, doi: 10.1109/ICCCIS48478.2019.8974527.
7. Y. Saito and V. Klyuev, "Classifying User Reviews at Sentence and Review Levels Utilizing Naïve Bayes," 2019 21st International Conference on Advanced Communication Technology (ICACT), PyeongChang Kwangwoon\_Do, Korea (South), 2019, pp. 681-685, doi: 10.23919/ICACT.2019.8702039.
8. A.Salinca, "Business Reviews Classification Using Sentiment Analysis," 2015 17th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC), Timisoara, 2015, pp. 247-250, doi: 10.1109/SYNASC.2015.46.
9. ChhayaChauhan, SmritiSehgal "SENTIMENT ANALYSIS ON PRODUCT REVIEWS", International Conference on Computing, Communication and Automation

(ICCCA2017) ISBN:978-1-5090-6471-7/17/\$31.00 ©2017 IEE

10. Prasadu Peddi (2019), "Data Pull out and facts unearthing in biological Databases", International Journal of Techno-Engineering, Vol. 11, issue 1, pp: 25-32.