Reservation Cancellation Prediction

1. INTRODUCTION

1.1 Overview

The purpose of this research is to forecast the possibility that a hotel reservation will be canceled. The collection contains information on hotel reservations for a total of 18 hotel attributes. The model seeks to comprehend reservations and effectively forecast, based on reservations, whether a customer has a higher likelihood of canceling.This technique will be extremely helpful for hotels to actively reward/penalize consumers depending on the marketing plan by recognizing potential clients who may cancel.

1.2 Purpose

We have created a model that can foretell the cancellation of a made-and-reserved reservation. The owners and managers of hotels can use this model to forecast cancellations of reservations. Personal information like name, age, gender, religion, address, and so on are not requested for this model. Anytime you receive a reservation, you can utilize this web application, and the model will provide the cancellation of the reservation.The hotel owners should use this model to cut losses, but it shouldn't be the primary consideration when making crucial choices.

2. LITERATURE SURVEY

2.1 Existing Problem

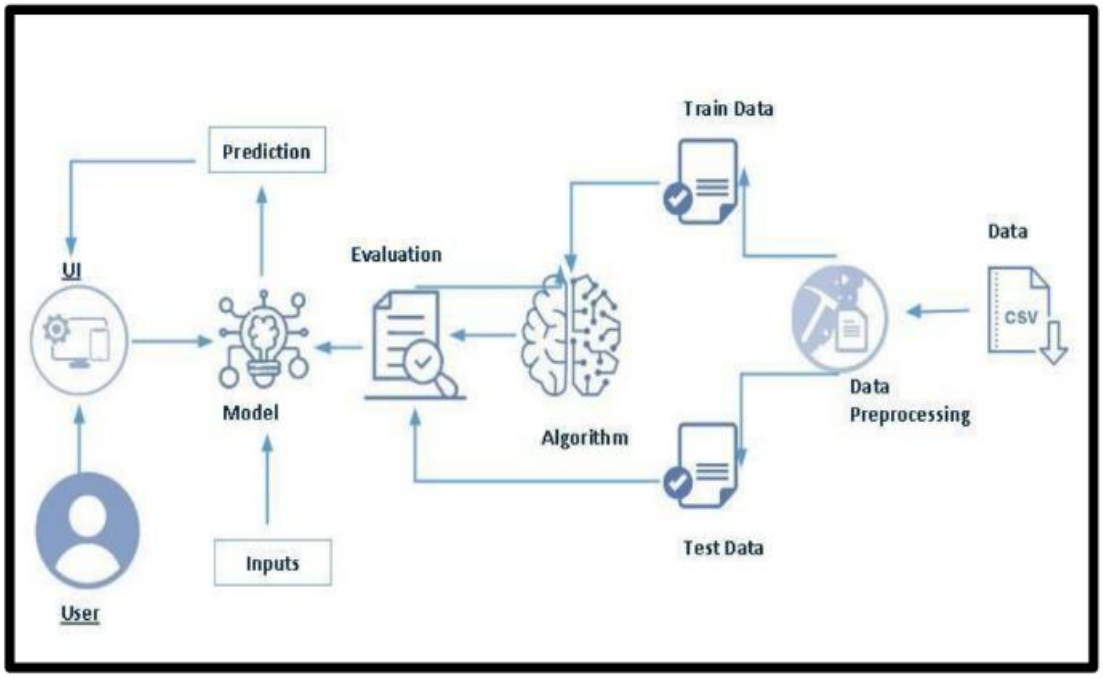
People take on a lot of responsibility in today's world. These significant tasks cause stress and exhaustion. Everyone considers taking a break or vacation as a way to unwind. At a particular location, hotel reservations are made. Once a reservation is made, it's not required for the person who made it to show up on the day of the reservation. They could need to cancel it because of unforeseeable events. The hotel owners or managers are at a loss when a reservation is canceled since they are unable to accept another booking for the same day.

2.2 Proposed Solution

In today's environment, people shoulder a lot of responsibilities. Stress and tiredness are caused by these important responsibilities. Everyone thinks about relaxing by taking a break or going on vacation. Reservations are made for hotels at a specific location. It is not necessary for the individual who booked the reservation to appear on the scheduled date. It might need to be cancelled due to unforeseen circumstances. When a reservation is canceled, the hotel's owners or management are at a loss because they cannot take another booking for the same day.

3. THEORITICAL ANALYSIS

3.1 Block Diagram



3.2 Hardware / Software Designing

Hardware Requirement

Processor : Pentium IV
RAM : 4 GB
HDD : 500 MB free space
Monitor : SVGA 16/32 bit color with 1024 by 768 resolutions
CD-R/W Drive : 52X CD/RW
Printer : Standard

Software Requirement

✓ **Programming Language:**

Python is a popular choice for data science and machine learning tasks. You can use Python for both data preprocessing and building predictive models.

✓ **Integrated Development Environment (IDE):**

Choose an IDE such as Jupyter Notebook, PyCharm, or Visual Studio Code for coding, experimenting with data, and developing machine learning models.

✓ **Data Manipulation and Analysis:**

Pandas: A Python library for data manipulation and analysis.

✓ NumPy: For numerical computing and handling arrays.

✓ **Data Visualization:**

Matplotlib: For creating static, interactive, and animated visualizations
Seaborn: A high-level interface to Matplotlib for creating attractive statistical graphics.
Plotly: For interactive and web-based visualizations.

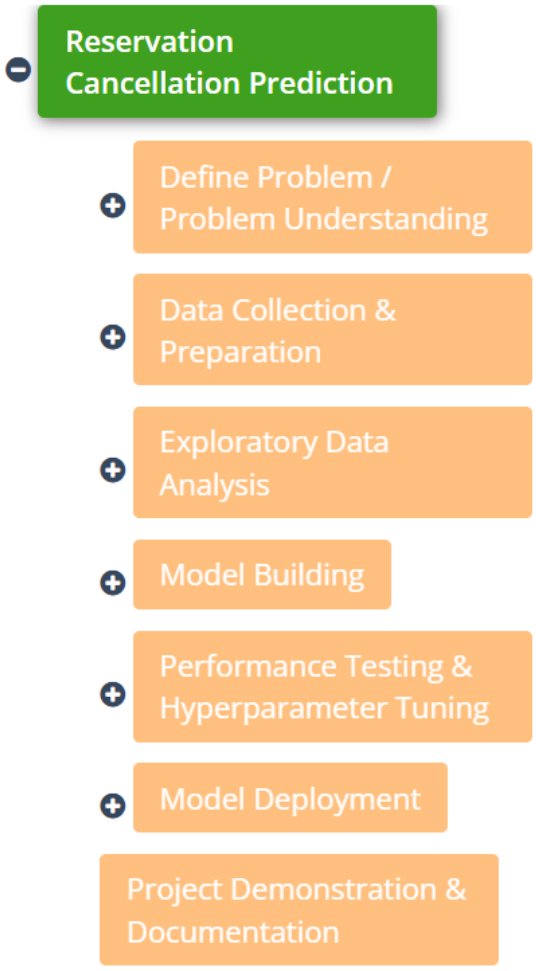
✓ **Machine Learning and Predictive Modeling:**

Scikit-learn: A machine learning library that provides tools for classification and regression tasks.
XGBoost, LightGBM, or CatBoost: Gradient boosting libraries known for their high predictive accuracy.

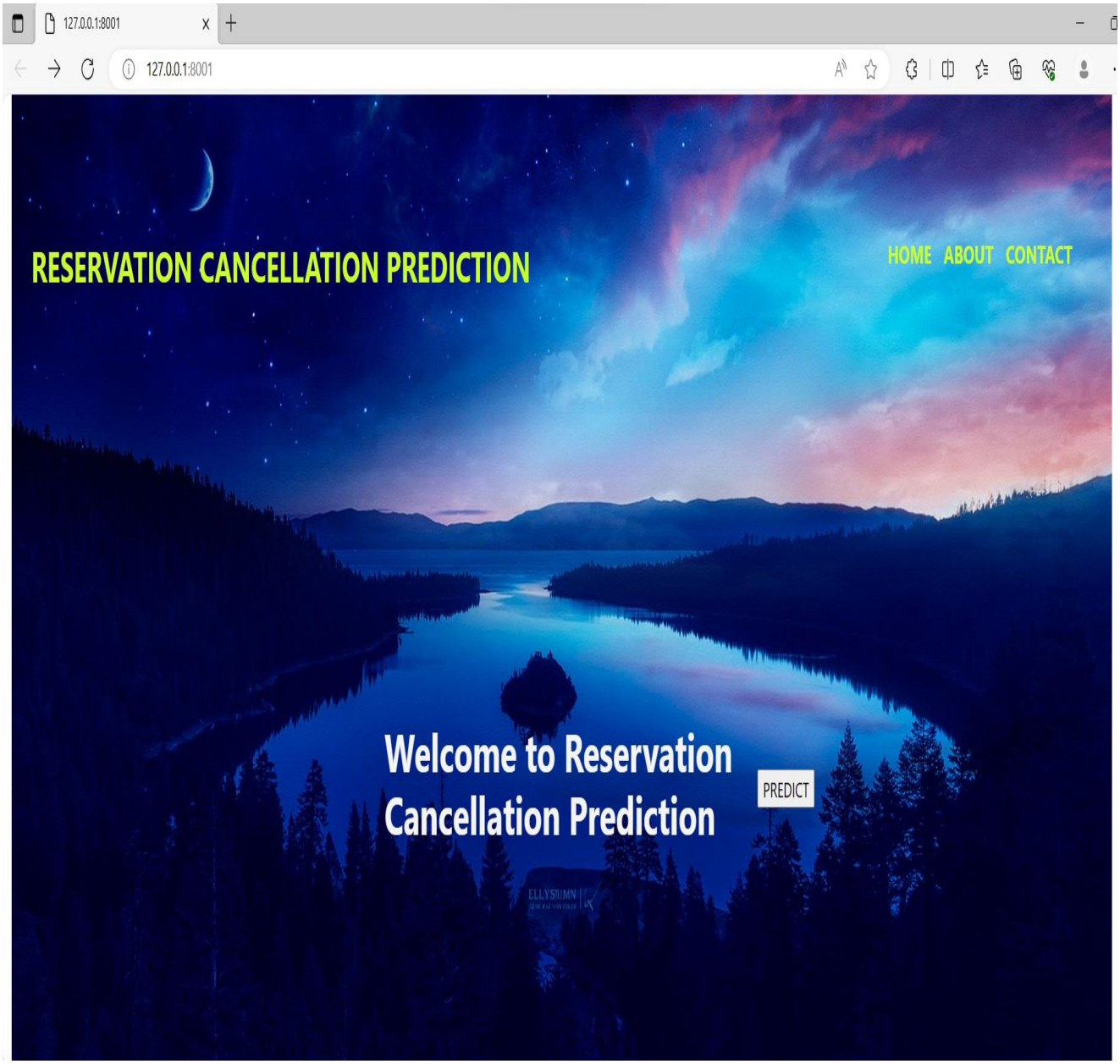
4. EXPERIMENTAL INVESTIGATION

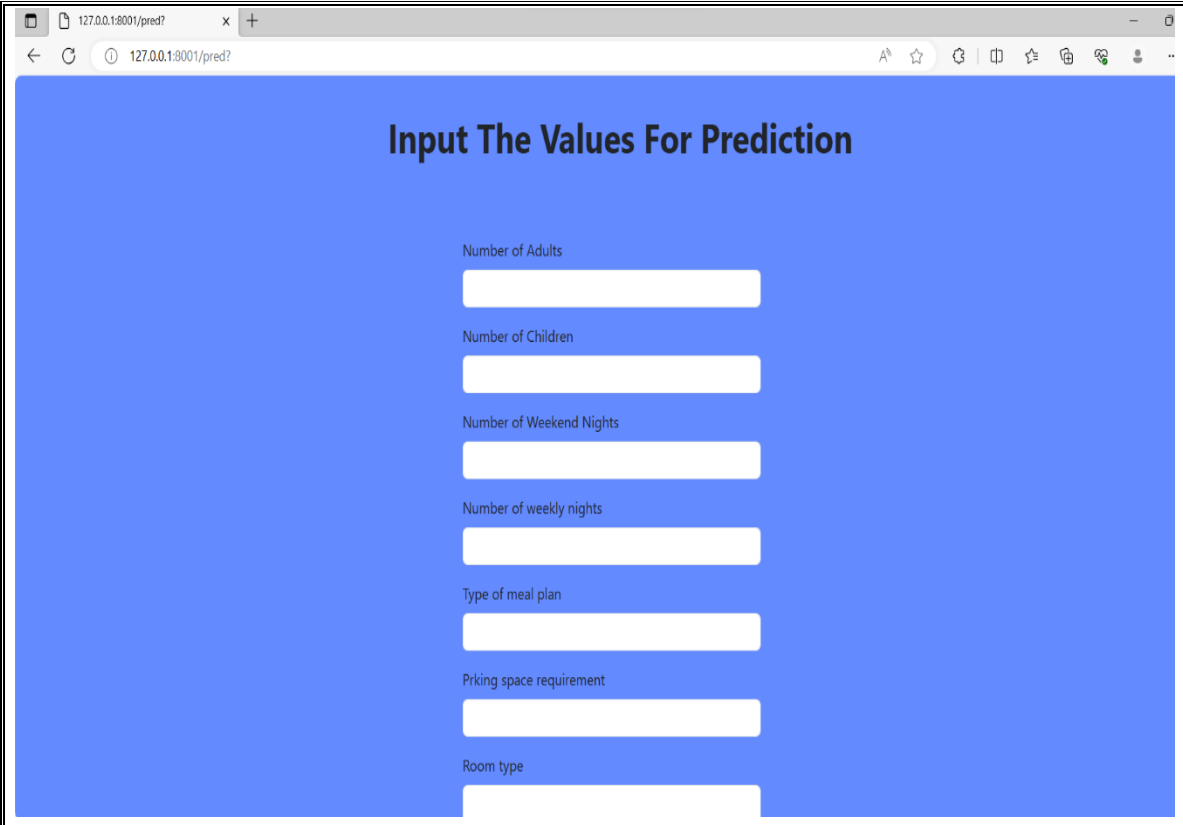
A literature study for a project on reservation cancellation prediction would entail looking up and analyzing previously published papers, journals, and other works on the subject of reservations. The survey's goal would be to learn more about the advantages and disadvantages of the present classification schemes as well as any knowledge gaps that the project might fill. The methods and approaches utilized in earlier reservation cancellation prediction studies as well as any pertinent information or findings that could influence the design and execution of the current project would also be examined in the literature review.

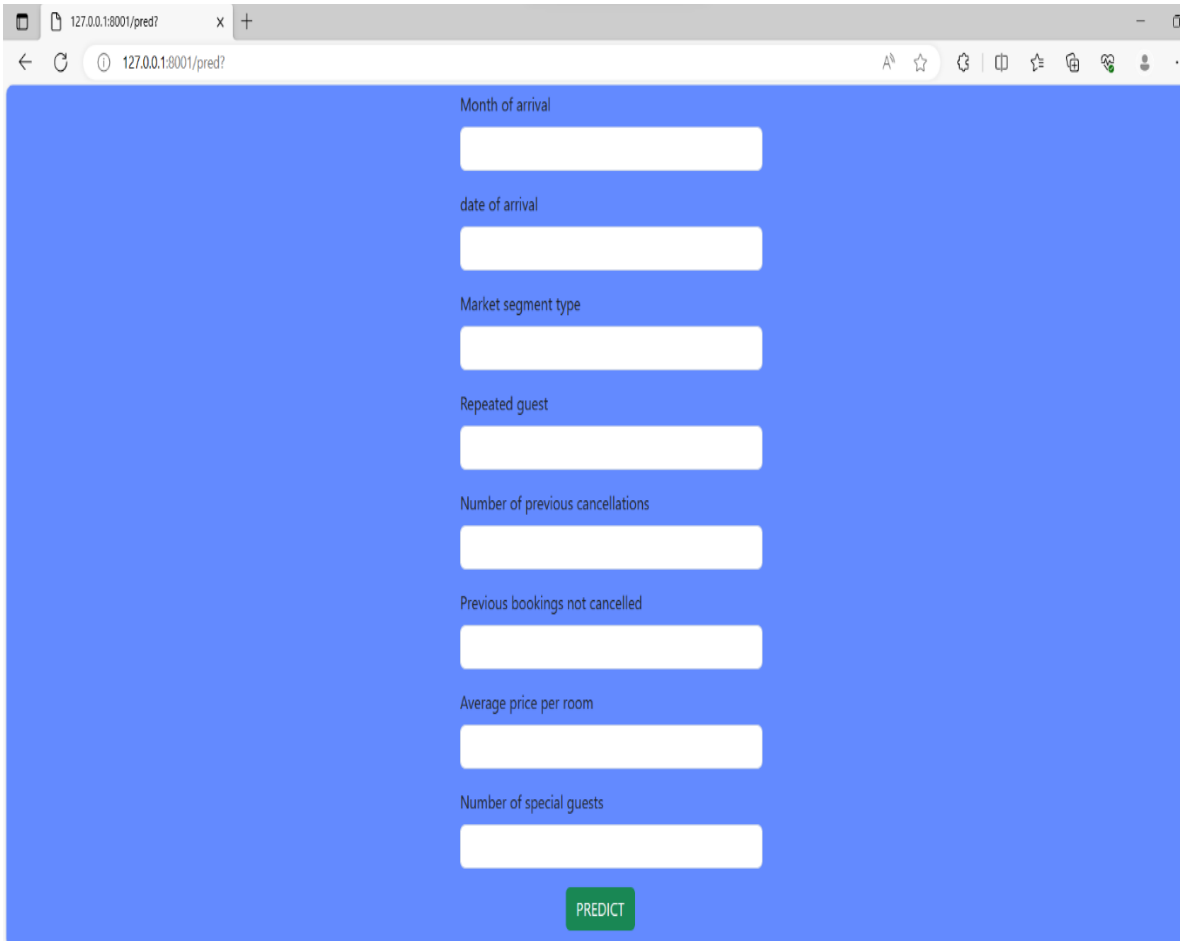
5. FLOW CHART



6. RESULT


127.0.0.1:8001
127.0.0.1:8001
RESERVATION CANCELLATION PREDICTION
HOME ABOUT CONTACT
Welcome to Reservation Cancellation Prediction
PREDICT


127.0.0.1:8001/pred?
127.0.0.1:8001/pred?
Input The Values For Prediction
Number of Adults
Number of Children
Number of Weekend Nights
Number of weekly nights
Type of meal plan
Prking space requirement
Room type


127.0.0.1:8001/pred?
127.0.0.1:8001/pred?
Month of arrival
date of arrival
Market segment type
Repeated guest
Number of previous cancellations
Previous bookings not cancelled
Average price per room
Number of special guests
PREDICT

The Reservation will not be cancelled

7. ADVANTAGES AND DISADVANTAGES

Advantages:

- Improved Revenue Management
- Enhanced Customer Experience
- Data-Driven Decision Making
- Customization
- Automation
- Scalability

Disadvantages:

- Data Quality
- Model Complexity
- Resource Requirements
- Model Drift
- Privacy and Security
- False Positives

8. APPLICATIONS

Reservation cancellation prediction can be applied in various industries and contexts to optimize resource allocation, improve customer satisfaction, and enhance revenue management. Here are some key applications where reservation cancellation prediction can be used:

- Hospitality and Hotels
- Airlines:
- Restaurants
- Car Rentals
- Online Ticket Sales

9. CONCLUSION

Reservation cancellation prediction is a valuable application of data analysis and machine learning techniques in the hospitality and booking industry. By implementing a well-structured prediction system, businesses can make informed decisions regarding overbooking, resource allocation, and revenue optimization.Reservation cancellation prediction is a valuable tool for optimizing the operations and revenue of businesses in the hospitality and booking industry. It allows organizations to make data-driven decisions, reduce revenue loss due to cancellations, and enhance customer satisfaction by managing reservations more effectively.

10. FUTURE SCOPE

The future scope of reservation cancellation prediction projects is bright and dynamic. As businesses strive to optimize their operations, customer experiences, and revenue management, the use of predictive analytics in this context will continue to evolve and expand, offering new opportunities for innovation and improved decision-making.

11. BIBLOGRAPHY

You must have the prior knowledge of the following topics to complete this project:

❖ ML Concepts:

- Supervised learning: https://www.javatpoint.com/supervised-machine-learning
- Linear Regression: https://www.javatpoint.com/linear-regression-in-machine-learning
- SVM: https://www.javatpoint.com/machine-learning-support-vector-machine
- Decision tree: https://www.javatpoint.com/machine-learning-decision-tree
- Random forest: https://www.javatpoint.com/machine-learning-random-forest
- Evaluation metrics: https://www.analyticsvidhya.com/blog/2019/08/11-important-modelevaluation-error-metrics/
- Regularisation: https://www.javatpoint.com/regularization-in-machine-learning
- Flask Basics: https://www.youtube.com/watch?v=lj4I_CvBnt0

12. APPENDIX

App.py

```
from flask import Flask, render_template, request
import pandas as pd
import pickle
model = pickle.load(open('model.pkl', 'rb'))
app = Flask(__name__,template_folder='templates')
@app.route("/")
def home():
    return render_template('index.html')
@app.route('/pred')
def pred():
    return render_template('details.html')
@app.route('/predict',methods = ['POST'])
def predict():
    no_of_adults = request.form['no_of_adults']
    no_of_children = request.form['no_of_children']
    no_of_weekend_nights = request.form['no_of_weekend_nights']
    no_of_week_nights = request.form['no_of_week_nights']
    type_of_meal_plan = request.form['type_of_meal_plan']
    required_car_parking_space = request.form['required_car_parking_space']
    room_type_reserved = request.form['room_type_reserved']
    lead_time = request.form['lead_time']
    arrival_year = request.form['arrival_year']
    arrival_month = request.form['arrival_month']
    arrival_date = request.form['arrival_date']
    market_segment_type = request.form['market_segment_type']
    repeated_guest = request.form[ 'repeated_guest']
    no_of_previous_cancellations = request.form['no_of_previous_cancellations']
    no_of_previous_bookings_not_canceled =
request.form['no_of_previous_bookings_not_canceled']
    avg_price_per_room = request.form['avg_price_per_room']
    no_of_special_requests = request.form['no_of_special_requests']

    total = [[no_of_adults, no_of_children, no_of_weekend_nights, no_of_week_nights,
              type_of_meal_plan, required_car_parking_space, room_type_reserved,
```

```
            lead_time, arrival_year, arrival_month, arrival_date,
market_segment_type,
            repeated_guest, no_of_previous_cancellations,
no_of_previous_bookings_not_canceled,
            avg_price_per_room, no_of_special_requests]]
    d1 = pd.DataFrame(data = total, columns = ['no_of_adults', 'no_of_children',
'no_of_weekend_nights',
                                           'no_of_week_nights', 'type_of_meal_plan',
'required_car_parking_space',
                                           'room_type_reserved', 'lead_time',
'arrival_year', 'arrival_month',
                                           'arrival_date', 'market_segment_type',
'repeated_guest',
                                           'no_of_previous_cancellations',
'no_of_previous_bookings_not_canceled',
                                           'avg_price_per_room',
'no_of_special_requests'])
    prediction = model.predict(d1)
    prediction = prediction[0]
    if prediction == 0:
        return render_template('results.html', prediction_text = "The Reservation
will not be cancelled")
    else:
        return render_template('results.html', prediction_text = "The Reservation
will be cancelled")

if __name__ == '__main__':
    app.run(debug=True, port=8001)
```

index.html

```
<html>
    <head>
        <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/css/bootstrap.min.css"
rel="stylesheet">
        <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/js/bootstrap.bundle.min.js"></
script>
    </head>
    <body>
        <div class="container-fluid">

            <div class="row" style="height: 3cm;">
                <img src="../static/images/wp.jpg" style="padding-top: 0cm;">

            </div>
            <div class="row" style="height: 83%; padding-top: 0cm;">
                 <nav class="navbar navbar-expand-sm navbar-dark shadow-5-strong"
style="padding-top: 0cm;">
```

```
                    <ul class="navbar-nav me-auto justify-content-center">
                        <li class="nav-item">
                            <a class="nav-link" href="#" style="font-size:
200%;padding-left: 1cm;color: rgb(205, 255, 42);""><b>RESERVATION CANCELLATION
PREDICTION</b></a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link" href="#" style="margin-left:
12cm;font-size: larger; color: rgb(205, 255, 42);""><b>HOME</b></a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link" href="#" style="font-size: larger;
color: rgb(205, 255, 42);" ><b>ABOUT</b></a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link" href="#" style="font-size: larger ;
color: rgb(205, 255, 42);"" ><b>CONTACT</b></a>
                        </li>
                    </ul>

                </nav>
                <div class="col-md-4" style="padding-left: 2cm">


                </div>
                <div class="col-md-4">
                    <h1 style="margin-top: 7cm; color: whitesmoke;"><b> Welcome to
Reservation Cancellation Prediction</b></h1>

                </div>
                <div class="col-md-4">
                    <form action="{{ url_for('pred')}}" method="get" style="margin-
top: 8cm;">
                        <input type="submit" value="PREDICT">
                    </form>
                </div>


            </div>
        </div>
</body>
</html>
```

details.html

```
<html>
    <head>
        <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/css/bootstrap.min.css"
rel="stylesheet">
```

```
        <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/js/bootstrap.bundle.min.js"></
script>
    </head>
    <body style="background-color: rgb(99, 138, 255);">
        <h1 style="margin-left: 12.5cm; padding-top: 1cm;"><b>Input The Values For
Prediction</b></h1>
        <form action="/predict" method="POST"  style="width: 10cm; margin-left: 15cm;
margin-top: 2cm;">

            <div class="mb-3 mt-3">
                <label class="form-label">Number of Adults</label>
                <input type="number" class="form-control"name="no_of_adults">
            </div>
            <div class="mb-3">
                <label class="form-label">Number of Children</label>
                <input type="number" class="form-control" name="no_of_children">
            </div>
            <div class="mb-3 mt-3">
                <label class="form-label">Number of Weekend Nights</label>
                <input type="number" class="form-control"name="no_of_weekend_nights">
            </div>
            <div class="mb-3">
                <label class="form-label"> Number of weekly nights</label>
                <input type="number" class="form-control" name="no_of_week_nights">
            </div>
            <div class="mb-3">
                <label class="form-label">Type of meal plan</label>
                <input type="number" class="form-control" name="type_of_meal_plan">
            </div>
            <div class="mb-3">
                <label class="form-label">Prking space requirement</label>
                <input type="number" class="form-control"
name="required_car_parking_space">
            </div>
            <div class="mb-3">
                <label class="form-label">Room type</label>
                <input type="number" class="form-control" name="room_type_reserved">
            </div>
            <div class="mb-3">
                <label class="form-label">Lead Time</label>
                <input type="number" class="form-control" name="lead_time">
            </div>
            <div class="mb-3">
                <label class="form-label">Year of arrival</label>
                <input type="number" class="form-control" name="arrival_year">
            </div>
            <div class="mb-3">
                <label class="form-label">Month of arrival</label>
                <input type="number" class="form-control" name="arrival_month">
            </div>
```

```
            <div class="mb-3">
                <label class="form-label">date of arrival</label>
                <input type="number" class="form-control" name="arrival_date">
            </div>
            <div class="mb-3">
                <label class="form-label">Market segment type</label>
                <input type="number" class="form-control" name="market_segment_type">
            </div>
            <div class="mb-3">
                <label class="form-label">Repeated guest</label>
                <input type="number" class="form-control" name="repeated_guest">
            </div>
            <div class="mb-3">
                <label class="form-label">Number of previous cancellations</label>
                <input type="number" class="form-control"
name="no_of_previous_cancellations">
            </div>
            <div class="mb-3">
                <label class="form-label">Previous bookings not cancelled</label>
                <input type="number" class="form-control"
name="no_of_previous_bookings_not_canceled">
            </div>
            <div class="mb-3">
                <label class="form-label">Average price per room</label>
                <input type="number" class="form-control" name="avg_price_per_room">
            </div>
            <div class="mb-3">
                <label class="form-label">Number of special guests</label>
                <input type="number" class="form-control"
name="no_of_special_requests">
            </div>
            <button type="submit" class="btn btn-success" style="margin-left:
3.5cm;">PREDICT</button>
        </form>
    </body>




</html>
```

results.html

```
<html>
    <head>
        <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/css/bootstrap.min.css"
rel="stylesheet">
        <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/js/bootstrap.bundle.min.js"></
script>
```

```
    </head>
    <body style="background-color: rgb(99, 138, 255);">
        <h1 style="padding-top: 5cm; margin-left:
10cm;"><b>{{prediction_text}}</b></h1>
    </body>


</html>
```

TEAM MEMBERS

1.JOSE ANTONY

2.AMAL SAJU

3.AMARNATH M M