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Flight Fare Predication using Machine Learning

Utkarsha Aher¹, Vaishnavi Dhumal², Ashwini Jadhav³, Shreya Kad⁴, G.B. Gadekar⁵

UG Student , Department of Computer Engineering, SRES Sanjivani College of Engineering, Kopargaon, India^{1,2,3,4}

Assistant Professor, Department of Computer Engineering, SRES Sanjivani College of Engineering, Kopargaon, India⁵

ABSTRACT: Travelling through flights has become associate integral a part of today's life style as additional and additional individuals are choosing quicker movement choices. The flight price tag costs increase or decrease each currently so is looking on varied factors like temporal arrangement of the flights, destination, and period of flights. Various occasions like vacations or merry season. Therefore, having some basic plan of the flight fares before coming up with the trip can certainly facilitate many folks save cash and time. In the planned system a prophetic model are going to be created by applying machine learning algorithms to the collected historical knowledge of flights. This system can provide individuals the concept regarding the trends that costs follow and conjointly give a foretold worth that they'll confer with before booking their flight tickets to save lots of cash. This kind of system or service is often provided to the shoppers by flight booking corporations which can facilitate the shoppers to book their tickets consequently.

KEYWORDS:-Machine Learning, Flight Fare ,Linear Regression, Random Forest.

I. INTRODUCTION

Problem Definition:-

Flight price tag costs may be one thing exhausting to guess, nowadays we'd see a worth, investigate the worth of identical flight tomorrow.

We might have usually detected traveler's speech communication that flight price tag costs area unit thus unpredictable. The planned System are supplied with costs of flight tickets for numerous airlines between numerous cities. The airline could increase the costs once the demand is to be expected to extend the capability. To estimate the minimum fare, knowledge for a particular air route has been collected as well as the options like point in time, point and airways over a particular amount. Features area unit extracted from the collected knowledge to use Machine Learning (ML) models. this method provides the machine learning regression strategies to predict the costs at the given time.

Motivation:-

The flight ticket price increase or decrease every now and depends on various factors. Therefore, having some basic idea of flight fares before planning the trip will surely help many people save money and time.

This system will give people the idea about the trends that prices follow and also provide a predicted value which they can refer before booking their flight tickets to save money.

II. LITERATURE SURVEY

Supriya Rajankar , Neha Sakharkar, Omprakash Rajankar, have proposed the system in a paper titled "Predicting The Price Of A Flight Ticket With The Use Of Machine Learning Algorithms", Someone who purchase flight tickets frequently would be able to predict the right time to procure a ticket to obtain the best deal. Many airlines change ticket prices for their revenue management. The airline may increase the prices when the demand is to be expected to increase the capacity[3].

Tianyi Wang, Samira Pouyanfar , have proposed the system in a paper titled "A Framework for Airfare Price Prediction: A Machine Learning Approach", —The price of an airline ticket is affected by a number of factors, such as flight distance, purchasing time, fuel price, etc. Each carrier has its own proprietary rules and algorithms to set the price accordingly. Recent advance in Artificial Intelligence (AI) and Machine Learning (ML) makes it possible to infer such rules and model the price variation. This paper proposes a novel application based on two public data sources in the domain of air transportation: the Airline Origin and Destination Survey (DB1B) and the Air Carrier Statistics database (T-100)[4].

Viet Hoang Vu, Quang Tran Minh Phu H. Phung[3], have proposed the system in a paper titled "An Airfare Prediction Model for Developing Markets", —Air passengers (the buyers) are often looking for the best time period to purchase airfares to get as much saving as possible while airlines (the sellers) always try to maximize their revenues by revising different prices for the same service. The sellers have all the necessary information (for example historical sale, market demand, customer profile, and behavior) to make the decision whether to increase or decrease air fares at different times prior to the departure dates. On the other hand, the buyers are only able to access limited information to assist their decision making on whether to wait or purchase airfare right away. In this paper, we propose a new model that can help the buyer to predict the price trends without official information from the airlines[1].

System Design:-

The System Design and architecture gives the detail architecture for developing the proposed system.

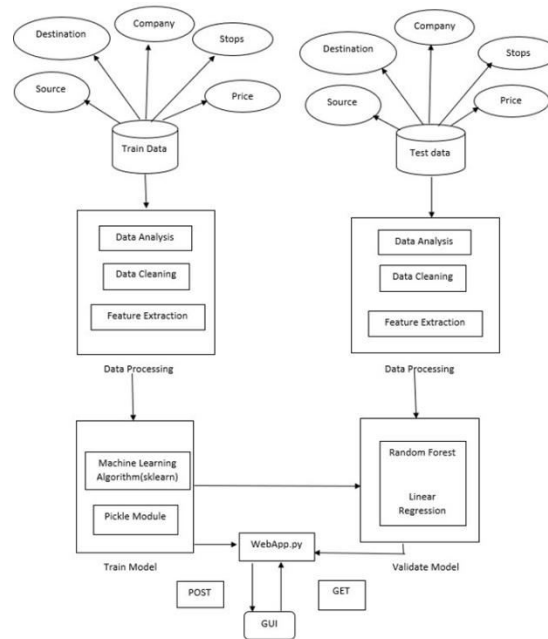


Figure 1:- System Architecture

1. Data selection is the first step where historical data of flight is gathered for the model to predict prices. Some of the features of the dataset are source, destination, departure date, departure time, and number of stops, arrival time, prices and few more.

2. Exploratory Data Analysis: In the exploratory data analysis step, we cleaned the dataset by removing the duplicate values and null values. If these values are not removed it would affect the accuracy of the model. We gained further information such as distribution of data.

3. Data pre-processing where we observed that most of the data was present in string format. Data from each feature is extracted such as day and month is extracted from date of journey in integer format, hours and minutes is extracted from departure time. Features such as source and destination needed to be converted into values as they were of categorical type. For this One hot-encoding and label encoding techniques.

4. Feature selection step is involved in selecting important features that are more correlated to the price. There are some be selected and passed to the group of models. Random forest basically uses group of decision trees as group of models.

5. After selecting the features which are more correlated to price the next step involves applying machine algorithm and creating a model.

6. The deployment of the trained machine learning model. Therefore, after getting the model with the best accuracy we store that model in a file using pickle mod

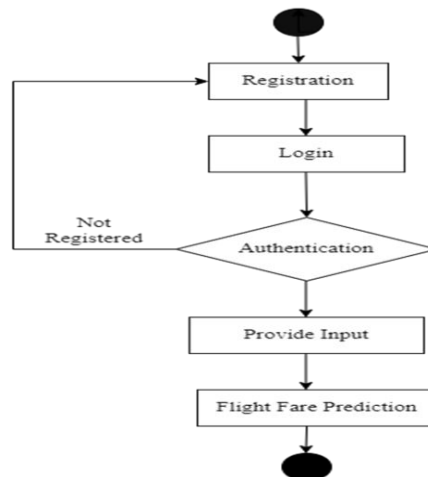
7. The back-end of the application will be created using Flask Framework where API end-points such and GET and POST will be created to perform operations related to fetching and displaying data on the front-end of the application.

8. User will have the functionality of entering their flight data. This data will be sent to the back-end service where the model will predict the output according to the provided data.
9. The predicted value is sent to the front-end and displayed.

State Machine Diagram:-

A finite-state machine (FSM) or finite-state automation or simply state machine is a mathematical model of computation used to design both computer programs and sequential logic circuits.

It is conceived as an abstract machine that can be in one of a finite number of states. The machine is in only one state at a time; the state it is in at any given time is called the current state. It can change from one state to another when initiated by a triggering event or condition; this is called a transition.



III. RESULT

Method	MAE	RMSE	ACCURACY
LR	1275.8061	2125.7018	0.6195
RF	1165.6061	2015.6018	0.8117

In order to demonstrate the importance of each feature for airfare price prediction, we extracted the importance scores generated by the feature selection module. In the model “Total Stops” and “Airline” (JetAirline or Indigo or Vistara) are the most important factors for airfare price estimation followed by “Departure time”, “Arrival time”. In spite of that source, destination and date of journey also help to predict a more accurate estimation of the air fare price however based on our experiments “Route” does not help the regression model.

The result comparing linear regression and random forest as can be seen from above table, LR have the lowest performance compared to RF with respect to RMSE and MAE.

IV. CONCLUSION

A proper implementation of this project can result in saving money of inexperienced people by providing them the information related to trends that flight prices follow and also give them a predicted value of the price which they use to decide. In conclusion this type of service can be implemented with good accuracy of prediction. As the predicted value is not fully accurate there is huge scope for improvement of these kind of service.

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 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



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