

**FLIGHT PRICE PREDICTOR**

Submitted by:

*SAYAN PAUL*

**ACKNOWLEDGMENT**

I would like to thank **makemytrip.com** from where I scraped the dataset and I would also like to thank our MSE , MS Khusboo Garg for her constant help during the project.

Also I would like to thank websites like stackoverflow, geeksforgeeks and sklearn documentary for helping me when I got stuck somewhere.

**INTRODUCTION**

* Business Problem Framing

We were required to model the price of flight tickets with the available independent variables. This model will then be used by our client to understand how exactly the prices vary with the variables. They can accordingly manipulate their business strategy and concentrate on areas that will yield high returns. Further, the model will be a good way for the management to understand the pricing dynamics of the post-COVID market.

* Review of Literature

Flights have become very necessary for the middle class as well as the upper class citizens of India which is one of the major contributors in a country’s economy. It is a very large market and there are various companies working in the domain. Data science comes as a very important tool to solve problems in the domain to help the companies increase their overall revenue, profits, improving their marketing strategies and focusing on changing trends in flight ticket sales and purchases. It also helps the customers to get a better deal.

* Motivation for the Problem Undertaken

1. Developing an understanding of the flight ticket market.
2. Improving my machine learning skills.

**Analytical Problem Framing**

* Data Sources and their formats

We were provided the training data from makemytrip.com by web scraping using selenium webdriver.

* Data Preprocessing Done

1. Label encoding
2. Skewness revomal of two columns using power transformer.
3. Outlier removal

* Data Inputs- Logic- Output Relationships

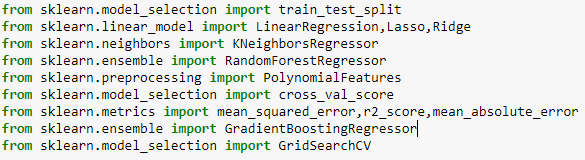
RandomForest Regressor was used here because it was giving the best results.

Different models were tried to obtain best results. Power transformer was applied on different combination of columns to check which combination was working best for which model.

* State the set of assumptions (if any) related to the problem under consideration

1. Since the number of columns were very less, we did not drop any column based on low correlation with target.
2. Models like LinearRegression, LassoRegression, RidgeRegression, ElasticNet,SGDRegressor is not going to preform well here.
3. Models like KNNRegressor, RandomForestRegressor, GradientBoostingRegressor might perform well.
4. Power transformer was not applied based on high skewness of data present in the column. Instead it was applied on different sets of columns for a particular algorithm to check whether power transformer is increasing the accuracy.
5. Applying power transformer only on the output column increased the accuracy of most of the models.

* Hardware and Software Requirements and Tools Used

****

**Model/s Development and Evaluation**

* Identification of possible problem-solving approaches (methods)

The algorithms tried for solving this problem are:-

1. Linear Regression
2. KNeighbors Regression
3. Random Forest Regression
4. Gradient Boosting Regression.

* Testing of Identified Approaches (Algorithms)

Hyperparameter tuning was performed on the above above algorithms and the best results are as shown below.

|  |  |
| --- | --- |
| **Algorithms** | **Best r2\_score** |
| KNN Regression | 0.673424365671921 |
| Random Forest Regression | 0.874401604763342 |
| Gradient Boosting Regression | 0.8307491846654054 |
|  |  |
|  |  |

* Run and Evaluate selected models





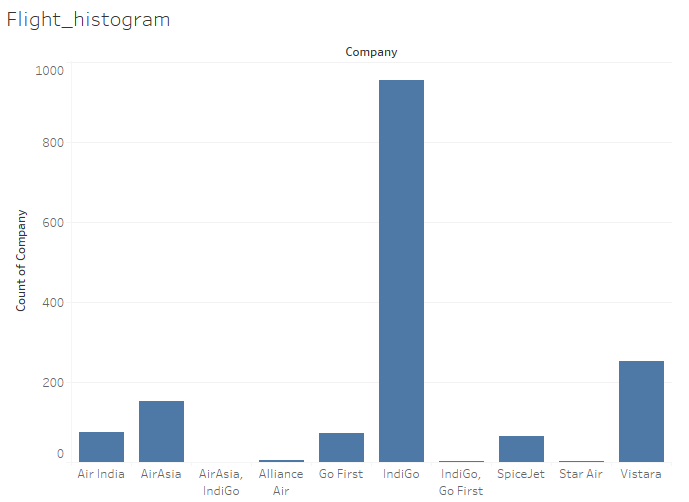


* Key Metrics for success in solving problem under consideration

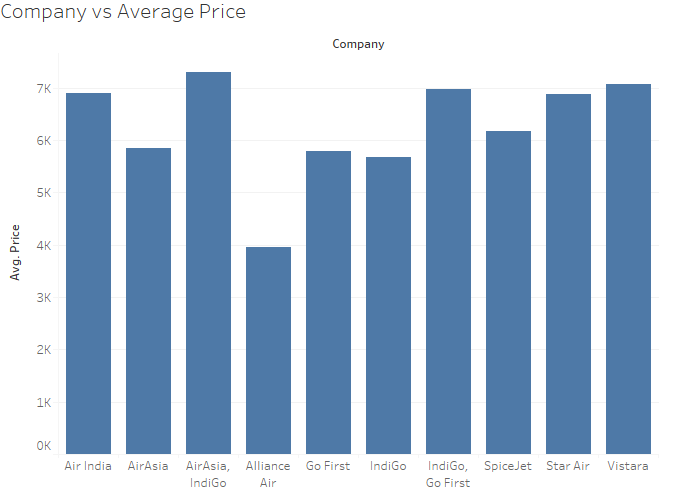
1. r2\_score
2. root\_mean\_squared\_error
3. mean\_absolute\_error

* Visualizations

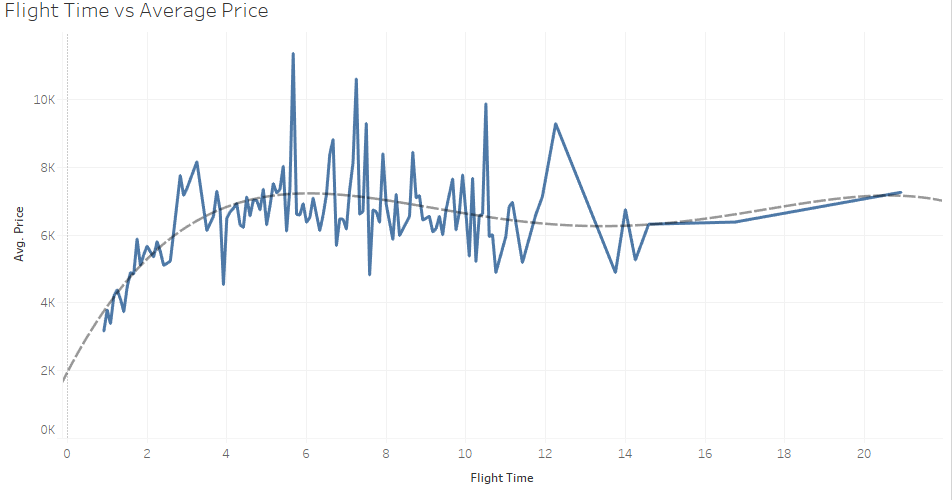




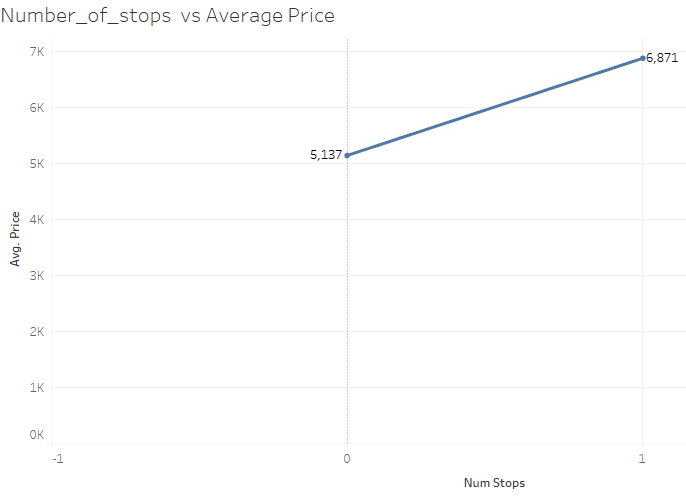
Indigo operates very high number of flights.



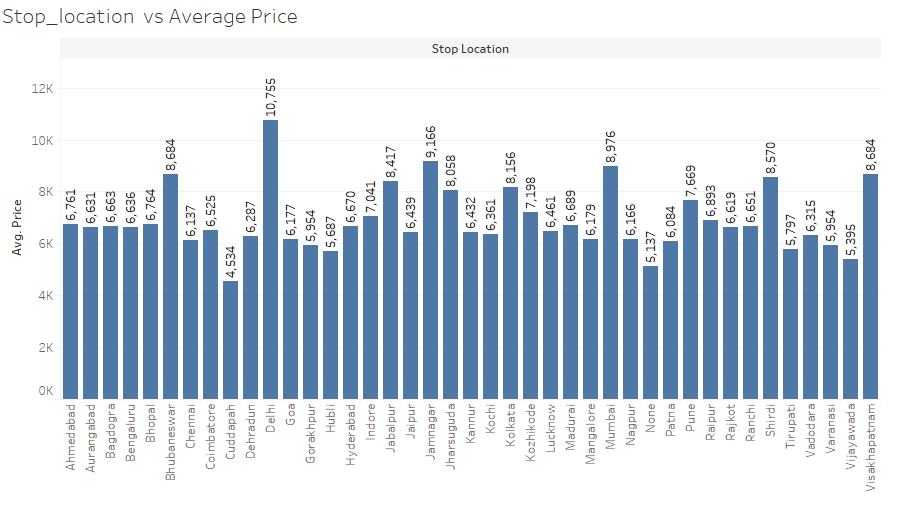
The company operating maximum number of flights has lowest average ticket price.



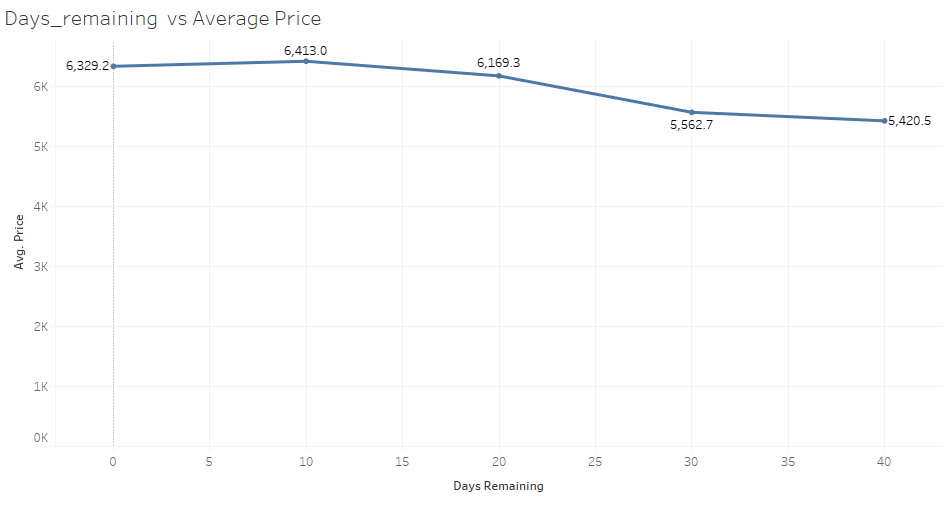
Price initially increases with flight distance but then it remains almost constant.



Flights having atleast one stop is having more average price.



Average price of ticket is high if the flight is having a stop at Delhi.



More the number of days, the ticket is bought before the flight, lower is the price

**CONCLUSION**

* Learning Outcomes of the Study in respect of Data Science

Dropping columns having low correlation with the target is not always the only way. Sometimes those correlation attributes are necessary to give good results with KNNRegressor and DecisionTree regressor, RandomForest Regressor, GradientBoosting Regressor.

* Limitations of this work and Scope for Future Work

More hyper parameter tunings can be tried with the algorithms.

More data can be collected in order to improve model accuracy.