Analysis Report

Problem Statement

An airline company collects information on all passengers who have flown in their airlines and are interested to do an analysis of customer satisfaction. They've recorded the satisfaction of the customer over several of their in-flight services.

As a solution specialist the client has approached you to analyse the data and arrive at a solution using machine learning to predict the customer satisfaction rate.

Data

Data has 24 columns and 103904 rows which is further divided in two parts (20% test data and 80% train data). Standardisation was applied to the data by StandardScaler.

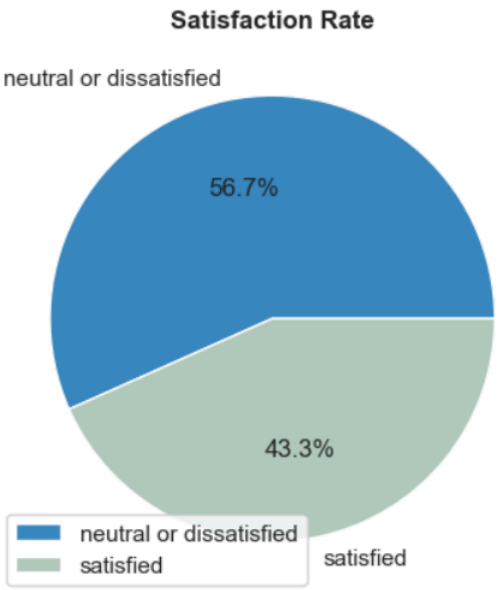
Data Cleaning

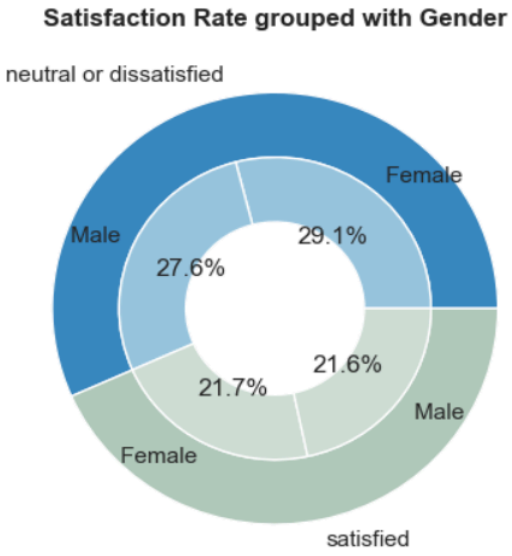
- NaN values in ‘Arrival delay in minutes’ are converted to 0.
- Dropped ‘Unnamed: 0’ column.

Analysis

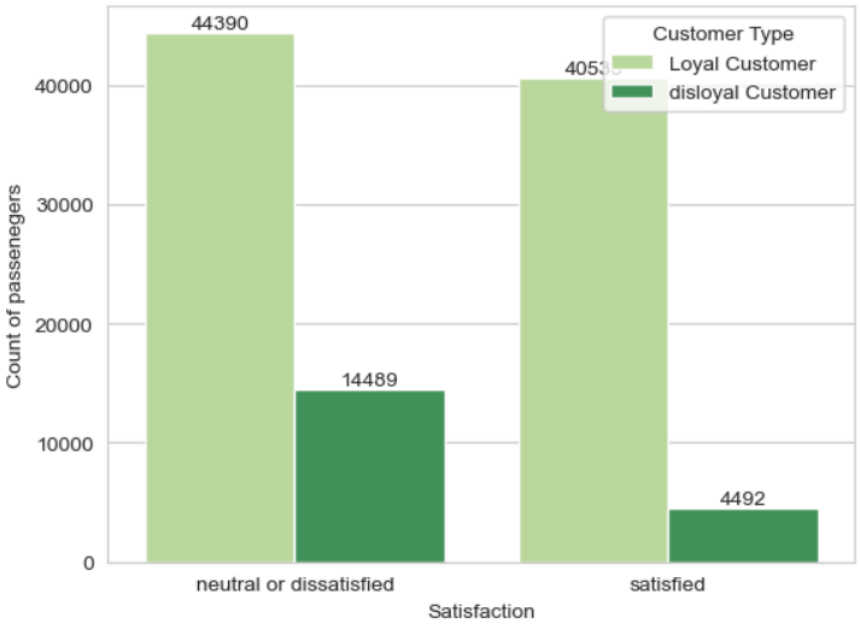
➔ According to the training data only 43.3% of passengers are satisfied with the services provided, about 56.7% of passengers are not satisfied.

Gender	Neutral Or Dissatisfied	Satisfied
Female	29.1%	21.7%
Male	27.6%	21.6%



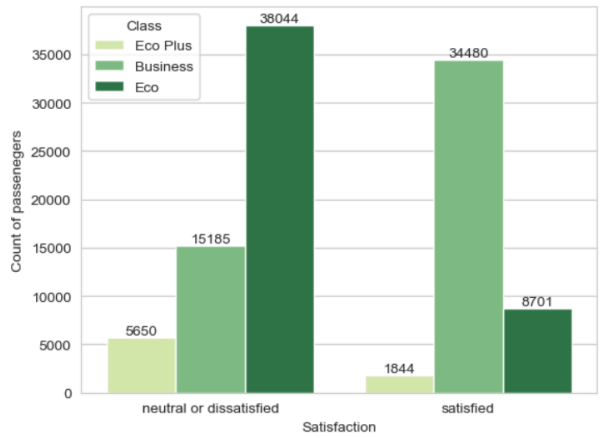


➔ It was observed that a large portion of loyal customers are dissatisfied with the services, while a significant number are highly satisfied. The data also shows that the levels of satisfaction and dissatisfaction are much lower among disloyal customers compared to loyal ones.



➔ By analyzing the data based on travel class, it was found that most passengers in both Economy and Business classes are dissatisfied with the services. While Business class

passengers show a reasonable level of satisfaction, there is a clear need for improvement in the services offered to Economy class passengers, as the majority of them are dissatisfied, and most passengers choose this class for their travel.



➔ Average arrival delay is 15.13 minutes.
➔ Average departure delay is 14.18 minutes.

Feedback / Rating analysis

The services are divided into categories based on different aspects of the passenger experience throughout their journey. These categories include:

1. Booking and pre-flight services

- Ease of Online booking

- Checkin service

- Gate location

➔ Ease of Online booking and Gate location ratings are comparatively low. So care must be taken in those services.

2. Flight Timing and Schedule

- Departure/Arrival time convenient

➔ Flight timing and schedule should be modified as about 53.85% gave rating below 3 stating inconvenient timing.

3. Onboard Comfort and Amenities

- Inflight wifi service
- Food and drink
- Seat comfort
- Inflight entertainment
- Leg room service

➔ Inflight wifi service, Food and drink services should be improved in this category.

4. Onboard Service Quality

- On-board service
- Inflight service
- Cleanliness

➔ Cleanliness should be improved a lot as per the ratings.

5. Baggage and Ground Services

- Baggage handling

6. Boarding Process

- Online boarding

Detailed analysis and visualization can be seen in here - Feedback / Rating analysis

Modelling

Models used:

- KNN Classifier
- Naive Bayes Classifier
- Logistic regression
- Support vector machine

- Decision Tree Classifier
- Random Forest Classifier

Models	Accuracy	Precision	Recall	F1
KNN Classifier	0.93	0.93	0.92	0.93
Naive Bayes	0.86	0.86	0.86	0.86
Logistic Regression	0.87	0.87	0.87	0.87
Support Vector machine	0.95	0.95	0.95	0.95
Decision Tree classifier	0.95	0.95	0.95	0.94
Random Forest	0.96	0.96	0.96	0.96

K-fold classification is also applied to evaluate the entire dataset by dividing it into K subsets or "folds."

★ Model which is giving high accuracy is the Random Forest Classifier with an average accuracy of 0.9627444254018224.

Conclusion

We have trained 6 different models but chose top three models based on their validation score:

- Random Forest classification model gave 96% accuracy.
- Support Vector Machine model gave 95% accuracy.
- Decision Tree Classification model gave 95% accuracy.

Insights taken out through the data analysis:

- Most of the passengers are not satisfied with the services provided.
- Even the loyal customers are not satisfied with the services.
- Lot of improvement should be done in Eco and Eco Plus class. Satisfaction rate of Business class passengers is comparatively high.

- Ease of booking, Gate location, Departure and arrival time convenience, Inflight wifi services, Food and drinks and Cleanliness should be improved according to the rating given by the passengers.