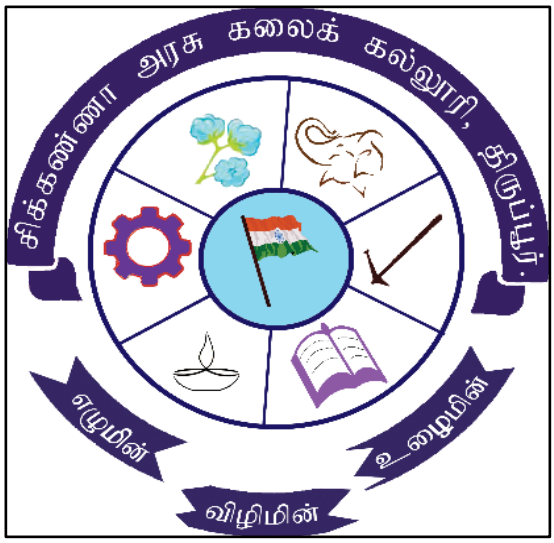
CHIKKANNA GOVERNMENT ARTS COLLEGE

TIRUPUR-641602

(AFFILIATED TO BHARATHIAR UNIVERSITY)



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GITHUB LINK : https://github.com/suryabaskaran15/Flight-Delay-Prediction-For-Aviation-Industry-Using-Machine-Learning.git

DEPARTMENT OF COMPUTER SCIENCE

CHIKKANNA GOVERNMENT ARTS COLLEGE

NAAN MUDHALVAN PROJECT WORK

(AFFILIATED TO BHARATHIAR UNIVERSITY)

TIRUPUR-641602

TITLE : Flight Delay Prediction For Aviation Industry Using Machine Learning.

This is to certify that this is a bonafide record of work done by the above students of III B.Sc (CS) Degree **NAAN MUDHALVAN PROJECT** during the year …….

Submitted for the Naan Mudhalvan project work held on……20

CLASS TUTOR HEAD OF THE DEPARTMENT

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INTRODUCTION

1.1 OVERVIEW

1. Binary Classification: Predicting whether a flight will be delayed or not. This is a common approach where the problem is framed as a binary classification task, where the model predicts whether a flight will be delayed (1) or not delayed (0) based on historical data, such as weather conditions, airline schedules, and previous flight delays.

2.Multiclass Classification: Predicting the severity of flight delays. This approach involves categorizing flights into multiple classes based on the severity of delays, such as mild delay, moderate delay, and severe delay. This can provide more detailed insights and allow airlines to take appropriate actions based on the predicted severity of delays.

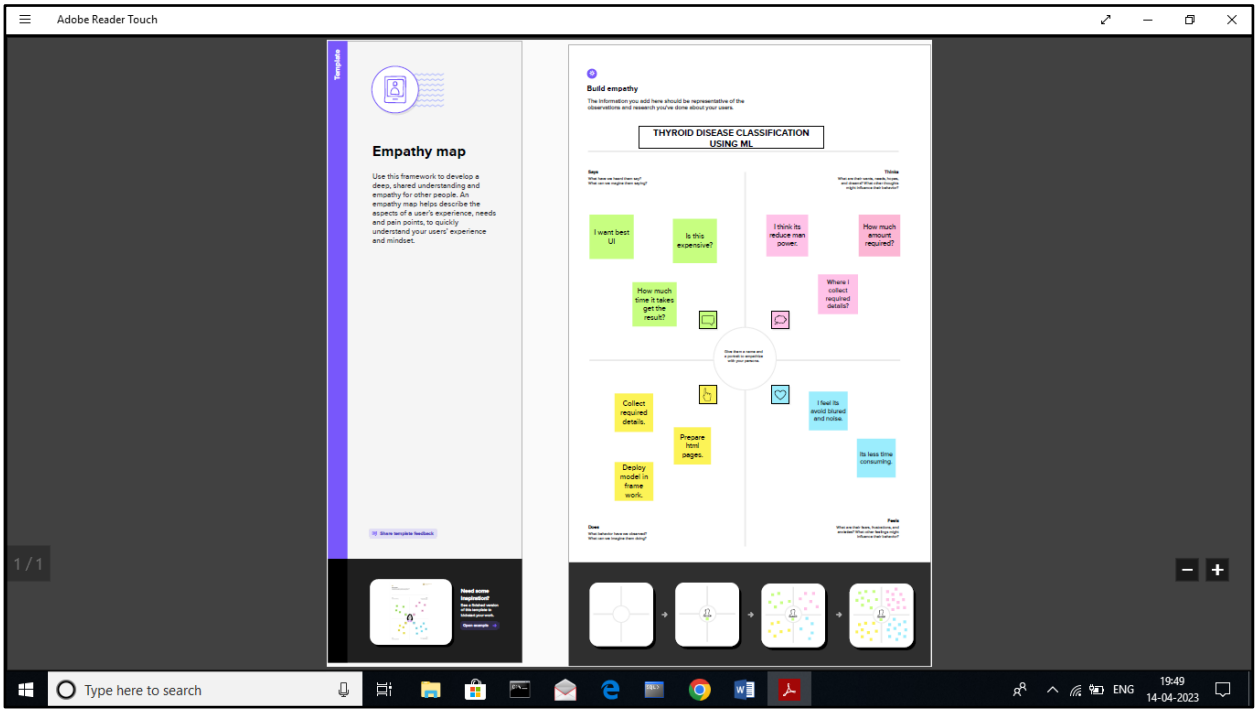
1.2 PURPOSE

Develop a model that predicts flight delays based on weather conditions, such as temperature, precipitation, wind speed, and visibility. The model can use historical weather data in combination with flight data to identify patterns and correlations between weather conditions and flight delays.Build a model that predicts flight delays based on the historical performance of airlines, such as on-time performance, previous delays, and cancellations. The model can leverage data from various airlines to identify trends and patterns in airline performance that may impact flight delays.

PROBLEM DEFINITION & DESIGN THINKING.

2.1 EMPATHY MAP

An empathy map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users in order to 1) create a shared understanding of user needs, and 2) aid in decision making.



2.2 IDEATION AND BRAINSTROMING

1.Time of Day and Seasonal Patterns: Develop a model that captures

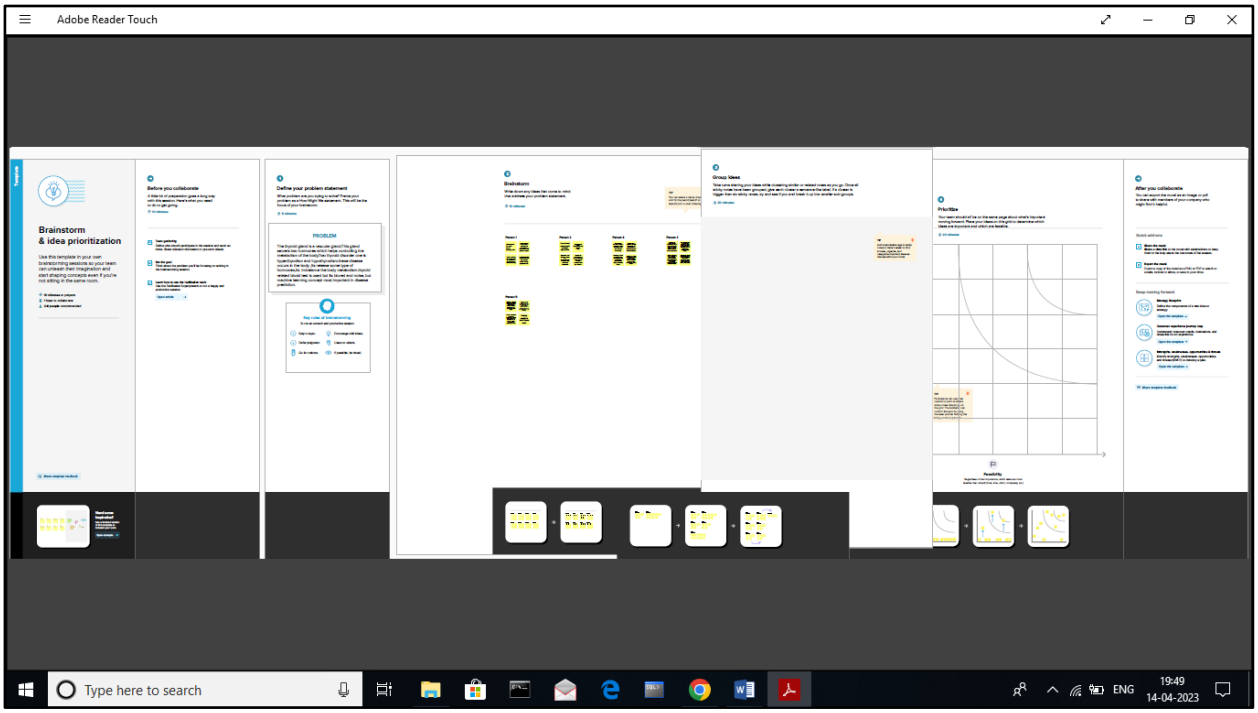
time of day and seasonal patterns in flight delays, such as peak travel

times, holiday seasons, and weather-related patterns. The model can help

airlines proactively manage operations during high-impact periods to reduce delays.

2.Airport Congestion Prediction: Build a model that predicts flight delays based on airport congestion levels, such as runway capacity, air

traffic control delays, and gate availability. The model can help airlines anticipate potential congestion-related delays and make operational adjustments accordingly.

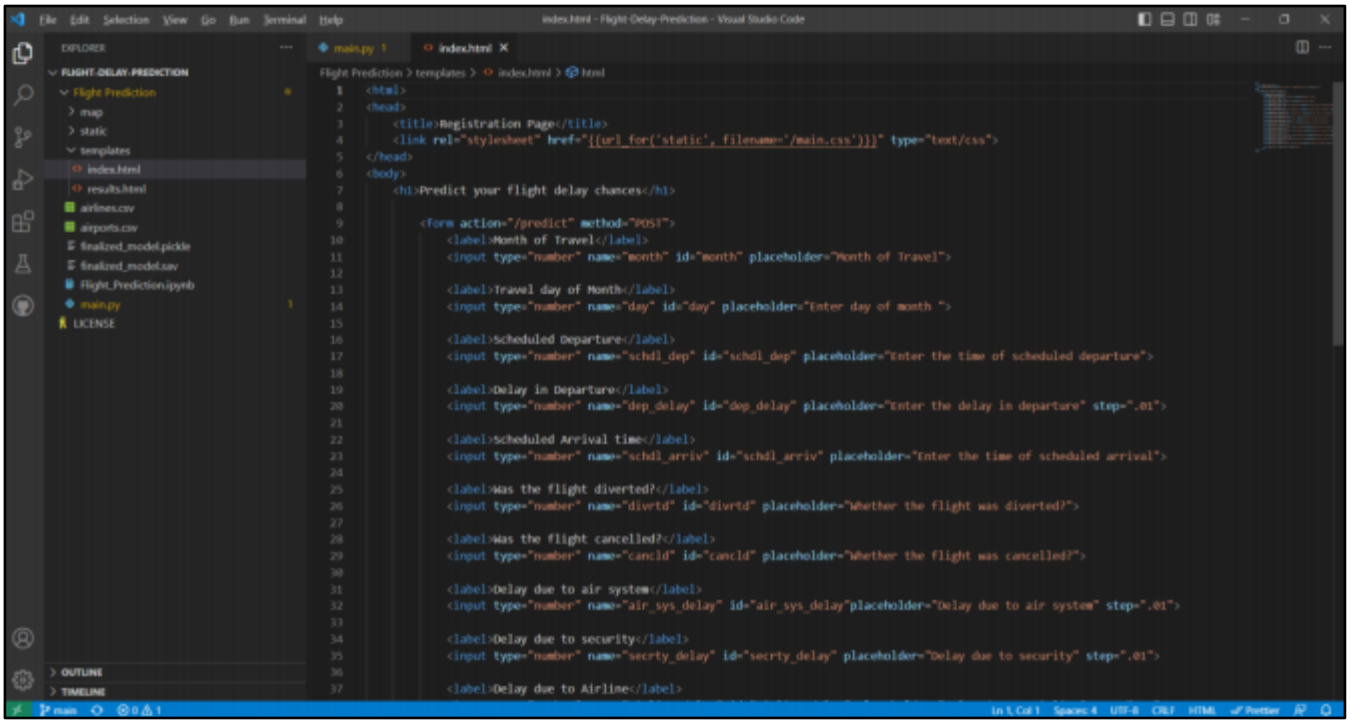


RESULT

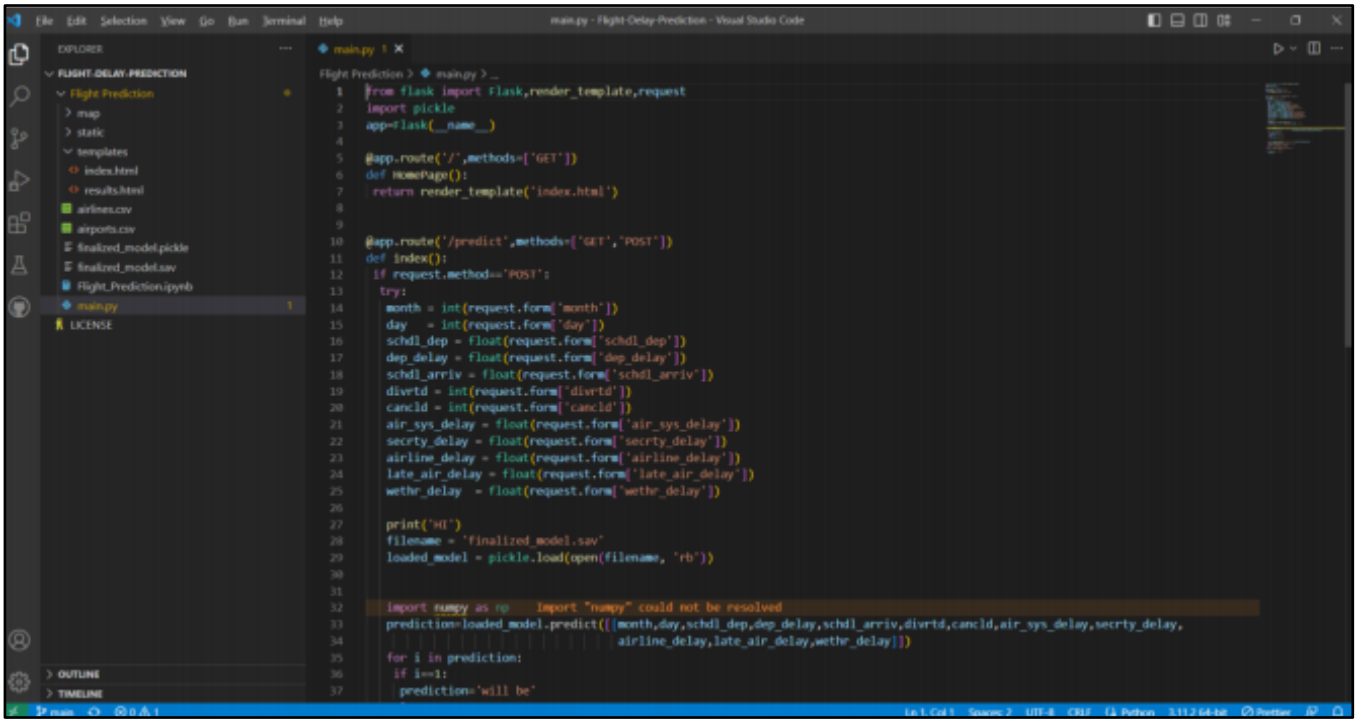

127.0.0.1:5000
Prediction of Flight Delay
Enter the Flight Number :
Month :
Day of Month :
Day of Week :
origin MSP
destination MSP
Scheduled Departure Time :
Scheduled Arrival Time :
Actual Departure Time :
SUBMIT


127.0.0.1:5000
Prediction of Flight Delay
Enter the Flight Number : 1399
Month : 2
Day of Month : 4
Day of Week : 5
origin JFK
destination SEA
Scheduled Departure Time : 1
Scheduled Arrival Time : 22
Actual Departure Time : 1
SUBMIT

SAMPLE CODING



```
<html>
<head>
    <title>Registration Page</title>
    <link rel="stylesheet" href="{{url_for('static', filename='/main.css')}}" type="text/css">
</head>
<body>
    <h1>Predict your flight delay chances</h1>

        <form action="/predict" method="POST">
            <label>Month of Travel</label>
            <input type="number" name="month" id="month" placeholder="Month of Travel">

            <label>Travel day of Month</label>
            <input type="number" name="day" id="day" placeholder="Enter day of month ">

            <label>Scheduled Departure</label>
            <input type="number" name="schdl_dep" id="schdl_dep" placeholder="Enter the time of scheduled departure">

            <label>Delay in Departure</label>
            <input type="number" name="dep_delay" id="dep_delay" placeholder="Enter the delay in departure" step=".01">

            <label>Scheduled Arrival time</label>
            <input type="number" name="schdl_arriv" id="schdl_arriv" placeholder="Enter the time of scheduled arrival">

            <label>Was the flight diverted?</label>
            <input type="number" name="divrtd" id="divrtd" placeholder="Whether the flight was diverted?">

            <label>Was the flight cancelled?</label>
            <input type="number" name="cancld" id="cancld" placeholder="Whether the flight was cancelled?">

            <label>Delay due to air system</label>
            <input type="number" name="air_sys_delay" id="air_sys_delay"placeholder="Delay due to air system" step=".01">

            <label>Delay due to security</label>
            <input type="number" name="secrty_delay" id="secrty_delay" placeholder="Delay due to security" step=".01">

            <label>Delay due to Airline</label>
```



```
from flask import Flask,render_template,request
import pickle
app=Flask(__name__)

@app.route('/',methods=['GET'])
def HomePage():
 return render_template('index.html')


@app.route('/predict',methods=['GET','POST'])
def index():
 if request.method=='POST':
  try:
   month = int(request.form['month'])
   day   = int(request.form['day'])
   schdl_dep = float(request.form['schdl_dep'])
   dep_delay = float(request.form['dep_delay'])
   schdl_arriv = float(request.form['schdl_arriv'])
   divrtd = int(request.form['divrtd'])
   cancld = int(request.form['cancld'])
   air_sys_delay = float(request.form['air_sys_delay'])
   secrty_delay = float(request.form['secrty_delay'])
   airline_delay = float(request.form['airline_delay'])
   late_air_delay = float(request.form['late_air_delay'])
   wethr_delay  = float(request.form['wethr_delay'])

   print('HI')
   filename = 'finalized_model.sav'
   loaded_model = pickle.load(open(filename, 'rb'))


   import numpy as np    Import "numpy" could not be resolved
   prediction=loaded_model.predict([[month,day,schdl_dep,dep_delay,schdl_arriv,divrtd,cancld,air_sys_delay,secrty_delay,
                                     airline_delay,late_air_delay,wethr_delay]])
   for i in prediction:
    if i==1:
     prediction='will be'
```

ADVANTAGES

Conduct feature engineering to identify and extract relevant features from the collected data that can be used as input features for the machine learning model. This may involve selecting relevant features, normalizing or scaling features, and creating new features that may capture important information related to flight delays

Evaluate the performance of the developed model using appropriate evaluation metrics, such as accuracy, precision, recall, F1-score, and AUC-ROC, depending on the problem type (binary classification, multi-class classification, regression, etc.). Validate the model's performance on a separate test set to ensure its generalization ability. Perform thorough model analysis, interpretability, and sensitivity analysis to gain insights into its behavior and limitations.

DISADVANTAGES

Refine the selected model(s) based on the evaluation results and feedback. Fine-tune the model hyperparameters, adjust the feature engineering techniques, or explore ensemble methods to improve the model performance. Repeat the model training and evaluation process iteratively until the desired performance level is Achieved.

Deploy the trained and refined machine learning model(s) in a production environment, such as a web application, mobile app, or cloud-based service, depending on the project requirements. Ensure that the model is integrated seamlessly into the operational workflow and follows the necessary security and privacy measures. Conduct thorough testing and validation of the deployed model(s) to ensure its accuracy, reliability, and stability in real-world scenarios.

CONCLUSION

- The paper performed a prediction of the occurrence of flight delays by adapting it into a machine learning problem. A supervised machine learning approach in the form of binary classification was used for the prediction.

- Seven algorithms were used for delay prediction, and four measures were used for algorithms performance evaluation. Due to the imbalanced nature of the data set, evaluation measures were weighted to eliminate the dominant effect of non-delayed flights over delayed flights. After applying classifiers to the delay prediction, the values of their four measures were compared to evaluate the performance of each model.The data set selected for this paper is imbalanced distributed, which may cause significant variation in the performance of each algorithm. In this paper, this problem was solved by the use of weighted evaluation measures. For future studies, using techniques such as SMOTE can better resolve this imbalance and improve the prediction. The result of algorithm comparison shows that tree-based ensemble algorithms tend to better predict flight delays of this data set. It will be valuable to repeat similar experimental processes using more tree-based ensemble algorithms to discover their significance in flight delay prediction.

FUTURE SCOPE

- In conclusion, machine learning can be a useful tool in predicting flight delays.
- These delays and cancellations tarnish the airlines reutation, often resulting in loss of demand by passengers.
- Further research and development are needed to improve the accuracy and reliability of machine learning models in predicting flight delays. Carriers attribute fight to several causes such as bad weather conditions,airspace congestion and use of smaller aircraft by airlines.

APPENDIX

Flight Delay Prediction For Aviation IndustryUsing Machine Learning..

Git Hub Link : https://github.com/suryabaskaran15/Flight-Delay-PredictionFor-Aviation-Industry-Using-Machine-Learning.git

Video Link :

https://drive.google.com/file/d/1_ulubRtwm-_c8cOt0w5t32zOa3nD3RhM/view