Flight Fare Estimator

Project Overview:

Inorder to tackle the significant problem of rapidly changing prices of the flights we aim to analyze the existing data and design a model that will be able to predict the flight prices based on the available historical data which would provide more meaningful insights to make a better decision of choosing any specific airlines or the specific month to travel to get the best available deals possible. ***'Flight Fare Estimator'*** is a web application that takes a few details of the desired flight as input from the user and uses ML model to predict the flight fares.

Dataset:

We have collected our data from kaggle which consists of 10,864 rows. This dataset consists of flights data and their prices of various airlines in India among different routes during the time period of (March 2019-June 2019)

- **Airline:** This column represents Name of the airline
- **Date_of_Journey**: This column represents Date of the journey
- **Source**: This column represents the source from which the flight begins.
- **Destination**: This column represents the destination at which the flight ends.
- **Route:** This column represents the route taken by the flight from source to destination.
- **Dep_Time**: This column represents the time when the flight departs from the source.
- **Arrival_Time**: This column represents the flight arrival time at destination.
- **Duration**: This column represents the total duration of the flight
- **Total_Stops**: This column represents the total stops between source and destination.
- **Additional_Info**: This column represents any additional information regarding the flight
- **Price**: This column represents the total fare of the ticket.

Project Structure:

This project is divided into three phases as follows.

Phase-1:

- Exploring Dataset
- Data Cleaning/Processing Steps
- Exploratory Data Analysis

Phase-2:

- Further Preprocessing of Data from phase-1

- Encoding Numerical and Categorical Values using Min Max Scaler and One Hot Encoder
- Splitting Train and Test Data (80:20)
- Training dataset using different ML Models:
    1. Ridge Regression
    2. K-NN Regression
    3. Random Forest Regression
    4. XGB Regression
    5. Extra Trees Regression
    6. Bagging Regression
- Repeating the above steps using different preprocessing Technique(Label Encoder)
- Finding out the best model (In our project random forest regressor) with highest r2_score, minimum errors among all.
- Performing Hyper Parameter Tuning on the best model
- Getting Feature Importance from the best Model

Phase-3:

- create a pickle file from the best model and dump the data generated by the model into that file.
- Create a Web-Interface tool using Html and Flask to enable user interaction.
- When the user enters details as below:
- The predicted value of the price will be displayed along with the comments whether the price is higher or lower.

Prerequisites:

- Python -3.10.8
- Flask- 2.2.2
- scikit-learn/sklearn
- Numpy
- pandas
- Jupyter/Pycharm

Technology Stack:

- Python
- Flask API
- Html
- Css
- Javascript

Instructions on how to run code locally:

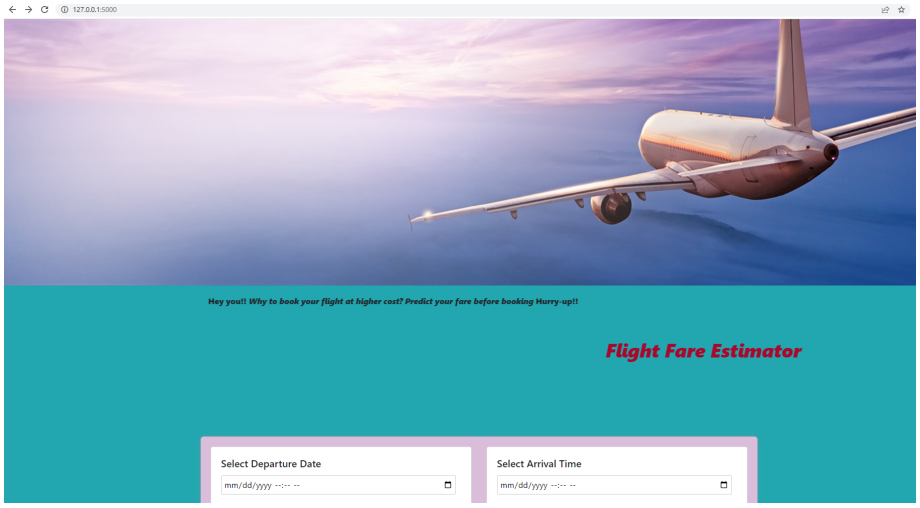
1. Download the FlightPricePrediction zip file and extract/unzip the files.
2. Ensure that you are in the project home directory.
3. Now move to the respective directory of phase_1,phase_2 or phase_3 respectively using command cd /path_to_folder
4. Since all the source code is available in phase_3. Navigate to the phase_3 folder using command cd /phase_3
5. Run app.py using below command to start Flask API

```
python app.py
```

6. After the above command, the output has a https url displayed in the output as given below:

```
* Running on http://127.0.0.1:5000
```

7. Copy the URL then Open a web browser, paste the url and hit enter
8. A web page like below should be displayed.



9. You can enter your desired flight details and hit submit
10. Predicted price of the flight will be displayed along with suggestions.

Future Scope:

- The product can be enhanced to save the route on which the user is searching for and send the user a notification when the price of the user's desirable flight price falls.
- After displaying the predicted flight price, One can further include the booking of the flight also to be available for the user.
- One can show the trend of the price variation of the chosen flight for a period of time.