Project Report On

Understanding Guest Perceptions Using Sentiment Analysis

INTRODUCTION

1.1 Overview

Sentiment analysis is a field of study that focuses on analyzing and classifying human emotions, opinions, and sentiments expressed in text data. In the context of understanding guest perceptions, sentiment analysis can be used to analyze feedback from guests, such as reviews and surveys, to determine their overall satisfaction with a hotel or service.

A machine learning project for sentiment analysis would involve collecting a large dataset of guest feedback, pre-processing the data to remove noise and irrelevant information, and then using machine learning algorithms to train a model to identify the sentiment in the feedback. The model can then be used to classify new, unseen feedback into categories such as positive, neutral, or negative.

There are several algorithms that can be used for sentiment analysis, including Naive Bayes, Support Vector Machines (SVM), and Recurrent Neural Networks (RNN). The choice of algorithm will depend on the specific requirements of the project and the size and quality of the data available for training.

Once the model is trained, it can be used to automatically classify new guest feedback, providing valuable insights into guest perceptions. This information can then be used by hotels to improve their services and enhance guest experiences. Additionally, sentiment analysis can also help hotels track trends and identify areas for improvement over time.

1.2 Purpose

The purpose of a sentiment analysis project using machine learning to understand guest perceptions is to gain insights into the opinions and emotions of guests with regards to their experiences at a hotel or service. The project aims to:

1. Evaluate guest satisfaction: The project can be used to determine the overall level of satisfaction among guests and identify areas for improvement.
2. Enhance guest experiences: By understanding guest perceptions, hotels can take steps to enhance the guest experience and increase customer satisfaction.
3. Track trends: Sentiment analysis can be used to track trends over time and identify patterns in guest feedback, allowing hotels to make data-driven decisions.
4. Save time and resources: Automating the process of sentiment analysis using machine learning can save time and resources compared to manual analysis.

5. Provide actionable insights: The results of the sentiment analysis can be used to provide actionable insights for hotels to improve their services and enhance the guest experience.

Overall, the purpose of a sentiment analysis project using machine learning is to provide valuable insights into guest perceptions and help hotels make informed decisions to improve their services and enhance guest experiences.

2.LITERATURE SURVEY

2.1 Existing Problem

There are several problems that hotels and other service providers face when trying to understand guest perceptions:

1. Large volume of data: Review websites and feedback platforms can generate a large volume of data, making it difficult and time-consuming to manually analyze and understand guest perceptions.
2. Lack of actionable insights: Manually reading through guest feedback can be challenging, and it can be difficult to extract actionable insights from the data.
3. Bias in manual analysis: Manual analysis can be subject to personal bias, leading to inaccurate results and incorrect conclusions.
4. Inability to track trends: Without an automated method of analyzing guest feedback, it can be difficult to track trends and identify patterns over time.
5. Inefficient use of resources: Manually analyzing guest feedback can be a time-consuming and resource-intensive process, and it may not be feasible for all organizations.

By using sentiment analysis and machine learning, these problems can be addressed by providing an automated and efficient method of analyzing guest feedback and gaining valuable insights into guest perceptions. The results can be used to improve services, enhance guest experiences, and make informed decisions based on data-driven insights.

2.2 Proposed Solution

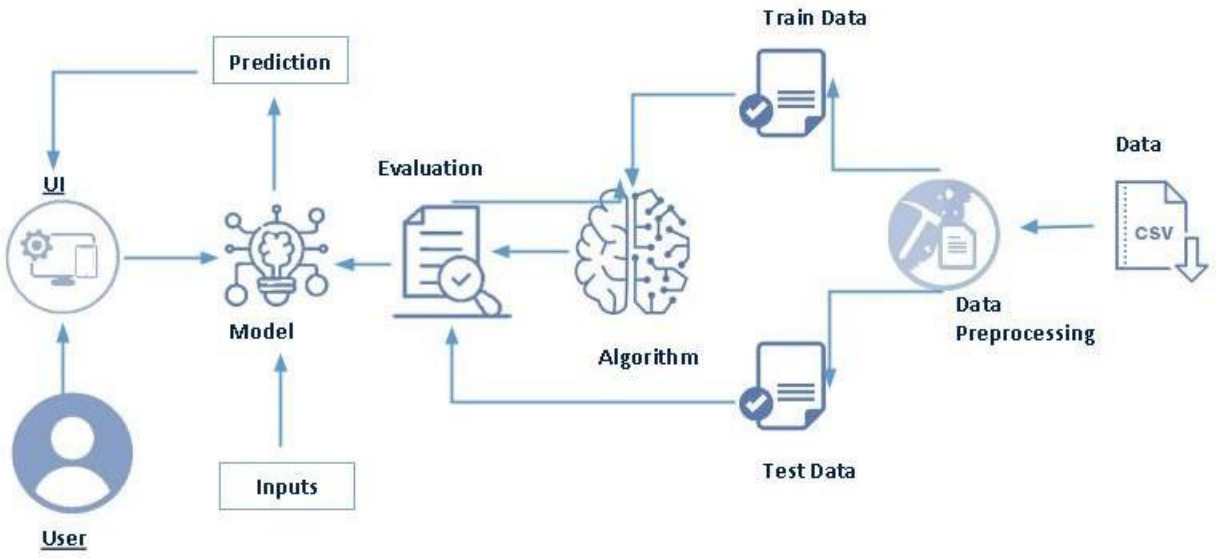
The proposed solution to the problems faced by hotels and other service providers in understanding guest perceptions is to use sentiment analysis and machine learning. The solution involves the following steps:

1. Collect and preprocess the data: Collect a large dataset of guest feedback, clean and preprocess the data to remove noise and irrelevant information, and convert the text data into numerical features that can be used by machine learning algorithms.
2. Train a sentiment analysis model: Use machine learning algorithms to train a model to identify the sentiment in the feedback, such as positive, neutral, or negative. The model can be trained on the preprocessed data and evaluated for performance.
3. Deploy the model: Deploy the trained model in a production environment, where it can be used to classify new, unseen guest feedback.
4. Analyze the results: Use the results of the sentiment analysis to gain valuable insights into guest perceptions, such as overall satisfaction, areas of improvement, and trends over time.

By using sentiment analysis and machine learning, hotels and other service providers can gain a better understanding of guest perceptions, extract actionable insights from the data, and make informed decisions to improve their services and enhance guest experiences. The automated process of sentiment analysis can save time and resources compared to manual analysis and provide more accurate results, free from personal bias.

3. THEORETICAL ANALYSIS

3.1 Block Diagram:



3.2 Hardware/Software Designing

1.Software Requirements

1.Downloading of Anaconda Navigator

2.Downloading of python packages like

a. NumPy Package

b. Pandas

c. librosa

d. Tensor Flow

e. Matplotlib

f. scikit-learn

g. Flask

h. pyhton_speech_features

I. mfcc

j. from python_speech_features import mfcc

k. import sklearn.model_selection

l. from sklearn.model_selection import train_test_split

m. import scipy.io.wavfile as wav

n. import os

o. import pickle

p. import operator

These are some of the software requirements required to implement the music genre classification project using KNN algorithm.

4.EXPERIMENTAL INVESTIGATION

Importing the Libraries

First step is usually importing the libraries that will be needed in the program.

Pandas: It is a python library mainly used for data manipulation.

NumPy: This python library is used for numerical analysis.

Matplotlib and Seaborn: Both are the data visualization library used for plotting graph whichwill help us for understanding the data.

csr_matrix() :A dense matrix stored in a NumPy array can be converted into a sparse matrix usingthe CSR representation by calling the csr_matrix() function.

Train_test_split: used for splitting data arrays into training data and for testing data.

Pickle: to serialize your machine learning algorithms and save the serialized format to a file.

Reading the Dataset

For this project, we make use of datasets (hotel_reviews.csv). We will be selecting the important features from these datasets that will help us in recommending the best results.

The next step is to read the dataset into a data structure that's compatible with pandas. Let's load a .csv data file into pandas. There is a function for it, called **read_csv().** We will need to locate the of the CSV file at first (it's more efficient to keep the dataset in the same directory as your program).If the dataset in same directory of your program, you can directly readit, without any path. After the next Steps we made following bellow:

1.Data visualization

2.Collabrative and filtering

3.Creating the Model

4.Test and save the model

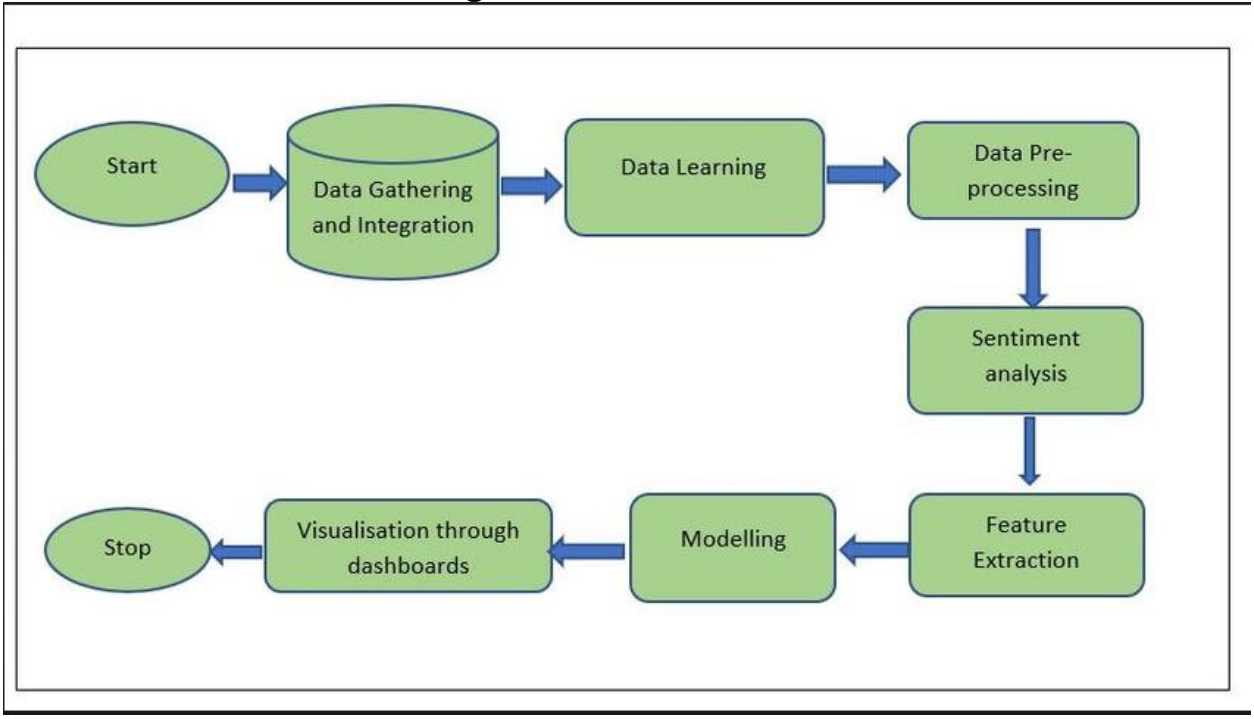
5.Buil Python code

6.Build HTML Code

7.Run the application

5.FLOWCHART

❖ Flow chart of the music genre classification:



6.RESULT

The results of a sentiment analysis project using machine learning can provide valuable insights into guest perceptions. Some of the possible results include:

1. Overall satisfaction: Determine the overall level of satisfaction of guests based on the sentiment analysis of the feedback, such as positive, neutral, or negative.
2. Areas of improvement: Identify areas where improvements are needed based on negative feedback, such as poor service, uncomfortable rooms, or unsatisfactory food quality.
3. Trends over time: Track changes in guest perceptions over time, such as changes in overall satisfaction levels or the frequency of negative feedback for specific areas.
4. Sentiment distribution: Visualize the distribution of sentiments in the feedback, such as the percentage of positive, neutral, or negative feedback.
5. Key drivers of satisfaction: Identify the key drivers of satisfaction or dissatisfaction among guests, such as specific amenities, staff behaviour, or room quality.
6. Comparison with competitors: Compare the guest perceptions of the service provider with those of its competitors, to identify areas where it is performing well or where improvements are needed.

The results of the sentiment analysis can be used by hotels and other service providers to improve their services, enhance guest experiences, and make informed decisions based on data-driven insights. The use of sentiment analysis and machine learning can provide a more efficient and accurate method of analyzing guest feedback compared to manual analysis, and can provide a deeper understanding of guest perceptions.

Regenerate response

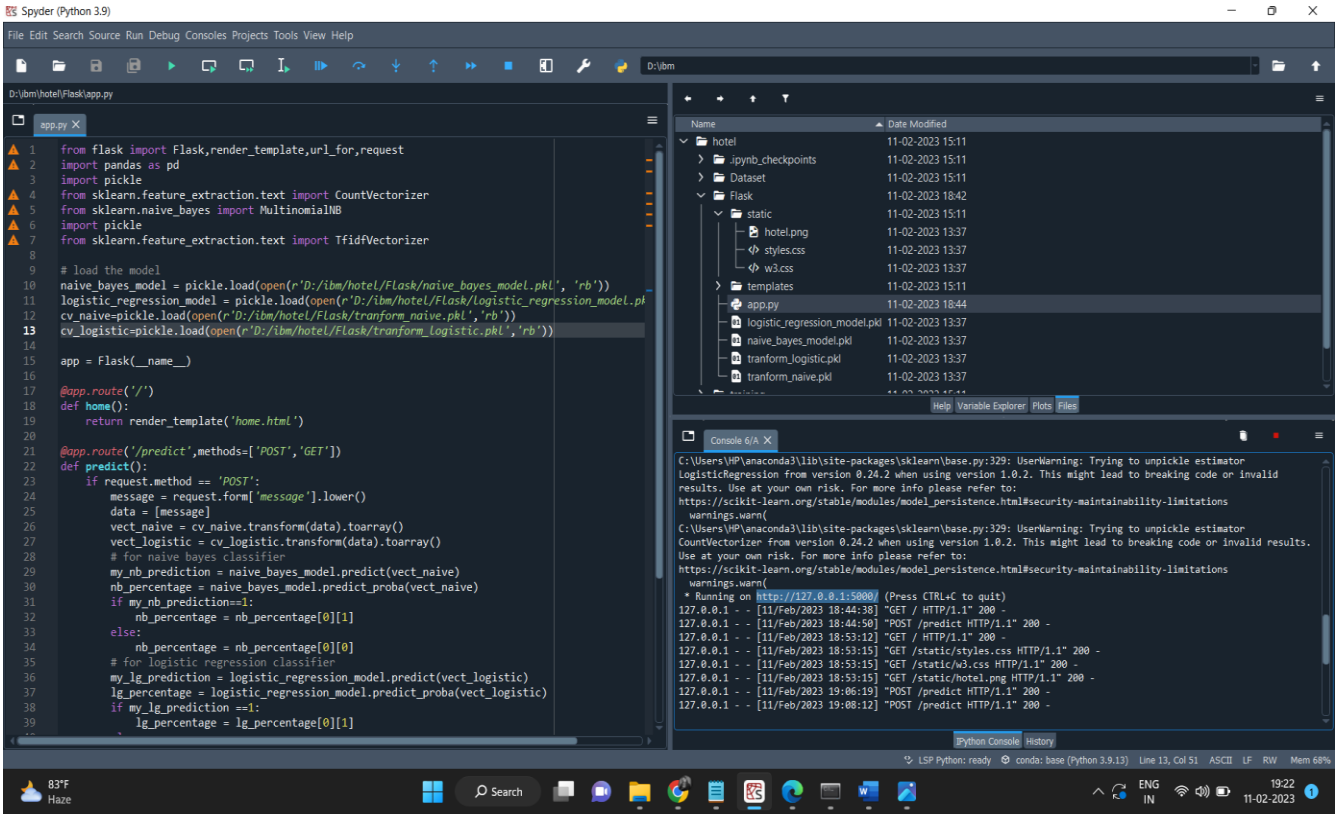


Fig 6.1 Flask code on Spyder

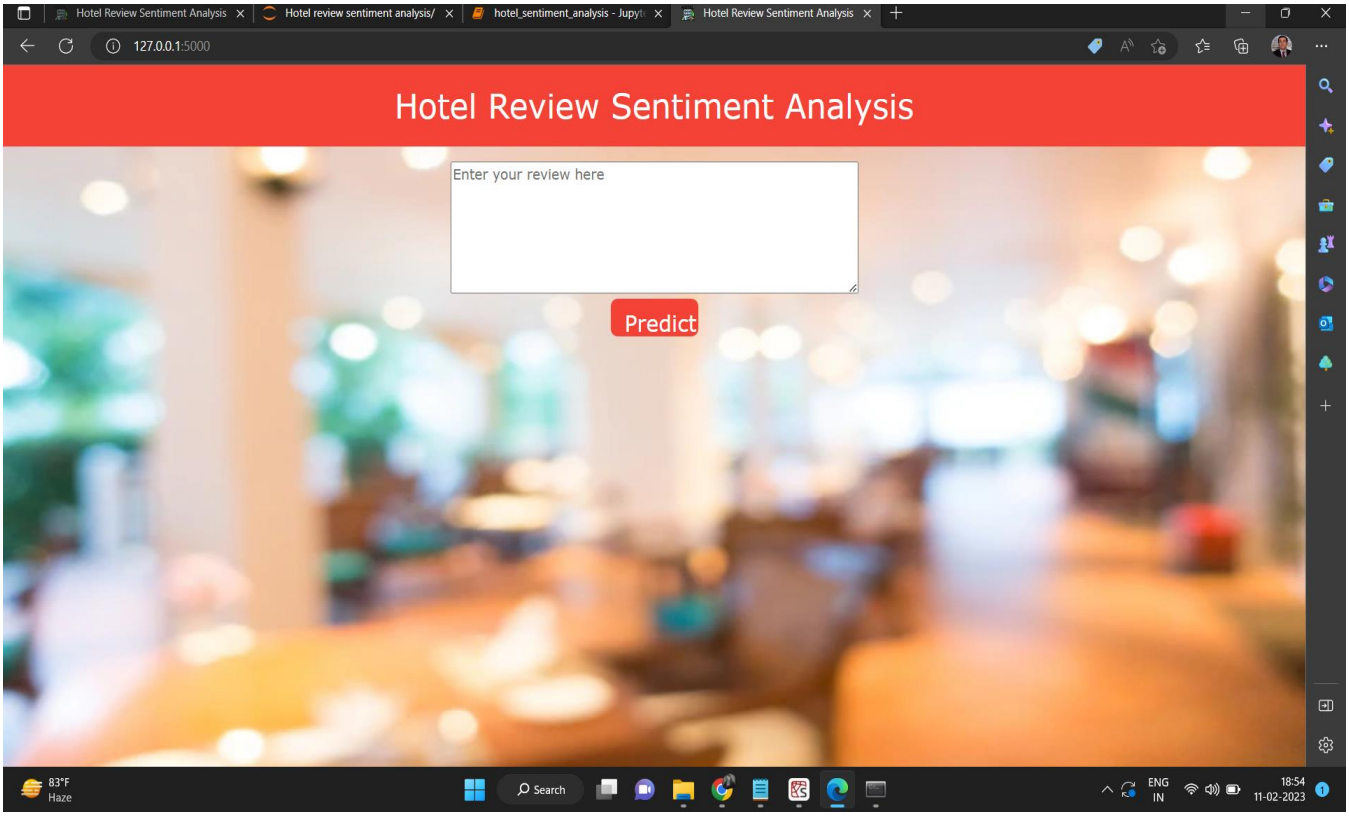


Fig 6.2 Home page for Hotel Review of sentiment analysis

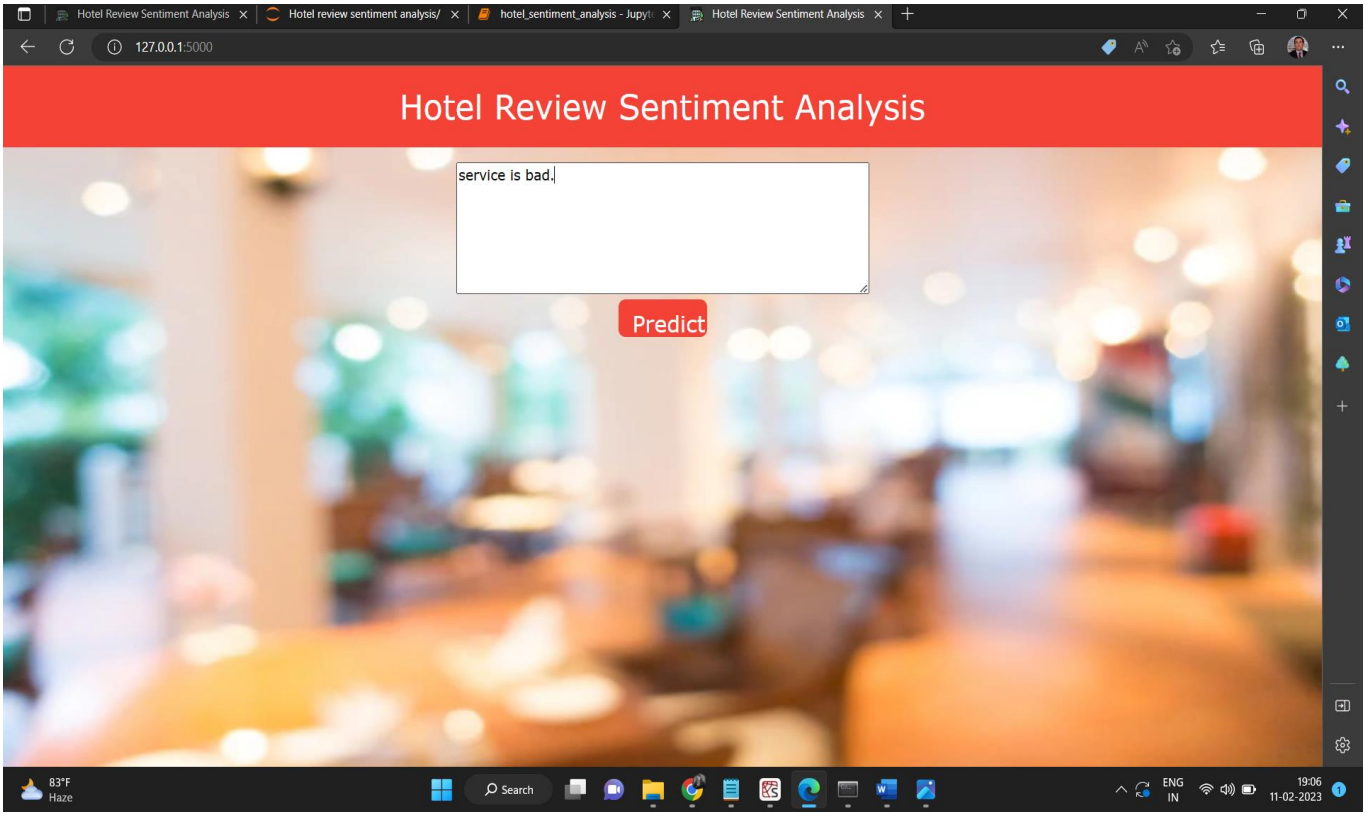


Fig 6.3 Predicting page of Hotel Review of sentiment analysis

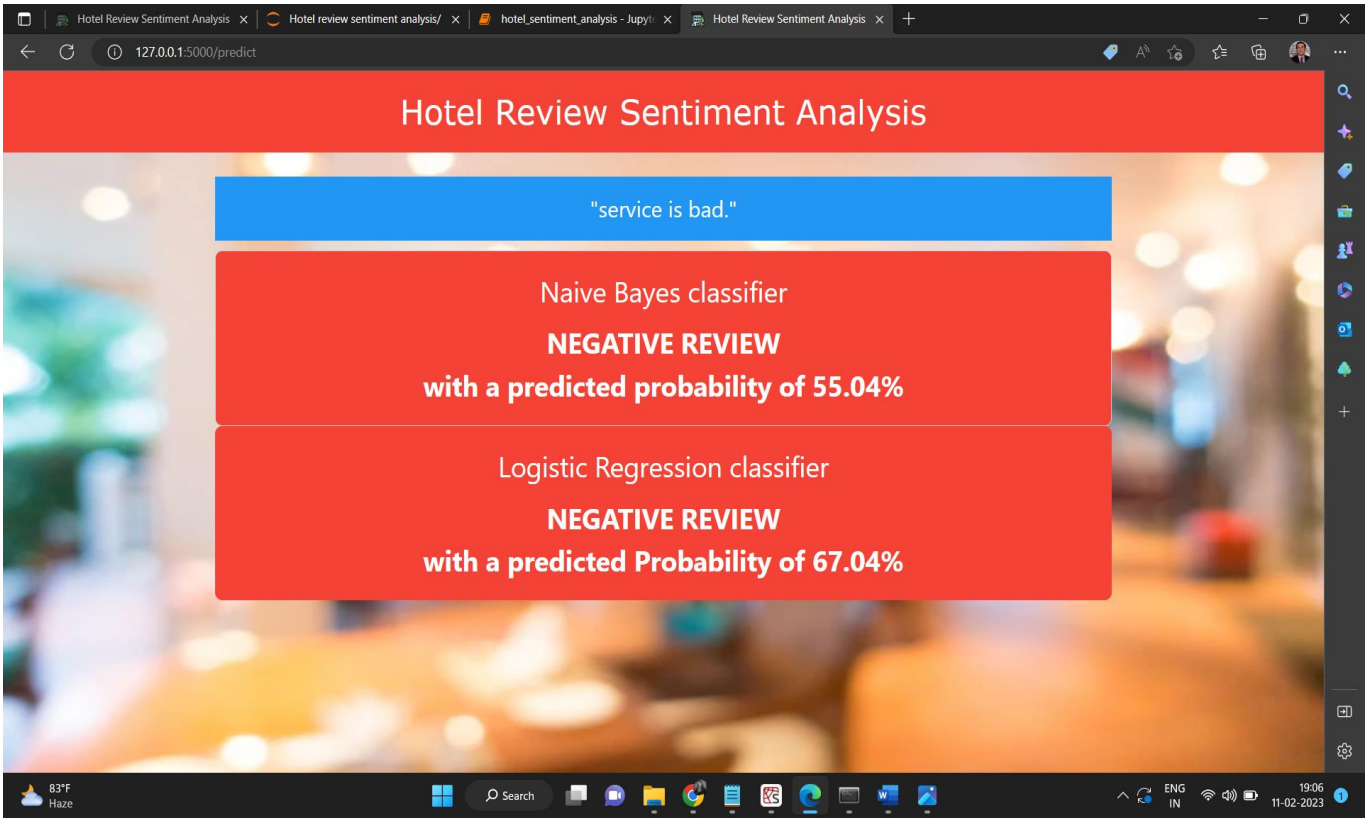


Fig 6.4 Predicting page of Hotel Review of sentiment analysis

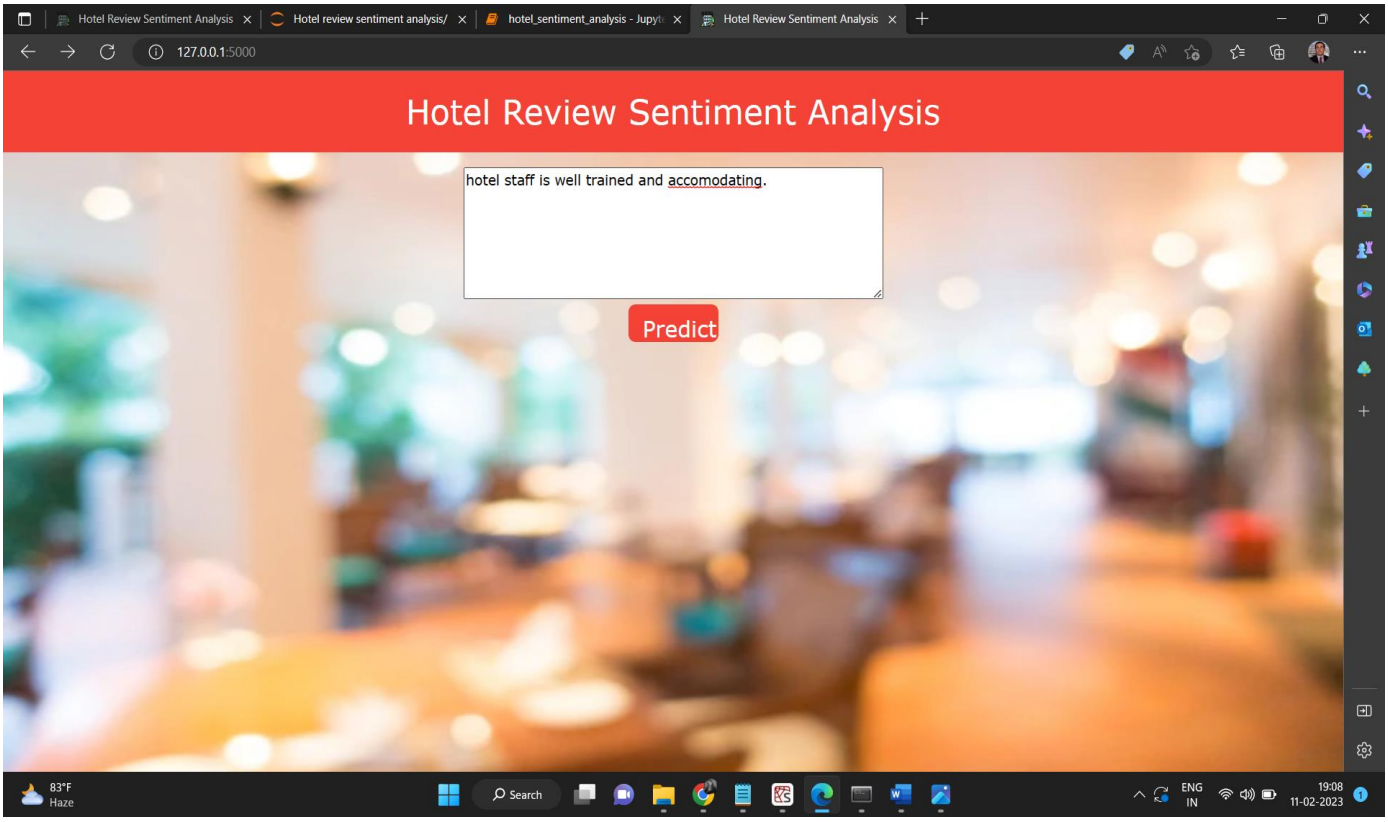


Fig 6.5 Predicting page of Hotel Review of sentiment analysis

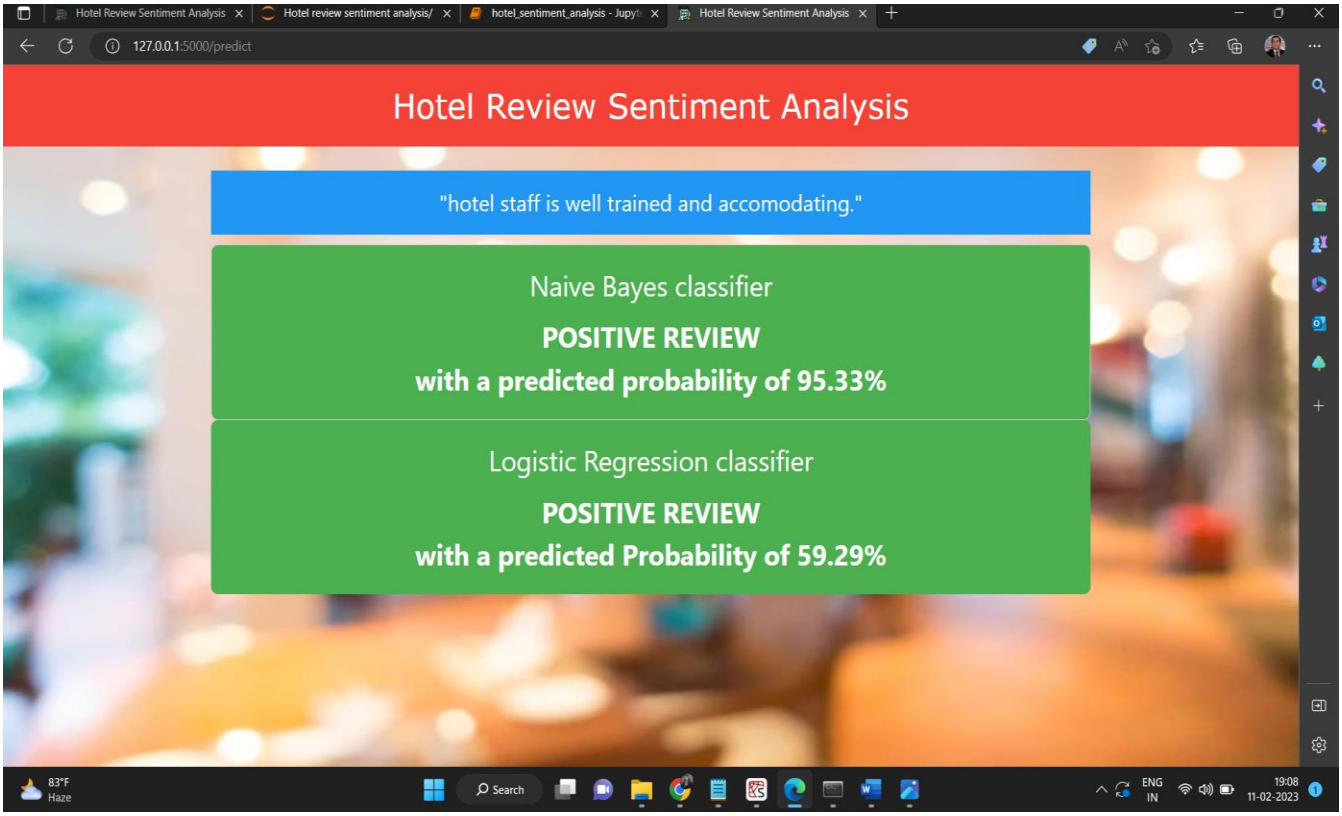


Fig 6.6 Predicting page of Hotel Review of sentiment analysis

7.ADVANTAGES AND DISADVANTAGES

ADVANTAGES

1. Automation: Sentiment analysis using machine learning can automate the process of analyzing guest feedback, reducing the time and effort required compared to manual analysis.
2. Large scale analysis: Machine learning algorithms can process large datasets of feedback more efficiently than manual methods, providing a more comprehensive analysis of guest perceptions.
3. Improved accuracy: Sentiment analysis using machine learning can be more accurate than manual analysis, as it is less prone to human error and can handle complex and nuanced sentiment expressions.
4. Objective analysis: Sentiment analysis using machine learning provides an objective and data-driven approach to understanding guest perceptions, reducing the influence of personal biases and subjective interpretations.

DISADVANTAGES

1. Data quality: The quality of the results of sentiment analysis depends on the quality of the data, and noisy or irrelevant data can negatively impact the accuracy of the results.
2. Bias in data: Sentiment analysis models can be biased if the training data contains a skewed representation of sentiments, leading to inaccurate results.
3. Limited interpretability: Sentiment analysis models are complex and difficult to interpret, making it challenging to understand how the model arrived at its results.
4. Difficulty in handling complex sentiments: Sentiment analysis models may struggle to accurately analyze complex or nuanced sentiments, leading to incorrect results.
5. Lack of context: Sentiment analysis models may not take into account contextual information that is important for understanding guest perceptions, leading to incorrect results.

8.APPLICATIONS

1. Customer feedback analysis: Analyze guest feedback from various sources, such as online reviews, social media posts, and survey responses, to gain a deeper understanding of guest perceptions.
2. Guest satisfaction tracking: Track changes in guest satisfaction over time to identify areas for improvement and evaluate the impact of changes to services.
3. Employee training and evaluation: Use sentiment analysis to evaluate the impact of employee behavior on guest perceptions, and to provide training to employees on how to improve guest experiences.
4. Marketing and branding: Use sentiment analysis to monitor and respond to guest feedback on social media and other online platforms, to improve the image of the service provider and to enhance guest experiences.
5. Service quality improvement: Use sentiment analysis to identify areas of poor service quality, and to prioritize improvements to services based on guest feedback.

9.CONCLUSION

In conclusion, sentiment analysis using machine learning is a powerful tool for understanding guest perceptions in the hospitality and service industries. This method can automate the process of analyzing guest feedback, provide a more comprehensive analysis of guest perceptions, and offer objective and data-driven insights. By leveraging the strengths of machine learning algorithms, sentiment analysis can provide valuable information to service providers, allowing them to identify areas for improvement, prioritize changes, and evaluate the impact of those changes on guest perceptions.

However, it is important to be aware of the limitations of sentiment analysis with machine learning, such as the quality of the data, the potential for bias, and the difficulty in handling complex and nuanced sentiments. As with any technology, sentiment analysis should be used as one of several methods to gain a complete understanding of guest experiences, and it is important to consider the results of sentiment analysis in conjunction with other data sources and methods to gain a well-rounded understanding of guest perceptions.

10. FUTURE SCOPE

The future scope for sentiment analysis using machine learning is quite promising, with several potential areas of growth and improvement:

1. Improved accuracy: The accuracy of sentiment analysis models is likely to improve as more advanced algorithms and techniques are developed, and as more data is collected and analyzed.
2. Integration with other technologies: Sentiment analysis may be integrated with other technologies, such as natural language processing and customer relationship management systems, to provide a more comprehensive and integrated view of guest perceptions.
3. Real-time analysis: Sentiment analysis models may be designed to process and analyze data in real-time, allowing service providers to quickly respond to changes in guest perceptions and take action to improve guest experiences.
4. Personalized sentiment analysis: Sentiment analysis models may be customized to better understand the specific needs and preferences of individual guests, allowing service providers to tailor their services to meet the unique needs of each guest.
5. Cross-lingual sentiment analysis: Sentiment analysis models may be developed to analyze feedback from guests in multiple languages, allowing service providers to better understand guest perceptions in a global context.
6. Multi-modal sentiment analysis: Sentiment analysis may be extended to analyze data from multiple sources, including text, audio, and visual data, to gain a more comprehensive understanding of guest perceptions.

11.BIBLIOGRAPHY

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4. Jain, Piyush, and K. P. Soman. "Sentiment analysis in twitter data." Proceedings of the Second International Conference on Computational Intelligence and Communication Technology. Springer, Berlin, Heidelberg, 2013.
5. Zhang, Mu, Xiaodong Liu, and Ming Zhou. "A survey of sentiment analysis techniques and applications." International Journal of Computational Linguistics and Chinese Language Processing 9, no. 3 (2014): 9-31.

APPENDIX:

Source code:

```
from flask import Flask,render_template,url_for,request
import pandas as pd
import pickle
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.naive_bayes import MultinomialNB
import pickle
from sklearn.feature_extraction.text import TfidfVectorizer


# load the model
naive_bayes_model = pickle.load(open(r'D:/ibm/hotel/Flask/naive_bayes_model.pkl', 'rb'))
logistic_regression_model =
pickle.load(open(r'D:/ibm/hotel/Flask/logistic_regression_model.pkl', 'rb'))
cv_naive=pickle.load(open(r'D:/ibm/hotel/Flask/tranform_naive.pkl','rb'))
cv_logistic=pickle.load(open(r'D:/ibm/hotel/Flask/tranform_logistic.pkl','rb'))


app = Flask(__name__)


@app.route('/')
def home():
    return render_template('home.html')


@app.route('/predict',methods=['POST','GET'])
def predict():
```

```
    if request.method == 'POST':
        message = request.form['message'].lower()
        data = [message]
        vect_naive = cv_naive.transform(data).toarray()
        vect_logistic = cv_logistic.transform(data).toarray()
        # for naive bayes classifier
        my_nb_prediction = naive_bayes_model.predict(vect_naive)
        nb_percentage = naive_bayes_model.predict_proba(vect_naive)
        if my_nb_prediction==1:
            nb_percentage = nb_percentage[0][1]
        else:
            nb_percentage = nb_percentage[0][0]
        # for logistic regression classifier
        my_lg_prediction = logistic_regression_model.predict(vect_logistic)
        lg_percentage = logistic_regression_model.predict_proba(vect_logistic)
        if my_lg_prediction ==1:
            lg_percentage = lg_percentage[0][1]
        else :
            lg_percentage = lg_percentage[0][0]
    return render_template('result.html',
                message=message,
                my_nb_prediction = my_nb_prediction,
                nb_percentage=nb_percentage,
                my_lg_prediction = my_lg_prediction,
                lg_percentage=lg_percentage
                )

if __name__ == '__main__':
    app.run(debug=False)
```