FLIGHT TICKET PRICE PREDICTION"

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ABSTRACT

This project presents a novel approach to predicting flight ticket prices using machine learning algorithms. With the increasing popularity of air travel and the dynamic nature of airline pricing, accurately forecasting ticket prices has become essential for travelers seeking to optimize their travel budgets.

Traditional methods of predicting flight ticket prices often rely on historical data and rule-based algorithms, which may not capture the complex patterns and factors influencing price fluctuations.

The proposed approach leverages machine learning techniques to analyze a wide range of factors affecting flight ticket prices, including departure and arrival locations, travel dates, airline preferences, route popularity, and seasonal trends.

Furthermore, the proposed system incorporates real-time data sources and dynamic pricing algorithms to continuously update price predictions based on changing market conditions and demand dynamics.

1 INTRODUCTION

The aviation industry is a dynamic and complex domain where ticket prices are influenced by a multitude of factors. Travelers often face the challenge of predicting the best time to purchase flight tickets, as prices can fluctuate significantly based on demand, seasonality, competition, and other variables. To address this challenge, we introduce a Flight Ticket Price Predictor, a system designed to forecast flight ticket prices using machine learning techniques.

The primary objective of the Flight Ticket Price Predictor is to provide travelers with actionable insights that can help them make informed decisions about when to buy flight tickets. By leveraging historical data and identifying patterns and trends, the predictor aims to estimate

future ticket prices with a high degree of accuracy. This can lead to significant cost savings for travelers and enhance their overall booking experience. Key motivations for developing the Flight Ticket Price Predictor include:

2 RELEATED WORK

Kirti Bhandg The advancement in information and communication technology hasgreatlyinfluenced the business transactions. In earlier days, food industry traditionally has laggedbehind other industries in adopting new technology. However rapid advances in computertechnology and heightened expectations of consumers have forced the food industry tobring automation in the process. Nowadays, the adoption of wireless technology &emergence of mobile devices has led to automation in the food industry. The business andservices in restaurants can be improved with the combination of wireless and mobiletechnologies. The competition in restaurants with respect to business has increased withthe advancements in food ordering techniques. In this paper, an automated food orderingsystem is proposed which will keep track of user orders smartly. Basically we are going toimplement food ordering system for different type of restaurants in which user will makeorder or make custom food by one click only. The implementation of this system will bedone using android application for Tablet PC's. The front end will be developed usingJAVA, Android and at the backend MySQL database will be used

3 implementation study

Existing System:

In the realm of flight ticket price prediction, existing systems typically rely on historical data analysis and rule-based algorithms to forecast ticket prices. These systems often incorporate factors such as historical flight prices, seasonal trends, day-of-week effects, and booking lead times to estimate future ticket prices. However, existing systems may struggle to capture the full complexity and variability of airline pricing dynamics due to their reliance on predefined rules and historical patterns.

3.1 Disadvantages:

While current flight ticket price prediction systems offer useful functionalities, they also come with several limitations and disadvantages. These shortcomings affect their accuracy, reliability, and overall user experience

4. Proposed System & alogirtham

The proposed system for flight ticket price prediction aims to address the limitations of existing systems by leveraging advanced machine learning algorithms and real-time data sources to improve the accuracy, timeliness, and reliability of price forecasts. Moreover, the proposed system incorporates real-time data sources, such as airline websites, travel aggregators, and global economic indicators, to provide up-to-date information and adapt to changing market conditions in real-time.

4.1 Advantages:

- The proposed Flight Ticket Price Predictor system brings several key advantages over existing systems. By addressing the limitations of current tools and leveraging advanced technologies, this system is designed to provide more accurate, reliable, and user-friendly predictions. Below are the main advantages of the proposed system.

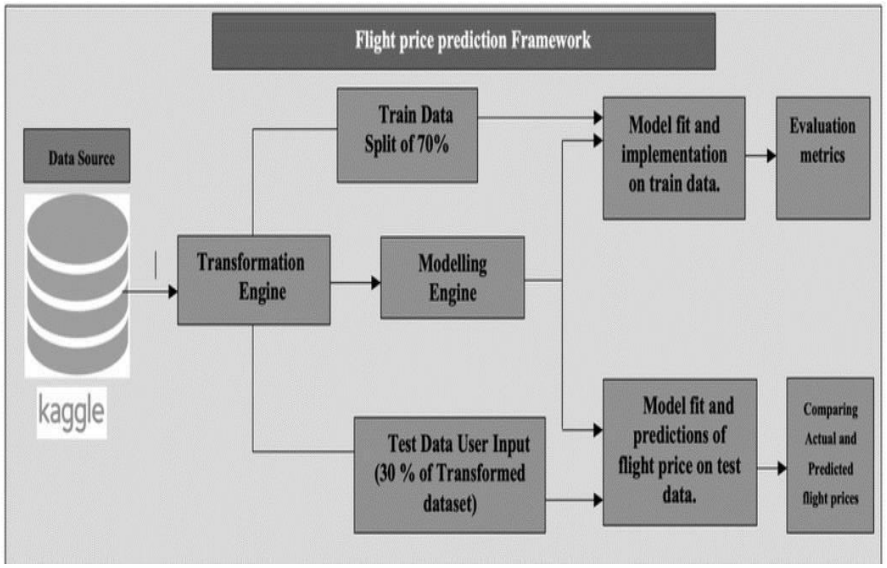


Fig1: SYSTEM ARCHITECTURE

SYSTEM IMPLEMENTION

- **Data Preprocessing**: Prepare the textual data by removing noise, such as special characters, punctuation, and stop words. Tokenize the text into sentences or paragraphs to facilitate sentiment analysis and summarization.
- **Sentiment Analysis Model**: Implement or utilize pre-trained sentiment analysis

models capable of accurately detecting the sentiment polarity (positive, negative, neutral) of each sentence or paragraph in the text.

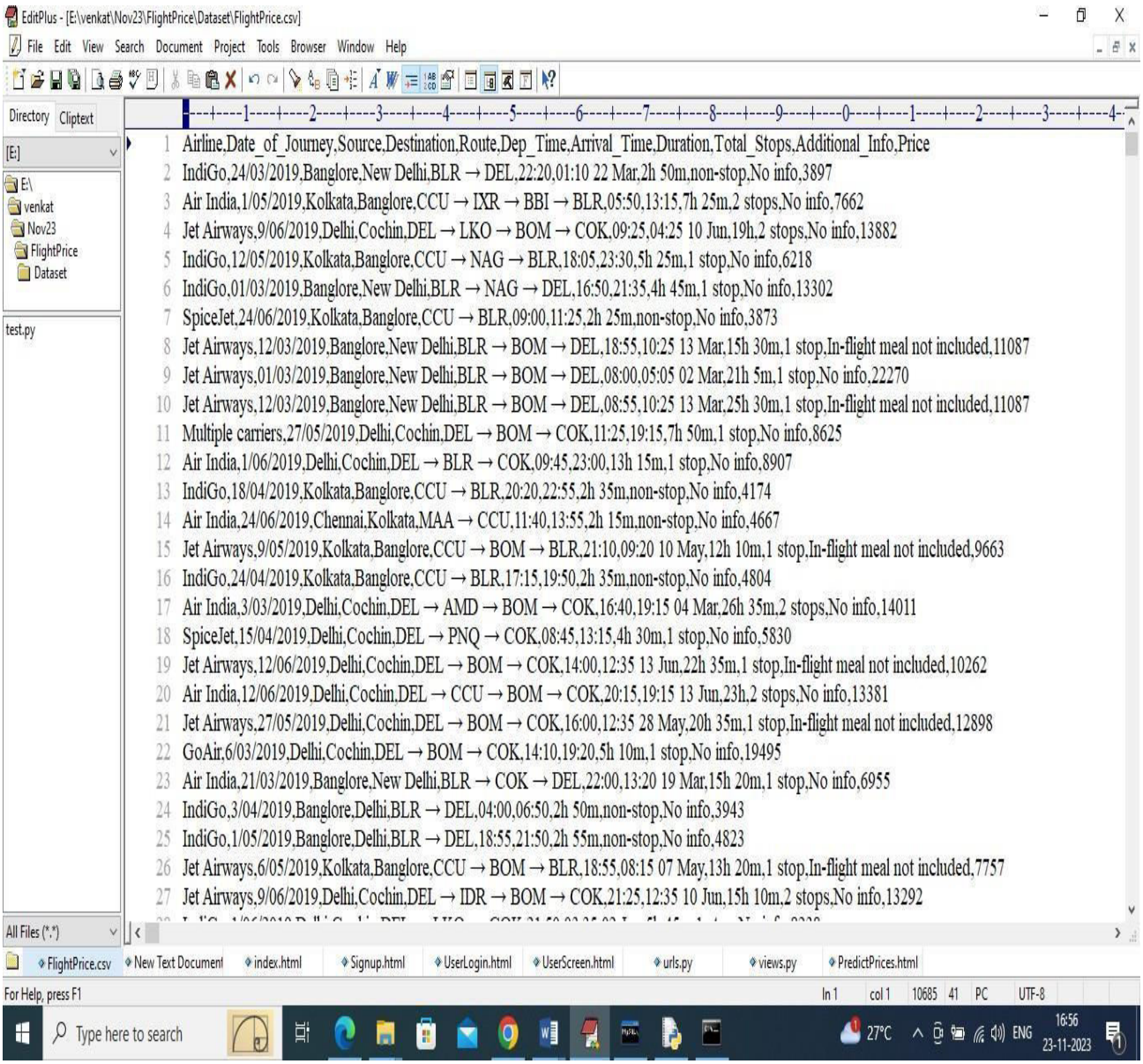
- **Summarization Model**: Implement a text summarization model capable of generating concise summaries while incorporating sentiment information.
- **Integration:** Integrate the sentiment analysis module with the summarization module to leverage information during sentiment the summarization process. Design mechanisms to prioritize or adjust the inclusion of sentences based on their sentiment polarity to ensure that the generated summaries reflect the emotional context of the original text.
- **Evaluation:** Evaluate the performance of the implemented system using standard metrics such as ROUGE (Recall-Oriented Understudy for Gisting Evaluation) for summarization quality and sentiment classification accuracy metrics for sentiment analysis
- **Optimization:** Optimize the system for efficiency and scalability by leveraging techniques such as parallel processing, caching, and model compression. Consider deploying the system on distributed computing frameworks or utilizing hardware accelerators (e.g., GPUs) to improve processing speed and resource utilization.
- **User Interface**: Develop a user-friendly interface for interacting with the system, allowing users to input text and view the generated summaries along with sentiment analysis results. Design the interface to be intuitive, responsive, and accessible across different devices and platforms.
- **Deployment**: Deploy the implemented system in production environments, considering factors such as scalability, reliability, and security. Ensure proper monitoring and maintenance procedures are in place to address potential issues and ensure continuous performance optimization.
- **Feedback Loop:** Establish a feedback loop to gather user feedback and monitor system performance over time. Use feedback to iteratively improve the system's accuracy, usability, and effectiveness based on user requirements and evolving needs.

5 RESULTS AND DISCUSSION

In this project we have implemented all modules given by you like dataset collection, cleaning, training and price prediction. We have collected price dataset from KAGGLE which can be downloaded from below URL

https://www.kaggle.com/datasets/jillanisofttech/flight-price-prediction-dataset

Above dataset contains all required columns like travel date, airline name, source and destination city etc. in below screen displaying dataset details



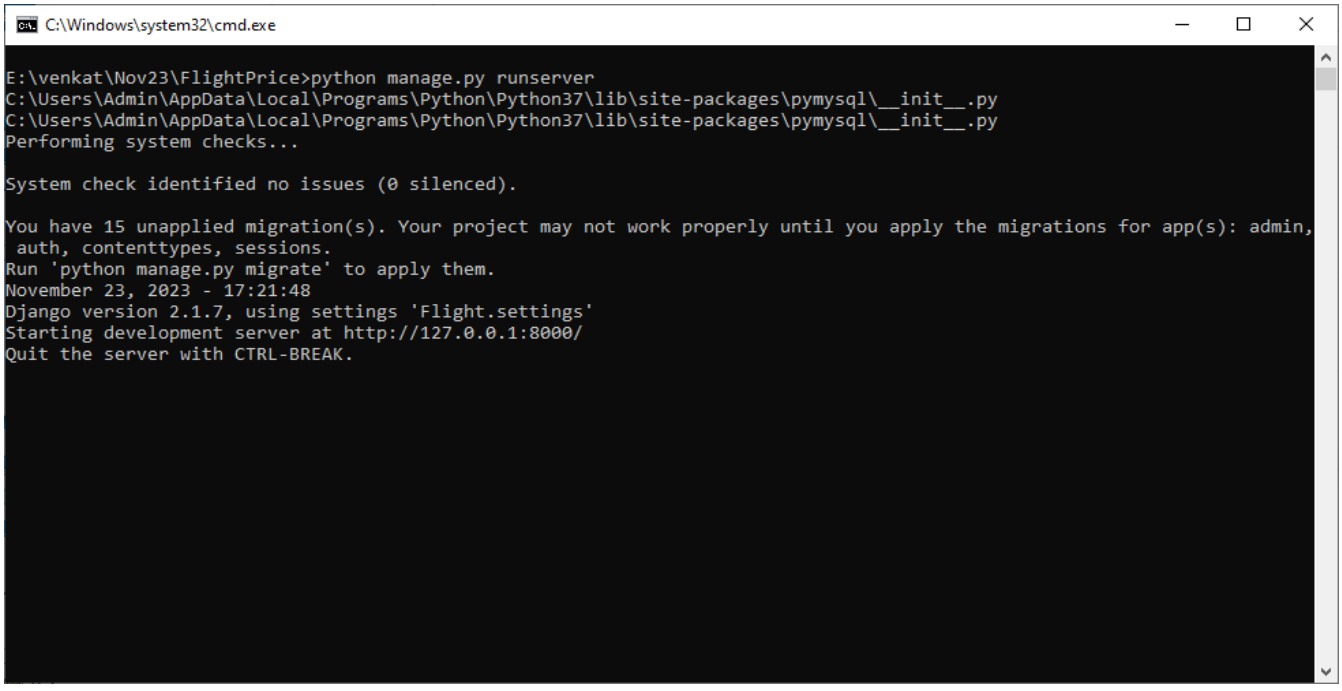
In above dataset screen first row contains dataset column names and remaining rows contains dataset values and by using above dataset we have trained Random Forest Regression algorithm to predict future prices.

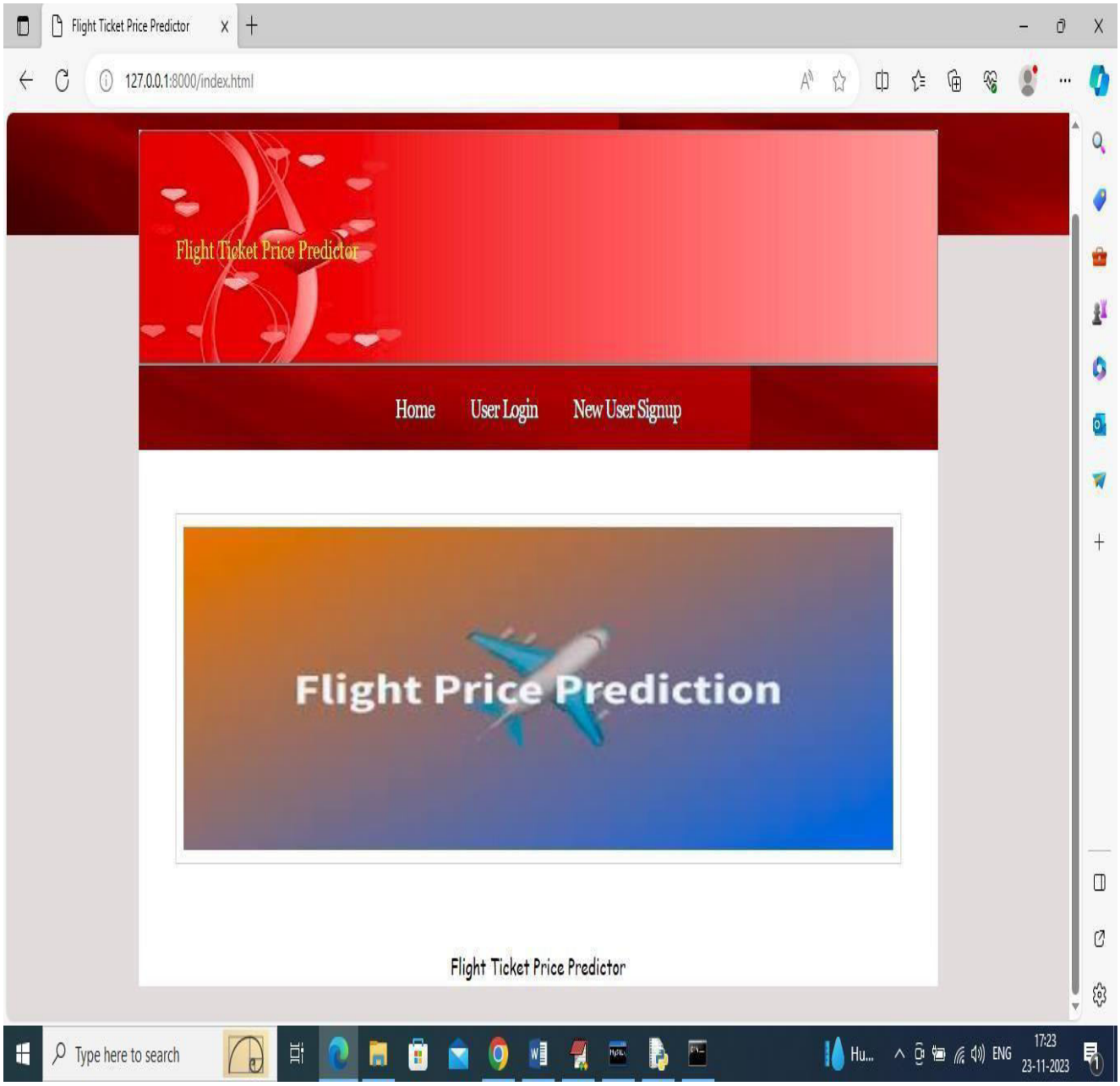
We have implemented above topic using DJANGO framework and contains following modules

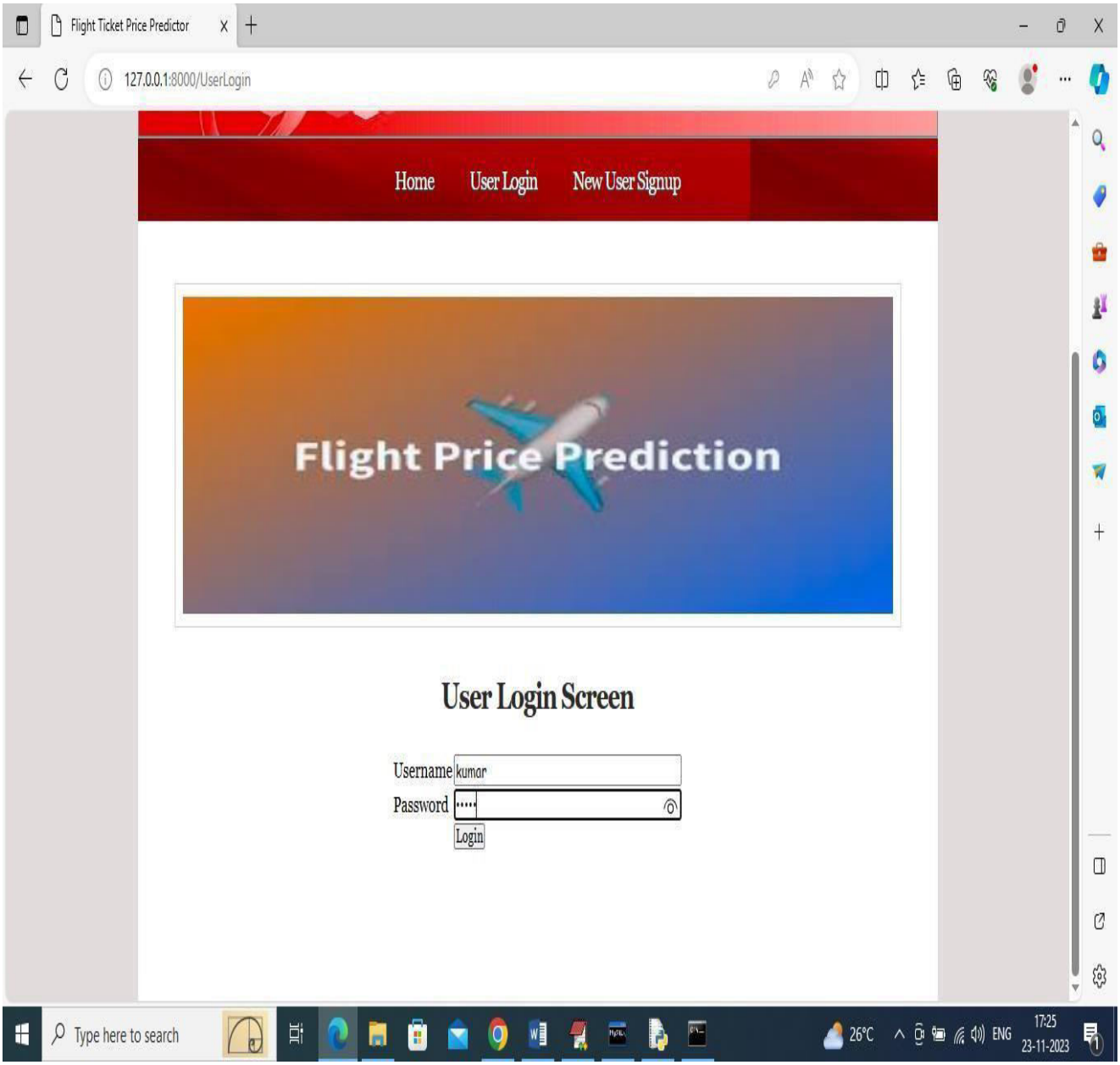
- New User Signup Here: using this module user can sign up with the application
- User Login: using this module user can login to application
- Dataset Collection & Visualization: using this module user can load and view dataset values and can visualize prices of different airline for source city
- Cleaning: using this module we will clean dataset like converting non-numeric values to numeric values, shuffling and normalization and then split dataset into train and test. 80% dataset using for training and 20% for testing
- Train Random Forest: random forest get trained on training data and can predict prices on 20% test data and then visualize graph between predicted and true prices
- Predict Prices: using this module user can select travel date, airline, source and destination and then application predict flight prices

In above screen python DJANGO web server started and now open browser and enter URL as http://127.0.0.1:8000/index.html and press enter key to get below page

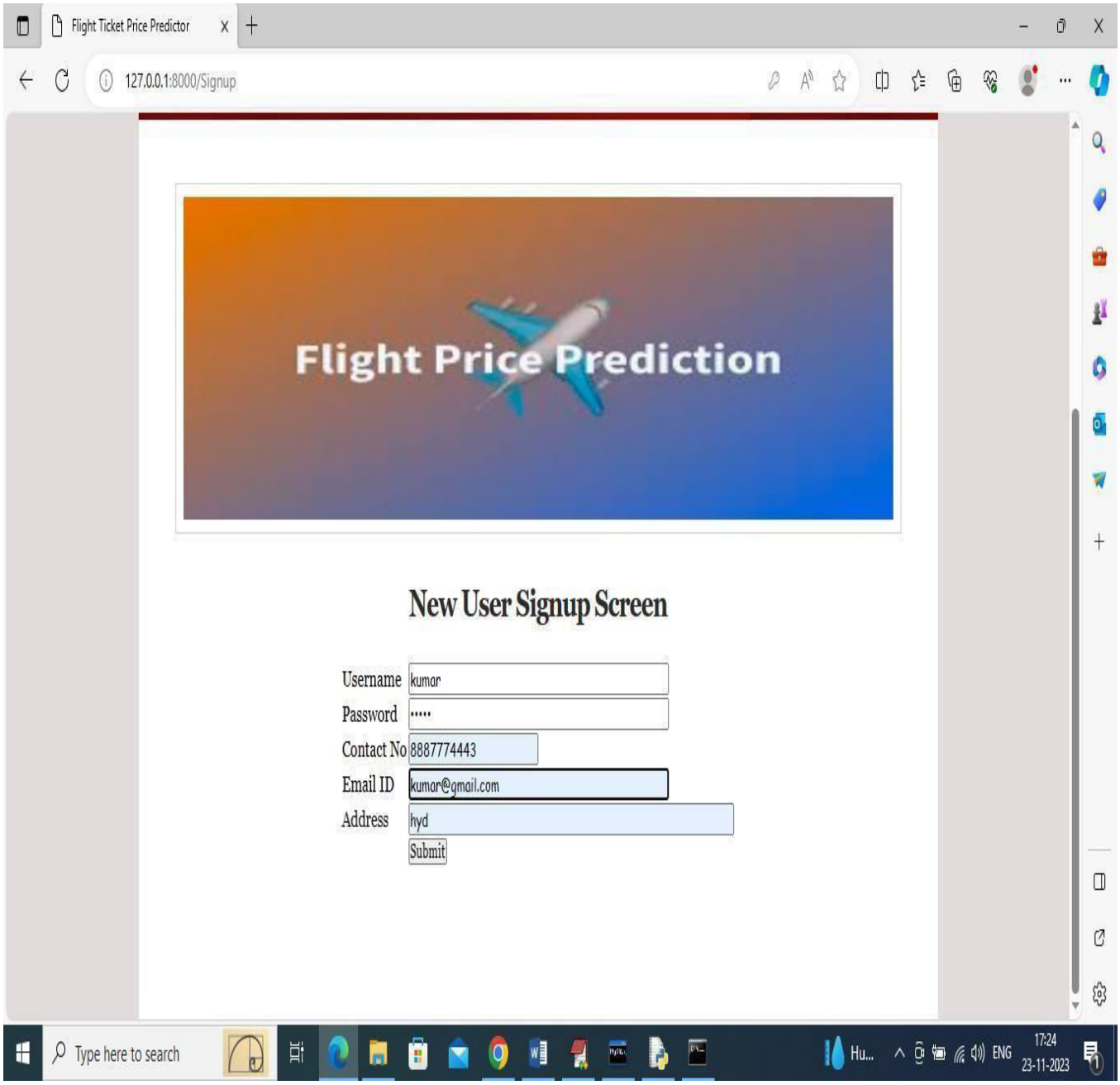
To run project double click on 'run.bat' file to start python server and get below page



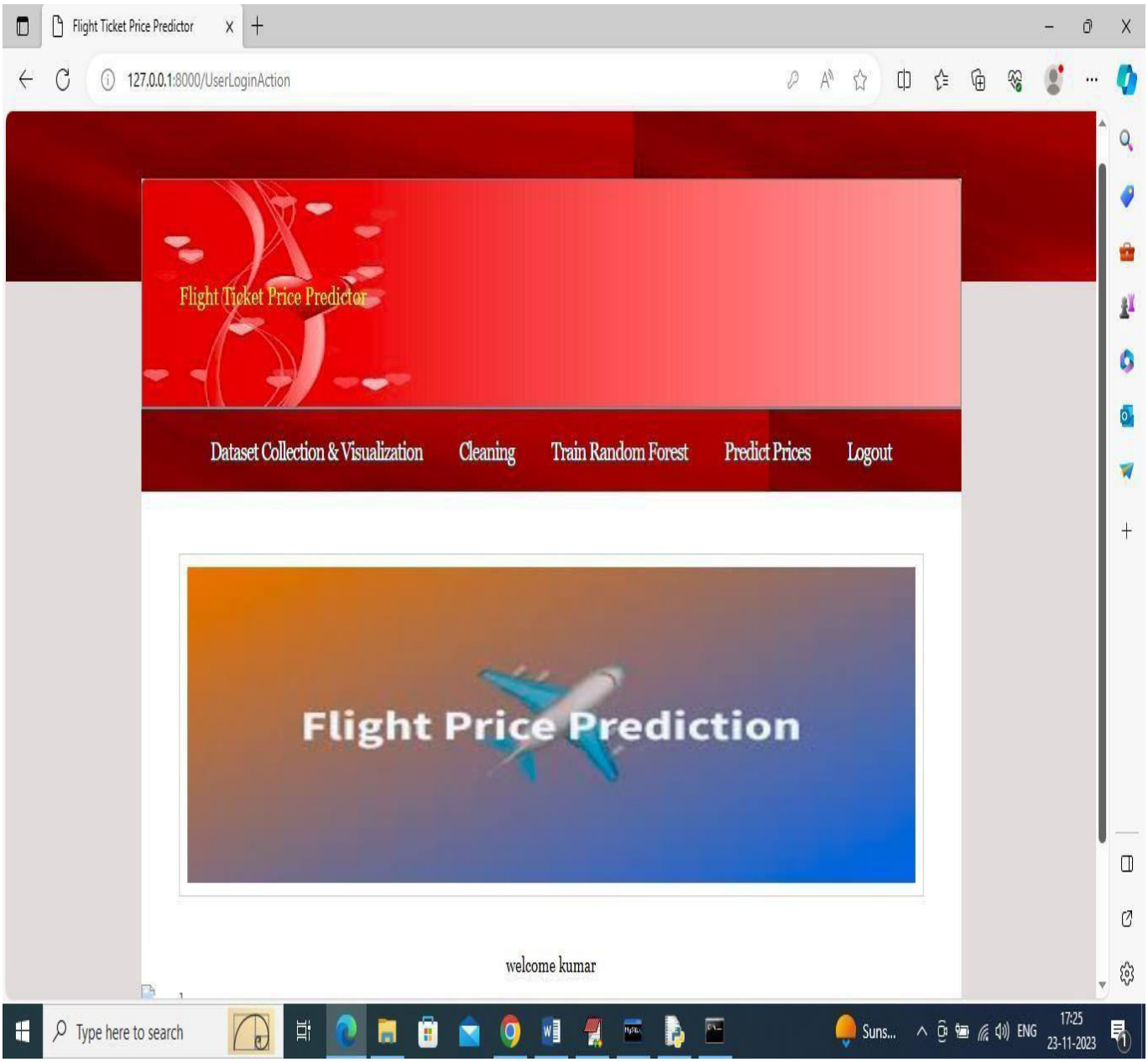

Flight Ticket Price Predictor
127.0.0.1:8000/index.html
Flight Ticket Price Predictor
Home
User Login
New User Signup
Flight Price Prediction
Flight Ticket Price Predictor
Type here to search
ENG
17:23
23-11-2023


Flight Ticket Price Predictor
127.0.0.1:8000/UserLogin
Home
User Login
New User Signup
Flight Price Prediction
User Login Screen
Username
kumar
Password
Login
Type here to search
26°C
ENG
17:25
23-11-2023

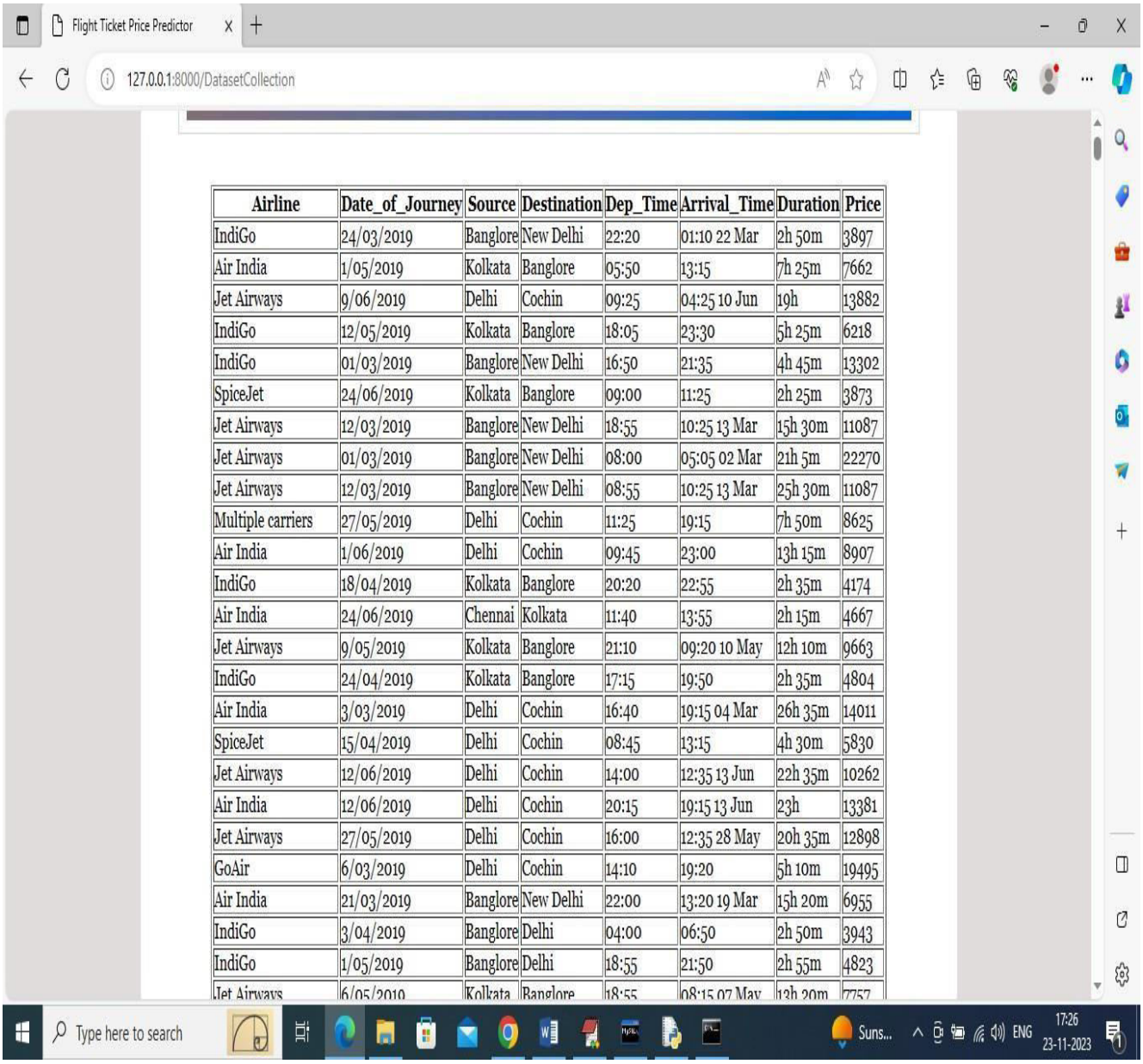
In above screen user is entering signup details and then press button to get below page.



In above screen user is login and after login will get below page

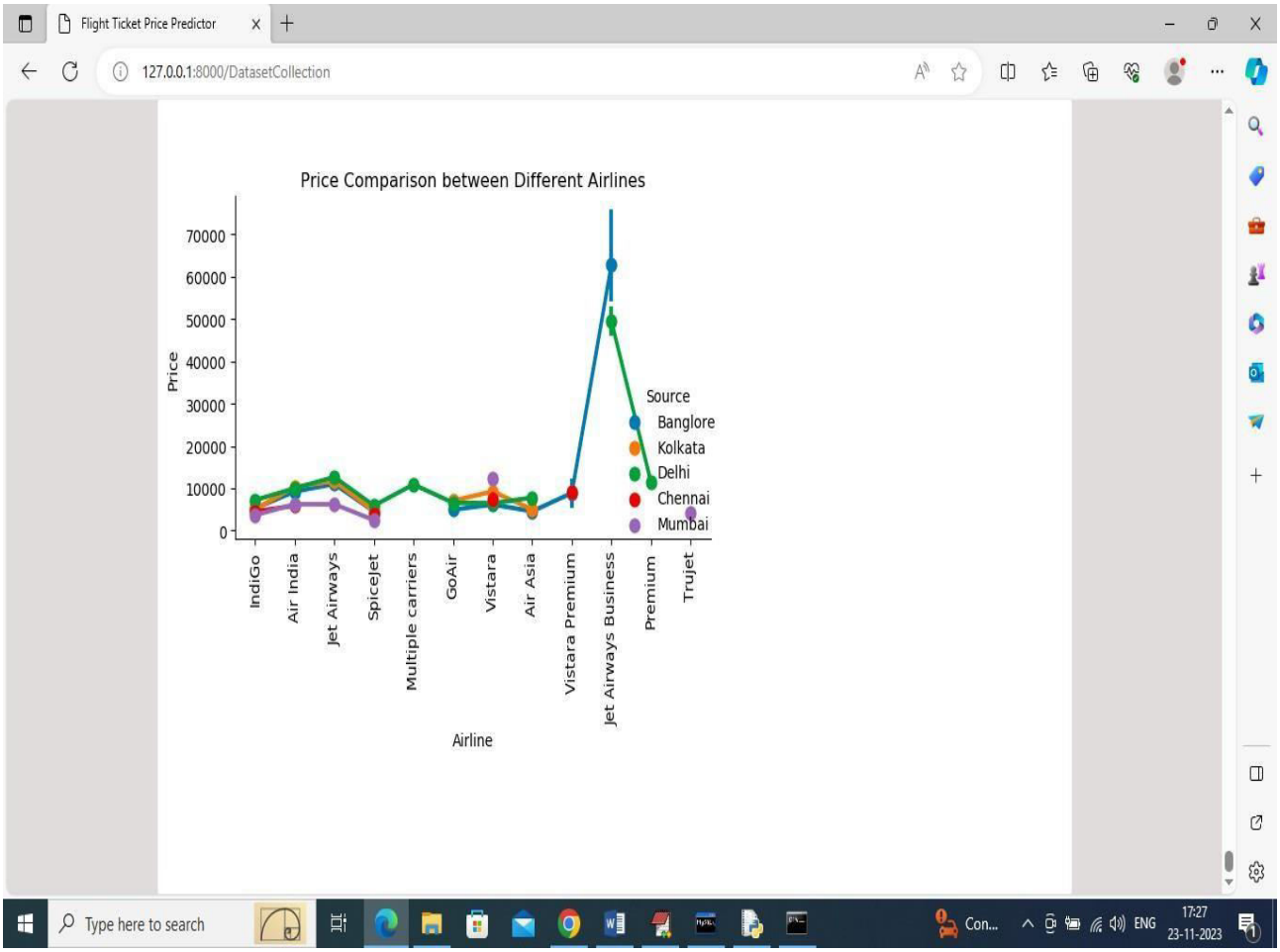


In above screen user can click on 'Dataset Collection & Visualization' link to load and visualize prices

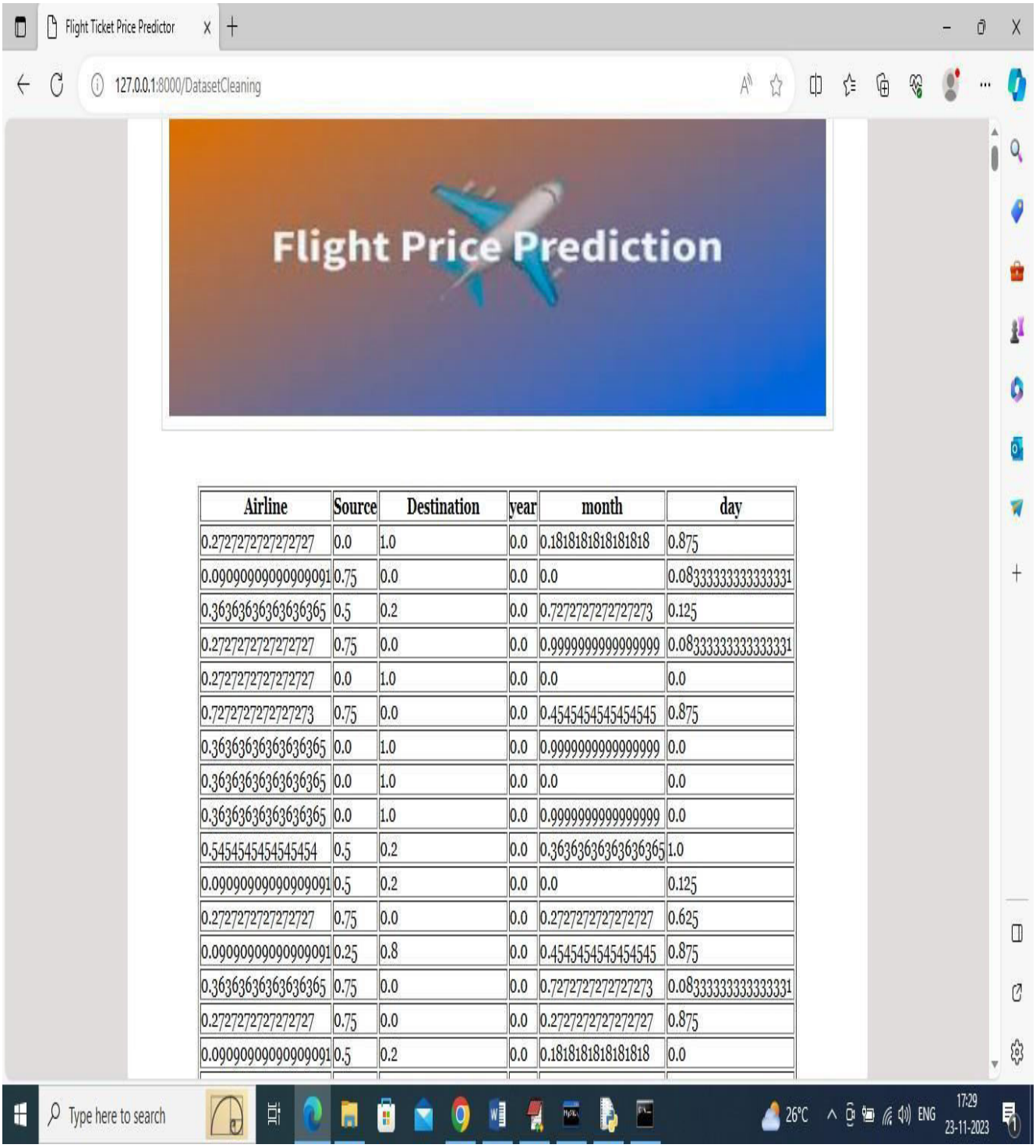


Airline	Date_of_Journey	Source	Destination	Dep_Time	Arrival_Time	Duration	Price
IndiGo	24/03/2019	Banglore	New Delhi	22:20	01:10 22 Mar	2h 50m	3897
Air India	1/05/2019	Kolkata	Banglore	05:50	13:15	7h 25m	7662
Jet Airways	9/06/2019	Delhi	Cochin	09:25	04:25 10 Jun	19h	13882
IndiGo	12/05/2019	Kolkata	Banglore	18:05	23:30	5h 25m	6218
IndiGo	01/03/2019	Banglore	New Delhi	16:50	21:35	4h 45m	13302
SpiceJet	24/06/2019	Kolkata	Banglore	09:00	11:25	2h 25m	3873
Jet Airways	12/03/2019	Banglore	New Delhi	18:55	10:25 13 Mar	15h 30m	11087
Jet Airways	01/03/2019	Banglore	New Delhi	08:00	05:05 02 Mar	21h 5m	22270
Jet Airways	12/03/2019	Banglore	New Delhi	08:55	10:25 13 Mar	25h 30m	11087
Multiple carriers	27/05/2019	Delhi	Cochin	11:25	19:15	7h 50m	8625
Air India	1/06/2019	Delhi	Cochin	09:45	23:00	13h 15m	8907
IndiGo	18/04/2019	Kolkata	Banglore	20:20	22:55	2h 35m	4174
Air India	24/06/2019	Chennai	Kolkata	11:40	13:55	2h 15m	4667
Jet Airways	9/05/2019	Kolkata	Banglore	21:10	09:20 10 May	12h 10m	9663
IndiGo	24/04/2019	Kolkata	Banglore	17:15	19:50	2h 35m	4804
Air India	3/03/2019	Delhi	Cochin	16:40	19:15 04 Mar	26h 35m	14011
SpiceJet	15/04/2019	Delhi	Cochin	08:45	13:15	4h 30m	5830
Jet Airways	12/06/2019	Delhi	Cochin	14:00	12:35 13 Jun	22h 35m	10262
Air India	12/06/2019	Delhi	Cochin	20:15	19:15 13 Jun	23h	13381
Jet Airways	27/05/2019	Delhi	Cochin	16:00	12:35 28 May	20h 35m	12898
GoAir	6/03/2019	Delhi	Cochin	14:10	19:20	5h 10m	19495
Air India	21/03/2019	Banglore	New Delhi	22:00	13:20 19 Mar	15h 20m	6955
IndiGo	3/04/2019	Banglore	Delhi	04:00	06:50	2h 50m	3943
IndiGo	1/05/2019	Banglore	Delhi	18:55	21:50	2h 55m	4823
Jet Airways	6/05/2019	Kolkata	Banglore	18:55	08:15 07 May	13h 20m	7757

In above screen dataset loaded and dataset contains both numeric and non-numeric values and ML algorithms accept only numeric values so by cleaning we can convert all non-numeric data to numeric data and now go down to get below graph.

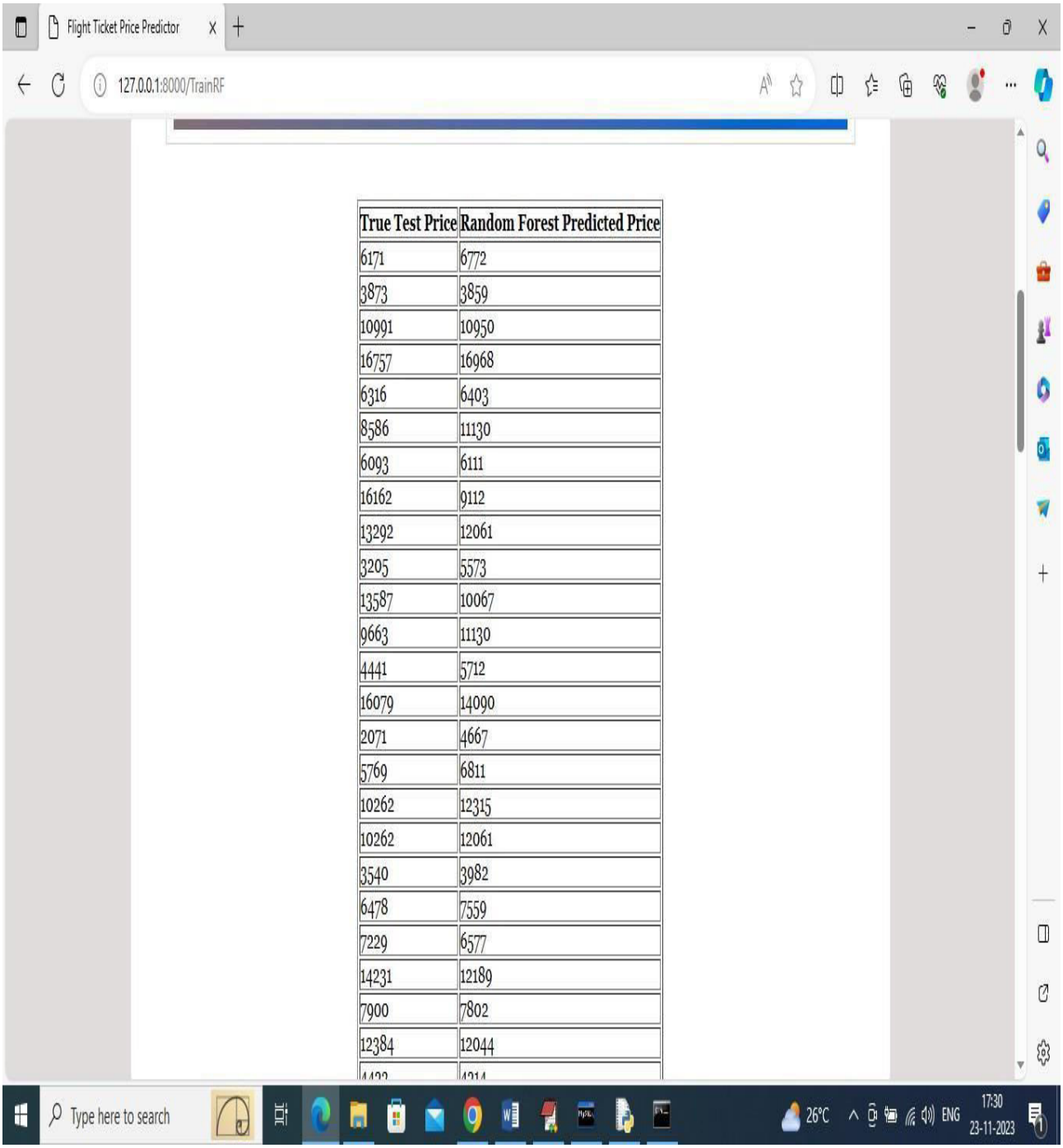


In above graph we are visualizing prices from different airlines for same city and in above graph x-axis represents Air Lines and y-axis represents prices and different line represents CITIES and by using above graph we can know difference in prices from different airlines and now click on 'Cleaning' link to get below clean data.



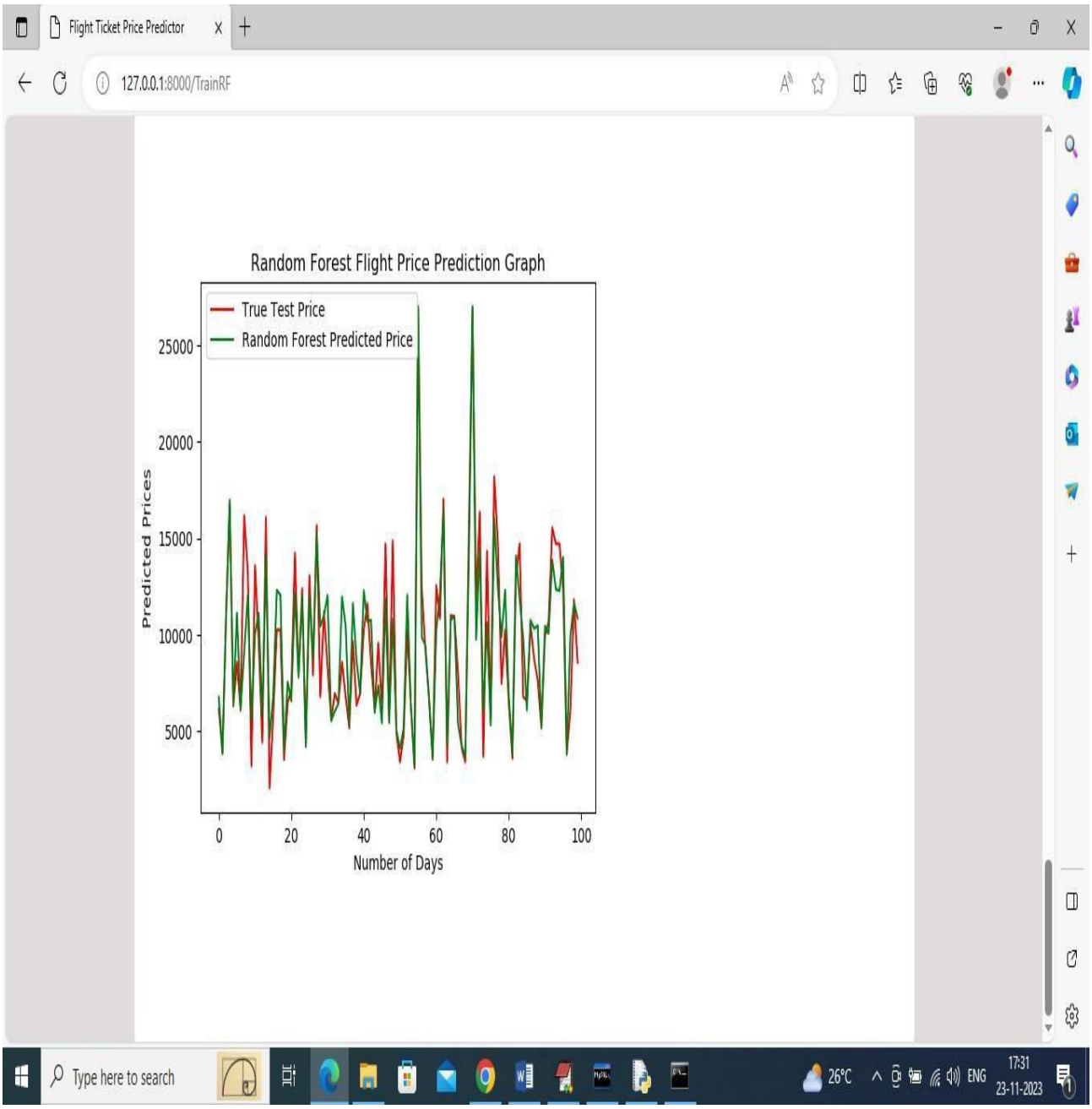
Airline	Source	Destination	year	month	day
0.2727272727272727	0.0	1.0	0.0	0.1818181818181818	0.875
0.09090909090909091	0.75	0.0	0.0	0.0	0.08333333333333331
0.3636363636363635	0.5	0.2	0.0	0.7272727272727273	0.125
0.2727272727272727	0.75	0.0	0.0	0.9999999999999999	0.08333333333333331
0.2727272727272727	0.0	1.0	0.0	0.0	0.0
0.7272727272727273	0.75	0.0	0.0	0.4545454545454545	0.875
0.3636363636363635	0.0	1.0	0.0	0.9999999999999999	0.0
0.3636363636363635	0.0	1.0	0.0	0.0	0.0
0.3636363636363635	0.0	1.0	0.0	0.9999999999999999	0.0
0.5454545454545454	0.5	0.2	0.0	0.3636363636363635	1.0
0.09090909090909091	0.5	0.2	0.0	0.0	0.125
0.2727272727272727	0.75	0.0	0.0	0.2727272727272727	0.625
0.09090909090909091	0.25	0.8	0.0	0.4545454545454545	0.875
0.3636363636363635	0.75	0.0	0.0	0.7272727272727273	0.08333333333333331
0.2727272727272727	0.75	0.0	0.0	0.2727272727272727	0.875
0.09090909090909091	0.5	0.2	0.0	0.1818181818181818	0.0

In above screen can see all values converted to numeric and normalized format and now click on 'Train Random Forest' algorithm to get below predicted process from test data



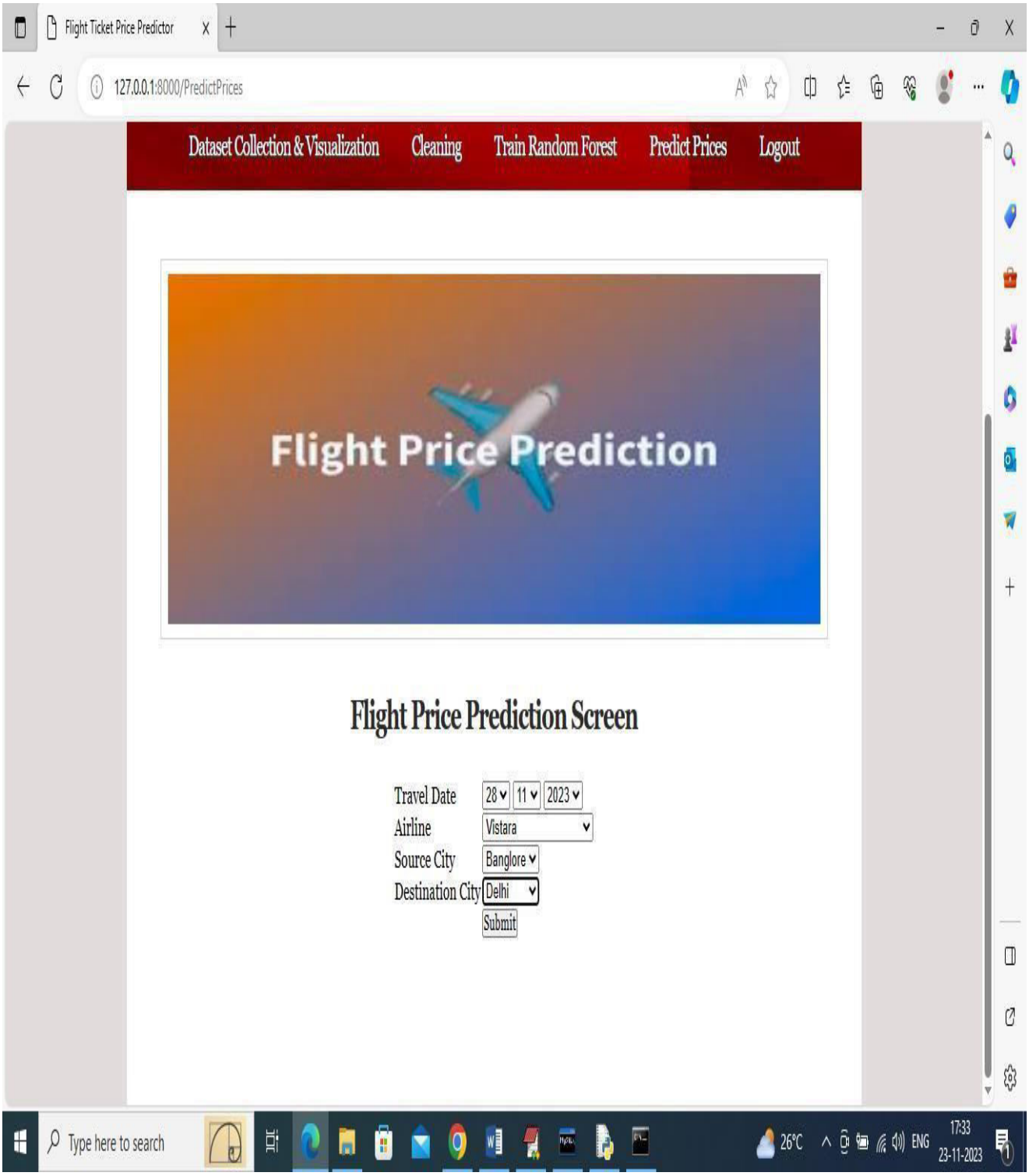
True Test Price	Random Forest Predicted Price
6171	6772
3873	3859
10991	10950
16757	16968
6316	6403
8586	11130
6093	6111
16162	9112
13292	12061
3205	5573
13587	10067
9663	11130
4441	5712
16079	14090
2071	4667
5769	6811
10262	12315
10262	12061
3540	3982
6478	7559
7229	6577
14231	12189
7900	7802
12384	12044

In above screen in first column we can see Test data original prices and in second column can see Random Forest predicted prices and go
d

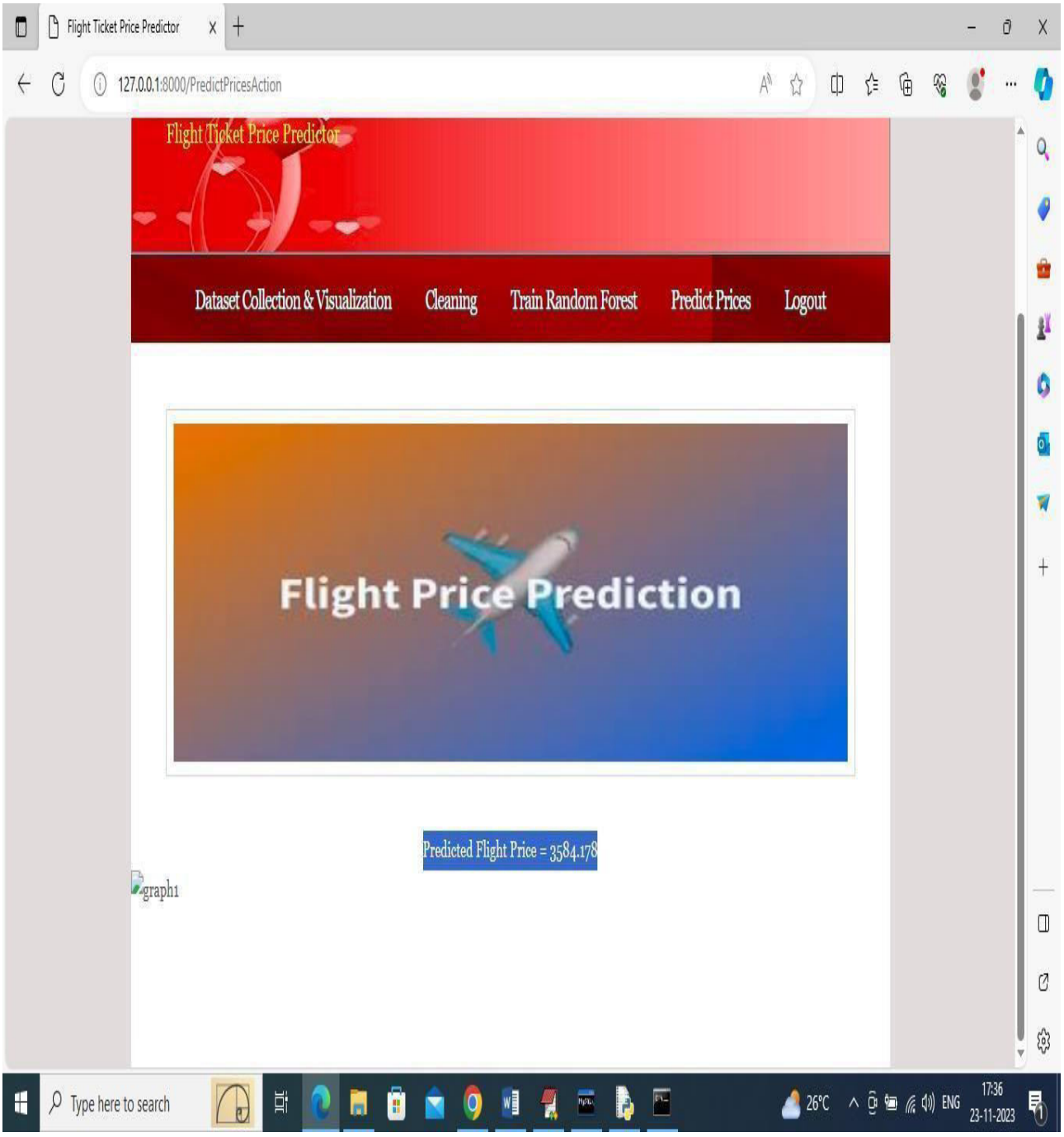


own in above screen to view below graph

In above graph x-axis represents 'Number of days' and y-axis represents PRICES and red line represents True test prices and green line represents Random Forest predicted prices and in above graph can see both lines are fully overlapping with little gap so we can say Random Forest predicted prices are accurate. Now click on 'Predict Prices' link to get below page.



In above screen I selected travel date, airline with source and destination and then press button to get below output.



In above screen in blue colour text can see predicted prices and in below screen showing prices for same cities with different airline

6. CONCLUSION AND FUTURE WORK

The proposed Flight Ticket Price Predictor system significantly enhances the accuracy, reliability, and user experience compared to existing systems. By leveraging advanced machine learning, real-time data integration, and personalized recommendations, it provides travelers with actionable insights to make informed decisions about their flight bookings. This system not only aims to save users money but also to simplify and enhance their overall travel planning experience.

The future work for the Flight Ticket Price Predictor system is rich with possibilities for enhancing its accuracy, personalization, and user experience. By continually integrating advanced technologies, expanding data sources, and focusing on user-centric design, the system can provide even more valuable insights for travelers. This ongoing development will help maintain the system's competitive edge and ensure it remains a leading tool in the dynamic and ever-evolving travel industry.

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sue 08, August/2021 ISSN NO:0377-9254 PageNo:63 www.jespublication.com