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Executive Brief

Flight price prediction

Introduction

We want to give you the edge.

In the rapidly growing economy of India, demand for more business class flight tickets is on the rise. The corporate landscape depends on the effective management of business travel expenses for organizational success and business class flight ticket prices in India often pose a challenge for strategic planning. The motivation behind this brief is to empower your organization with predictive insights. By understanding the patterns of ticket pricing, your company can optimize travel budgets, enhance financial planning, and ensure seamless travel experiences for executives. In this report, we explore data-driven methodologies and key findings, providing price recommendations to navigate the complexities of business class flight ticket pricing in India, offering your business a competitive edge in the market. With more than 90.000 observations and using the power of machine learning we ensure the absolute best predictive model for your business. We've created a Streamlit application for your business to try out our prediction model, just scroll to the end of this brief.

Process

In this executive brief we've only focused business class tickets. The dataset used to predict flight prices contains variables such as airline, departure city, departure time, arrival city and arrival time. It also contains the number of stops, flight duration and of course the price, see the table below.

Airline	Departure city	Departure time	Arrival city	Arrival time	Number of stops	Flight duration	Price

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Airlines and cities included:

Airlines: *Vistara and Air India*

Cities: *Delhi, Mumbai, Bangalore, Kolkata, Hyderabad, Chennai*

The data has been cleaned of all its outliers and we've also added a new column called distance, which is the distance between two airports. To make the data suitable for machine learning we've applied the StandardScalar to the numerical values and the OneHotEncoder to the categorical values. Departure and arrival time has been grouped in 7 sections: Night, early morning, morning, midday, afternoon, evening, and late evening. The flight duration has also been changed from hours and minutes to just minutes to use it in the machine learning model.

Model Selection

To see what model fits the data the best, we have been training and testing the data on three different models: a linear regression model, a random forest model and an XGBoost model. All showed decent signs of usability, but the random forest model stood out with the highest R^2 value and the lowest $RMSE$. Testing for hyperparameters and fine tuning the random forest model didn't create a better model.

Findings

Model performance

From testing and choosing between different models we found the best fit for our data. For that reason, our model performed well and predicted an acceptable price from the different input features. In our model which airline you fly with, how many stops you have on your flight and the duration of the flight had the biggest impact on the price of your flights.

Key insights

- Prices depends most on airline, stops and duration of the flights.
- Predictive model based on a random forest model.
- Can predict the price of a business class flight ticket.

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- Application contains both predictive model interface.

Business Implication

- Give customers a personalized offer based on their predicted price.
- Get business insights into demand of business class flights.
- Strategic and competitive pricing of business class tickets.
- Price differentiation based on different factors.
- Customer satisfaction through predictability and transparency.

Conclusion

In conclusion, a predictive price model can help airlines and customers alike in creating better experiences and getting business insights when looking at business class flight tickets. Our model can give your customers a tool they can use to predict the price of and get recommendations on their next business class trip between India. Your business can use our predictive model to make more strategic decisions regarding business class tickets, the pricing and competitiveness of your pricing. All in all, machine learning can be a productive and powerful tool for your business to create even more value for your business and customers.

Link to streamlit app and the flight price prediction model:
https://bds23-flight-prices.streamlit.app