Predicting Customer Satisfaction for Airlines

Final Presentation | Group A | June 17th, 2024

Approach

Problem Statement

- Understanding of **issue** in practical context
- Definition of **business goal** for the implementation of ML algorithms

Dataset Introduction

- Understanding of **underlying numerical and categorical predictors**

ML Model Selection

- **ML modelling approach**
- **Choice of ML models** for solving the problem

Model Evaluation & Feature Importance

- Interpretation of **performance metrics** of the model
- Extraction of **feature importance** to determine most relevant predictors

Impact

- **Suggestion of key measures** to implement going forward
- **Application of ML models** withing a **dashboard**

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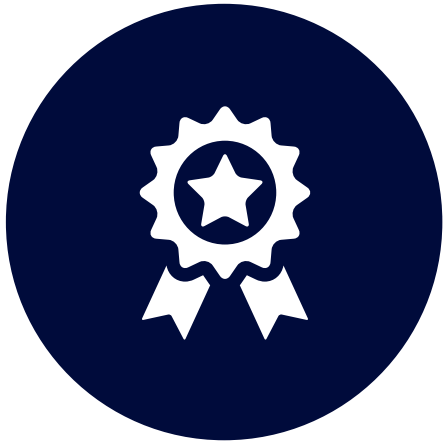
Dissatisfied customers have detrimental consequences



Negative Impact on Reputation

Bad reviews, damaged brand image

Decreased Customer Loyalty

Loss of repeat business, higher customer acquisition costs

Negative Financial Consequences

Refunds, compensation, costly operational adjustments

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Our dataset is sourced from an undisclosed airline

Data Source[1]

Undisclosed airline company

Details

Customer survey
Scores from customer survey questions

Passenger details
e.g., age, booked class, travel type

Flight information
Departure and arrival delay

[1] Source: https://www.kaggle.com/datasets/raminhuseyn/airline-customer-satisfaction

In our models, we rely on 19 flight-related predictors

Numerical Predictors

Flight experience

- Flight distance
- Seat comfort
- Leg room service
- Inflight entertainment
- Inflight WIFI service
- Food and drink
- Cleanliness
- On-board service

Service efficiency

- Online boarding
- Check-in services
- Departure delay
- Arrival delay
- Baggage handling
- Age

Digital experiences

- Ease of online booking
- Online support

Categorical Predictors

- Customer type
- Type of travel
- Class

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We decided to compare 6 different ML model algorithms

Binary classification

Will a customer be satisfied or dissatisfied after the flight?

- **Decision Tree**
- **Logistic Regression**
- **XGBoost**
- **Support Vector Classifier**
- **NN** (MLP Classifier)
- **AutoML** (TPOT Classifier)

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XGBoost performs best with a Validation AUC of 0.992

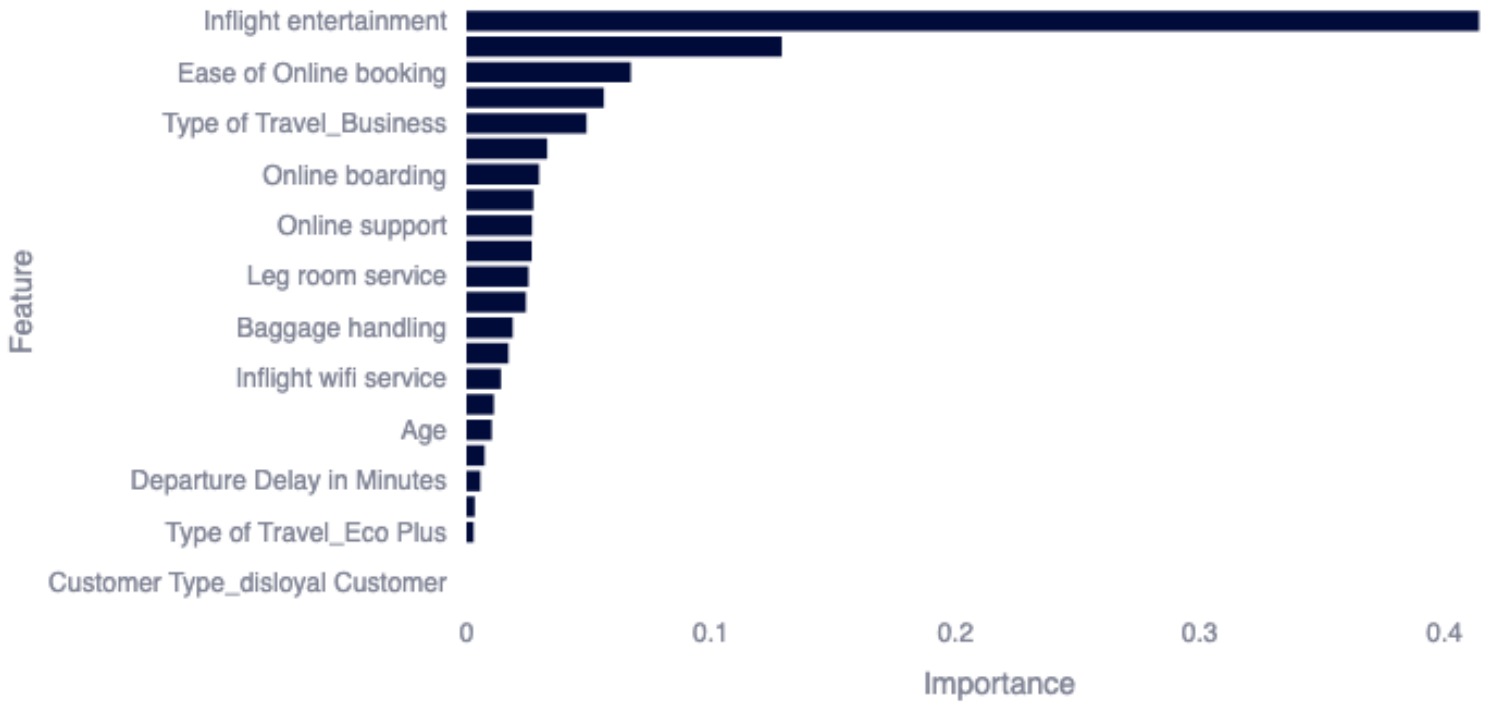
Criterion: Validation AUC (Area under curve)

1. AUC is **independent of setting a classification threshold**, which makes it robust even when the threshold is not known
2. AUC **considers both the True Positive Rate (Sensitivity) and the False Positive Rate (Specificity)**, ensuring that the **model performs well in identifying both satisfied and dissatisfied customers**, which is relevant in our business context
3. AUC evaluates how well the model distinguishes between the two classes regardless of their distribution, making it **robust against class imbalance**

	XGBoost	NN	AutoML (XGBClassifier)	SVC	Decision Tree	Logistic Regression
Validation AUC	**0.992**	0.991	0.988	0.986	0.974	0.900
Rank	**1**	2	3	4	5	6

Top 3: entertainment, seat comfort & online booking

Feature Importance (XGBoost model)



Top 3 Features

- **Inflight entertainment**
- **Seat comfort**
- **Ease of online booking**

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Airlines can focus on 3 main areas of improvement

Inflight entertainment

Action Items:

1. **Expand variety of content available** to cater to wider passenger preferences (incl. different age groups, languages)
2. Invest in **high-quality screens with better resolution and responsiveness** and user interfaces
3. **Update the entertainment content regularly** to include the latest content

Seat comfort

Action Items:

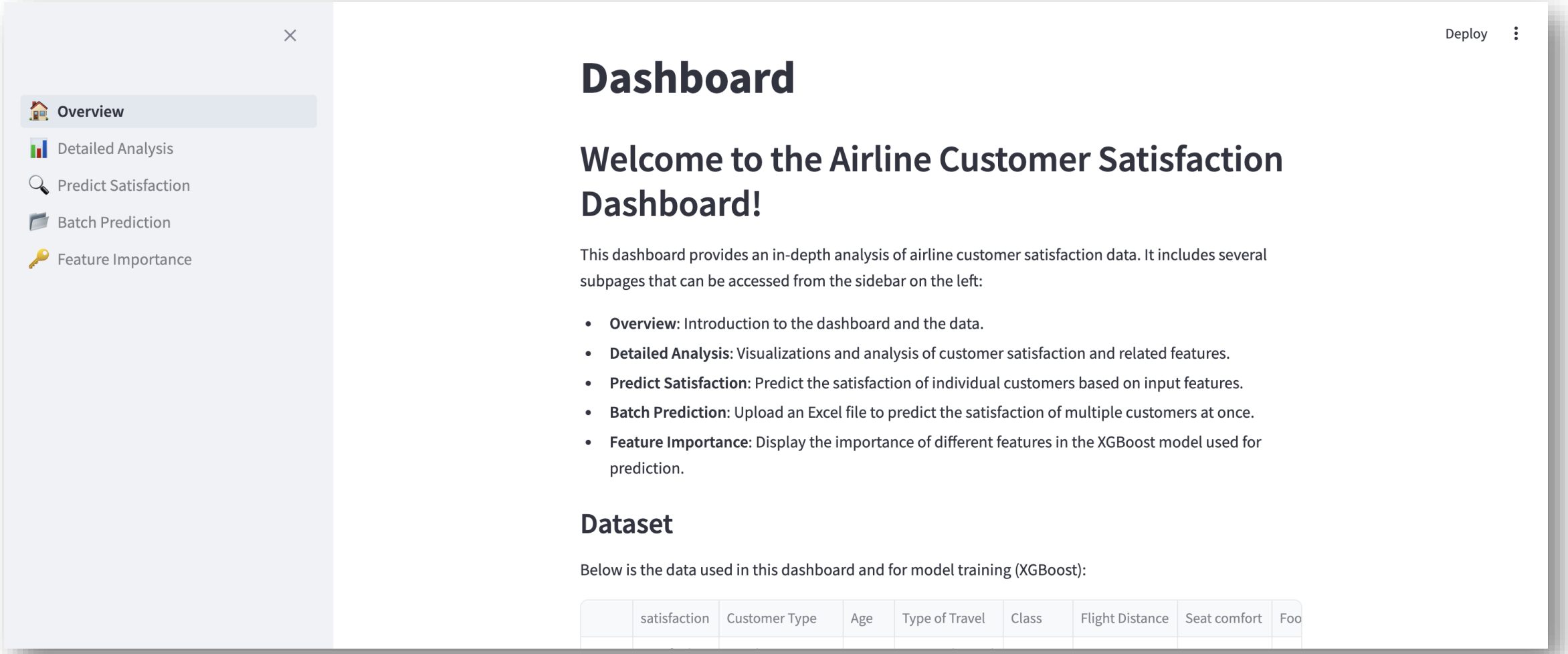
1. Work with seat manufacturers to design **more ergonomic seats that provide better lumbar support** and adjustable features like headrests
2. Reconfigure the seating layout to **offer more legroom**, especially in economy class
3. Use **higher-quality, more comfortable seat cushions** that offer better support during long flights

Ease of online booking

Action Items:

1. Simplify the online booking interface to **reduce the number of steps required to complete the booking**
2. Ensure the online booking system is fully **optimized for mobile devices**, including through an own app
3. Integrate **real-time customer support options**, such as chatbots and live chat, withing the booking process

A dashboard serves as insight hub to airline managers



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