Invistico Airlines Analysis

Mohamed Gad

2024-07-12

Introduction

In this analysis report, I aim to explore the issues that Data Science can address. The dataset pertains to a hypothetical Airlines company "Invistico Airline". The upper management is concerned about potential underlying issues despite the operations running smoothly. They are also interested in identifying strategies to enhance customer satisfaction, which in turn, is expected to boost customer loyalty and increase demand, thereby maximizing profits.

Approach

After loading the data into ***R***, I will conduct an initial exploration of the dataset to understand its structure and contents. This involves examining the variables, checking for missing values, and identifying any patterns or anomalies. Following this, I will attempt to create grouped variables, which can provide a more efficient and insightful way of analyzing the data. Grouping variables can help in summarizing key aspects of the data, making it easier to identify trends, relationships, and potential areas for improvement. This process will set the foundation for more detailed and focused analysis in the subsequent steps.

```
na <- sum(is.na(data))
```

Running the aforementioned code line revealed a total of **393** rows containing N/A cells. Given that the number of N/A cells is insignificant compared to the overall dataset, I will proceed by omitting all N/A values and removing these rows from the dataset.

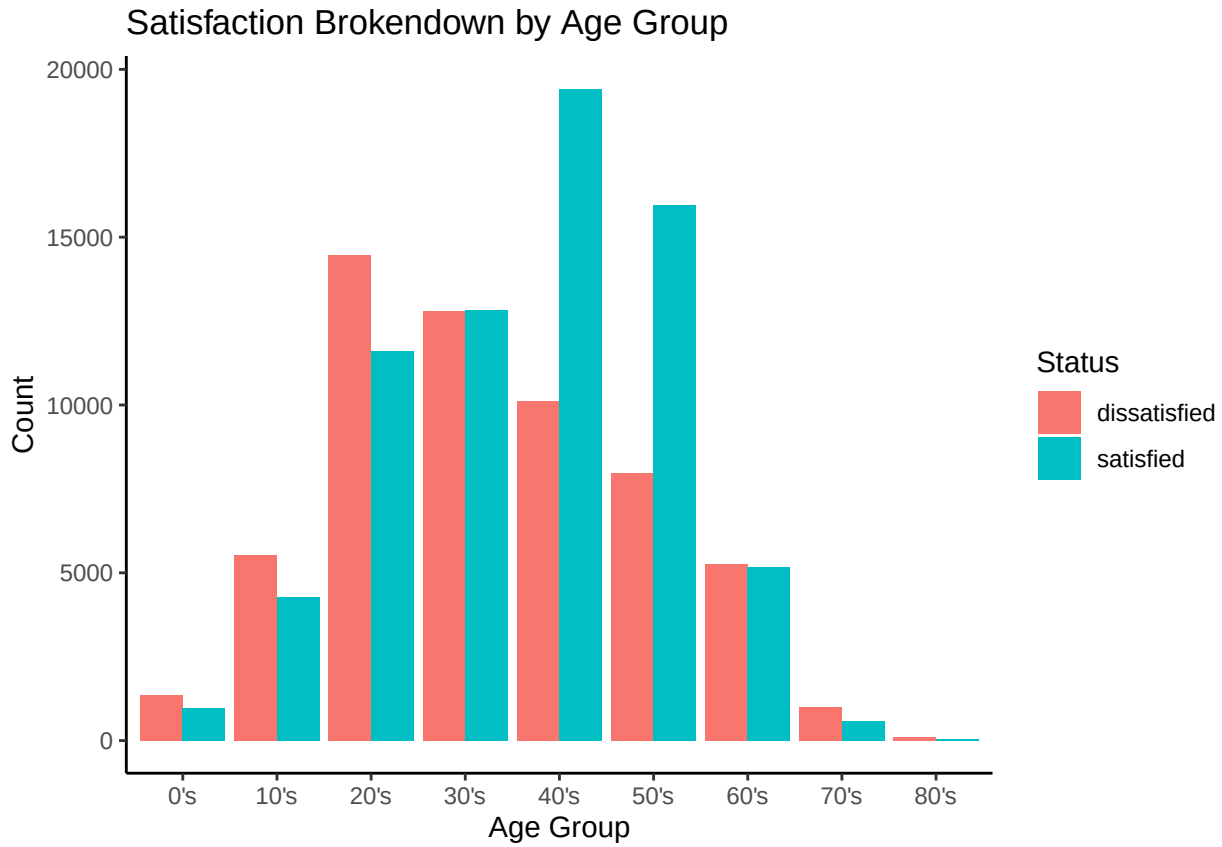
It is observed within the dataset that a factor such as Age can be grouped and then used to proceed with the Exploratory Data Analysis (EDA). This step will help in gaining a deeper understanding of the company's performance. Grouping the age factor will allow for more detailed insights into different customer segments, thereby facilitating a more comprehensive analysis.

```
## [1] 60's 40's 10's 70's 30's 50's 20's 0's  80's
## 10 Levels: 0's < 10's < 20's < 30's < 40's < 50's < 60's < 70's < ... < 90's
```

I will continue with the approach by breaking the dataset into several smaller tables. This will allow me to plot these subsets and visualize anomalies and trends more effectively. This step is crucial for identifying patterns and gaining deeper insights into the data, which will inform further analysis and decision-making.

Exploratory Data Analysis (EDA)

Satisfaction's Dataset



The visualization illustrates the satisfaction levels of different age groups with the service provided by Invistico Airlines. Here's a detailed analysis based on the provided visualization:

Key Observations:

1- Age Groups with Majority Dissatisfaction:

- The age groups 0's, 10's, 20's, 60's, and 70's show a majority of dissatisfaction with the service.

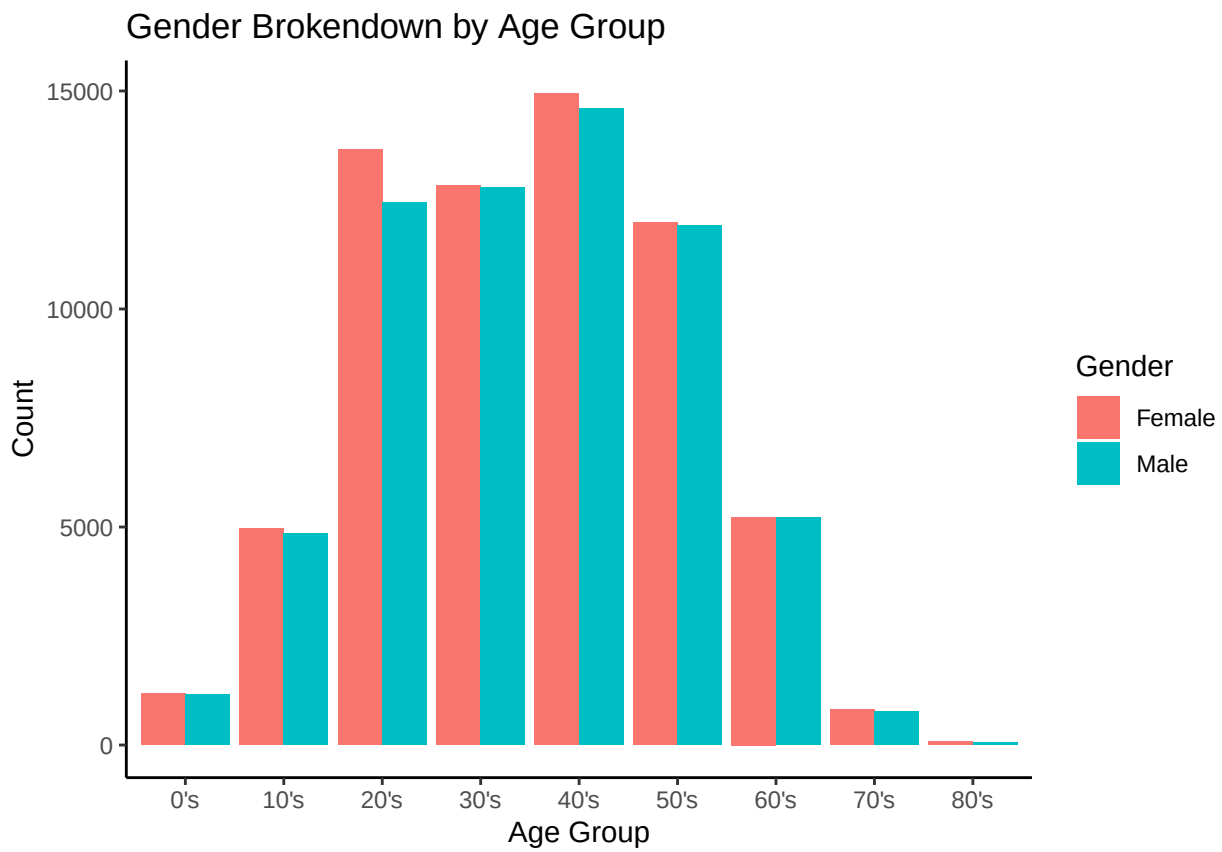
2- Neutral Age Group:

- One age group appears to have a balanced satisfaction and dissatisfaction level, indicating mixed experiences.

3- High Satisfaction Age Groups:

- The age groups 40's and 50's show a majority of satisfaction, indicating these groups generally have a positive experience with the service.

Demand by Gender



The visualization illustrates the gender breakdown by age group for Invistico Airlines. Here's a detailed analysis based on the provided visualization:

Key Observations:

1- Balanced Gender Distribution:

- In most age groups, the gender distribution appears relatively balanced, with both males and females having similar counts.

2- Age Groups with Slight Gender Imbalance:

- In the age groups 0's, 10's, and 20's, there is a slight predominance of females over males.
- Conversely, in the age groups 40's and 50's, males slightly outnumber females.

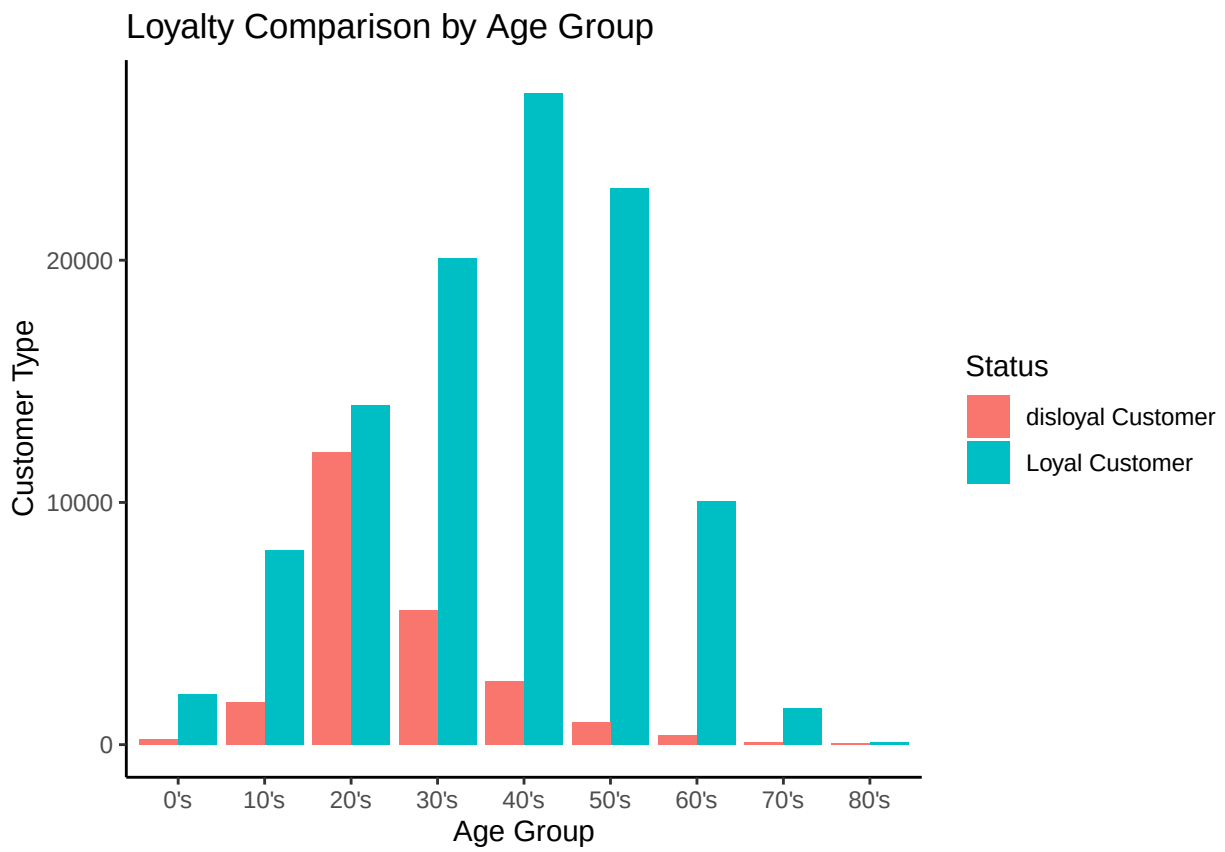
3- Age Group 60's:

- The age group 60's shows a more pronounced imbalance, with a higher number of females compared to males.

4- Age Group 70's and 80's:

- These age groups show a significant drop in counts for both genders, with a slight female predominance in the 70's and near balance in the 80's.

Loyalty



The visualization illustrates the loyalty comparison by age group for Invistico Airlines. Here's a detailed analysis based on the provided visualization:

Key Observations

1- High Loyalty Across Most Age Groups:

- The majority of age groups show a high proportion of loyal customers compared to disloyal customers, indicating strong customer retention overall.

2- Increased Disloyalty in 20's and 30's Age Groups:

- The age groups 20's and 30's exhibit a noticeable increase in disloyal customers. This suggests that younger customers are less satisfied or less engaged with the airline's services compared to other age groups.

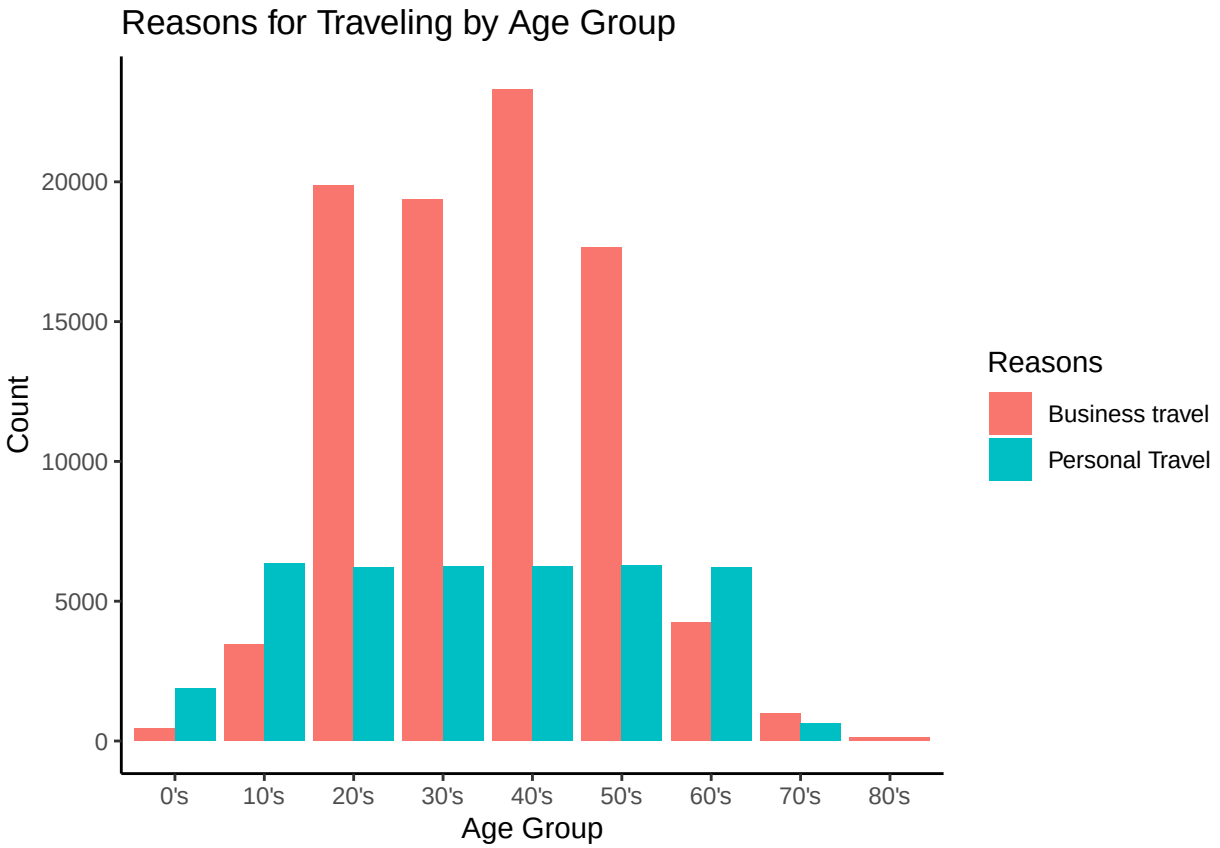
3- Predominantly Loyal Age Groups:

- Age groups 40's, 50's, and 60's have a significantly higher number of loyal customers, indicating strong brand loyalty among middle-aged and older customers.

4- Minimal Disloyalty in Older Age Groups:

- Age groups 70's and 80's show very few disloyal customers, though the overall number of customers in these groups is lower.

Travel Reasons



The visualization illustrates the reasons for traveling by age group for Invistico Airlines. Here's a detailed analysis based on the provided visualization:

Key Observations

1- Predominance of Business Travel:

- Across most age groups, business travel is the primary reason for travel. This trend is particularly pronounced in the 20's, 30's, and 40's age groups.

2- Personal Travel:

- Personal travel is consistently present across all age groups but is less common compared to business travel, especially in the middle age ranges.

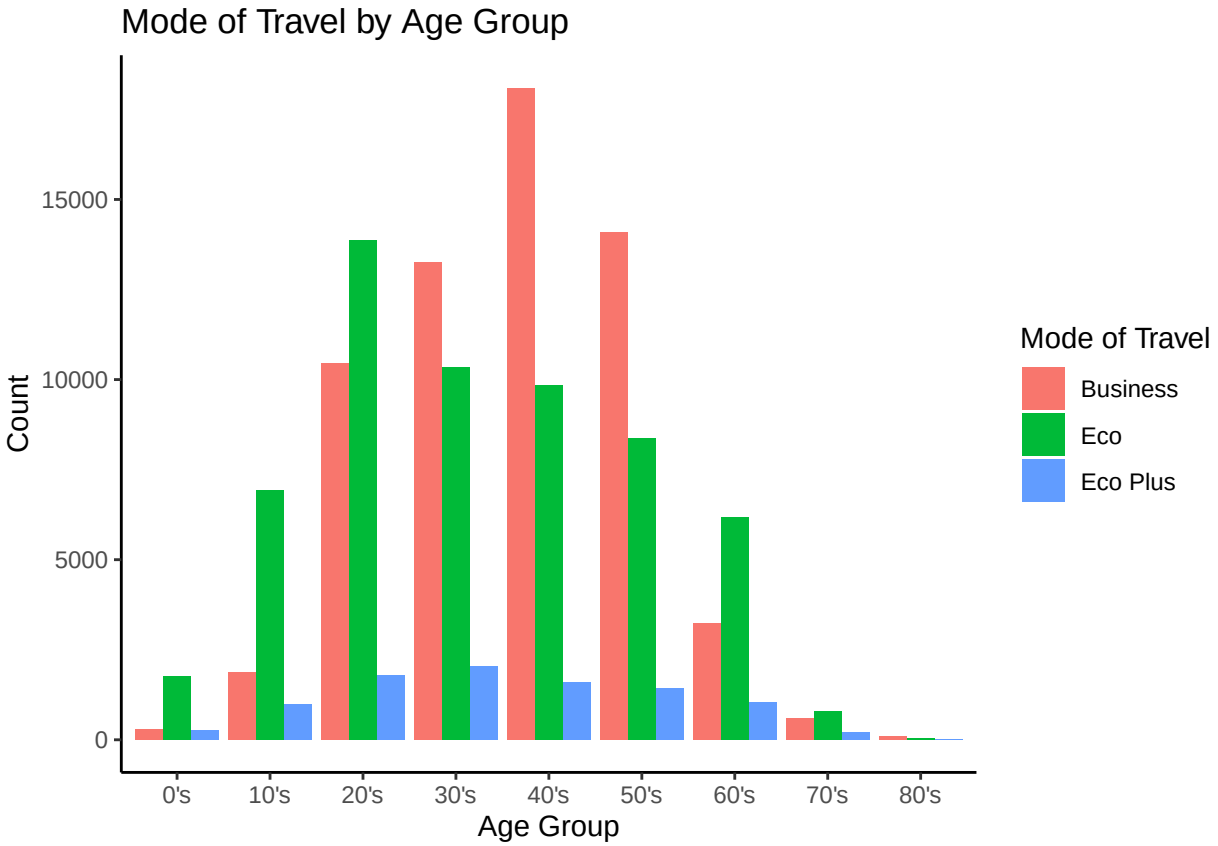
3- Age Group 40's:

- The 40's age group shows the highest number of travelers, predominantly for business reasons.

4- Variation in Younger and Older Age Groups:

- In the youngest (0's) and oldest (70's and 80's) age groups, there is a more balanced distribution between business and personal travel, although the overall numbers are lower.

Mode of Travel (Class)



The visualization illustrates the mode of travel by age group for Invistico Airlines. Here's a detailed analysis based on the provided visualization:

Key Observations

1- Preference for Business Class:

- Business class is the most preferred mode of travel across many age groups, particularly in the 20's, 30's, 40's, and 50's. The 40's age group has the highest number of business class travelers.

2- Economy Class Popularity:

- Economy class is also a popular choice across all age groups, with significant representation in the 20's, 30's, and 50's age groups. The 20's age group has a notably high count of economy class travelers.

3- Eco Plus Class:

- Eco Plus class has lower representation compared to Business and Economy classes but is consistently chosen across all age groups. The 30's and 40's age groups show a noticeable preference for Eco Plus.

4- Variation in Younger and Older Age Groups:

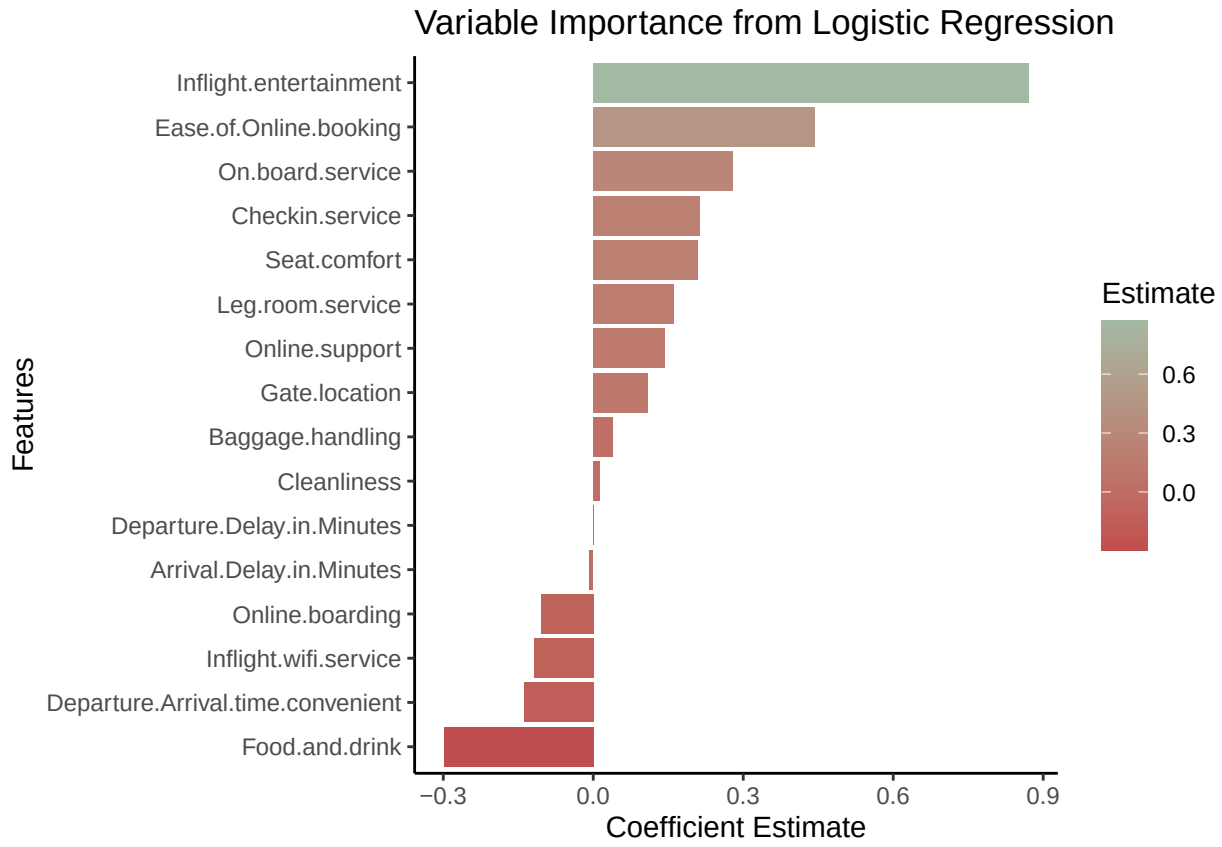
- In the youngest (0's) and oldest (70's and 80's) age groups, there is a balanced distribution among the three travel modes, although the overall numbers are lower.

Targeted Diagnoses and Solutions

Methodology

I have created a new dataset based on the original dataset, specifically targeting the following age groups: 0's, 10's, 20's, 30's, 60's, and 70's. These groups had the highest levels of dissatisfaction with the service. From this dataset, we will develop machine learning models to help us understand and explain the factors contributing to these outcomes.

Machine Learning (Satisfaction)



Analysis and Insights

The plot provided illustrates the variable importance for predicting customer satisfaction based on a logistic regression model. Here's a detailed analysis based on the feature importance chart:

Key Observations

1- Positive Impact on Satisfaction:

- In flight entertainment has the highest positive impact on satisfaction, suggesting that enhancing the quality and availability of entertainment options can significantly improve customer satisfaction.
- Ease of Online booking, On-board service, Check in service, and Seat comfort are also strong positive predictors of satisfaction.

- Leg room service, Online support, Gate location, and Baggage handling also contribute positively but to a lesser extent.

2- Negative Impact on Satisfaction:

- Food and drink has a notable negative impact on satisfaction, indicating that this area requires significant improvement to enhance overall customer experience.
- Departure Arrival time convenient, In flight wifi service, and Online boarding also negatively impact satisfaction but to a lesser extent.
- Arrival Delay in Minutes and Departure Delay in Minutes are near the neutral line but can still impact satisfaction if not managed properly.

Suggested Improvements

1- Enhance In flight Entertainment:

- Invest in a variety of high-quality entertainment options, such as movies, TV shows, music, and interactive games, to cater to different passenger preferences.

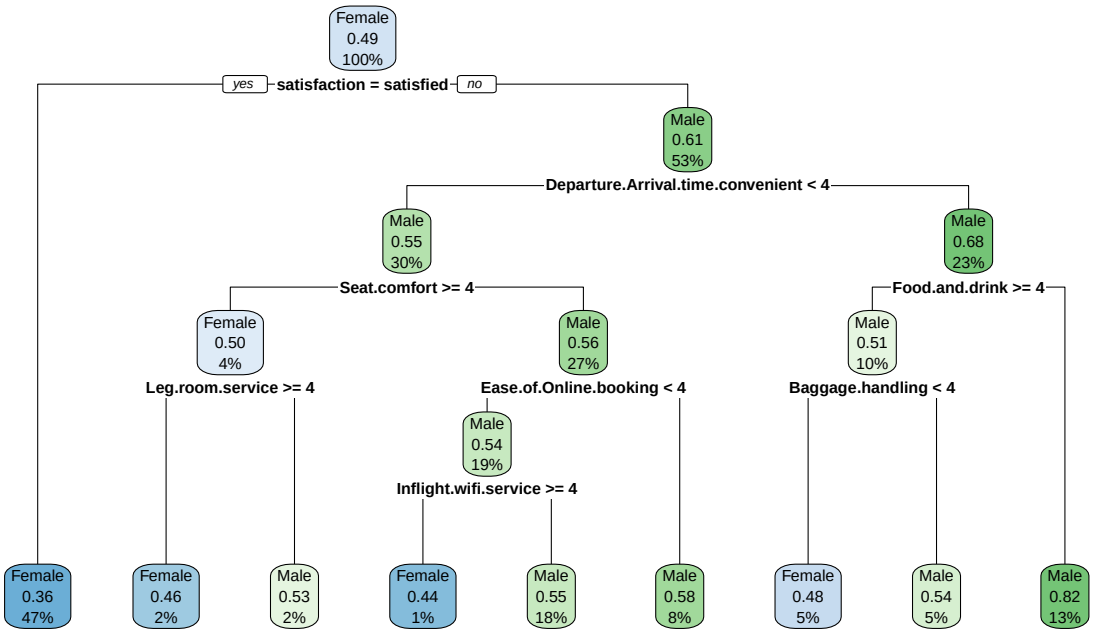
2- Streamline Online Booking Process:

- Ensure the online booking process is user-friendly, fast, and efficient, with clear instructions and minimal steps to complete a booking.

3- Improve On-Board Service:

- Focus on training staff to provide exceptional customer service, including prompt and courteous assistance, and ensuring passenger needs are met during the flight. Upgrade Check-in Services:
- Simplify and speed up the check-in process by utilizing technology such as mobile check-ins, self-service kiosks, and efficient queue management. Enhance Seat Comfort and Leg Room:
- Consider investing in more comfortable seating with better cushioning and support, as well as offering more legroom, especially in long-haul flights. Improve Food and Beverage Offerings:
- Revamp the in-flight menu to include a wider variety of high-quality food and drink options, including dietary-specific choices and healthier options. Address Negative Aspects:
- Focus on reducing delays and improving the timeliness of flights to enhance the overall travel experience.
- Improve the convenience of departure and arrival times based on passenger feedback.

Machine Learning (Satisfaction & Gender)



The decision tree provided visualizes the relationship between satisfaction, gender, and various other variables. Let's break down the decision tree and explain the insights it provides:

Key Components of the Decision Tree

1- Root Node:

- The root node splits based on the satisfaction variable, indicating whether a customer is satisfied (1) or not satisfied (0).

2- Splitting Criteria:

- Each subsequent node represents a decision point based on one of the variables in the dataset.
- The nodes are split based on criteria such as Departure.Arrival.time.convenient, Seat.comfort, Food.and.drink, etc.

3- Leaf Nodes:

- The leaf nodes represent the final decision points where predictions are made.
- Each leaf node shows the predicted class (gender in this case) and the proportion of observations that fall into that class.

Detailed Explanation

1- Satisfaction:

- The first split is based on satisfaction. If satisfaction is 1 (satisfied), the decision tree further splits based on other variables to determine the gender distribution.

2- Departure.Arrival.time.convenient:

- For customers who are not satisfied (satisfaction = 0), the tree splits based on Departure.Arrival.time.convenient.
- If Departure.Arrival.time.convenient is less than 4, it further splits based on Seat.comfort and Ease.of.Online.booking.
- If Departure.Arrival.time.convenient is greater than or equal to 4, it splits based on Food.and.drink and Baggage.handling.

3- Other Variables:

- For customers who are satisfied (satisfaction = 1), the tree splits based on Leg.room.service and Inflight.wifi.service to predict the gender distribution. Insights Gender and Satisfaction:
- Female customers tend to be more satisfied when Seat.comfort is high and Ease.of.Online.booking is good.
- Male customers' satisfaction is more influenced by Departure.Arrival.time.convenient and Food.and.drink.

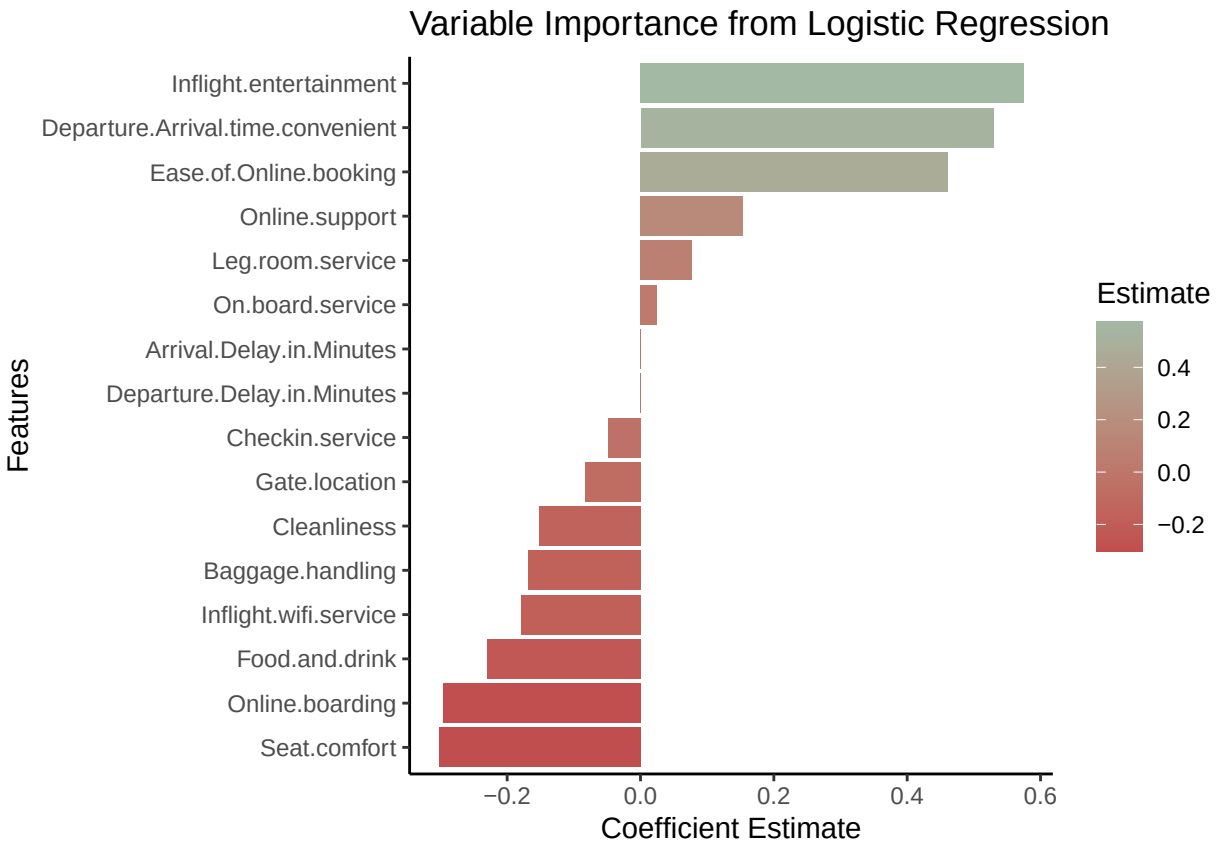
4- Other Variables:

- Leg.room.service, In flight.wifi.service, and Baggage.handling also play significant roles in predicting satisfaction and gender distribution.

Suggested Improvements

- Improve the convenience of departure and arrival times. Ensure that flights are scheduled at times that are convenient for the majority of passengers.
- Enhance seat comfort and the ease of online booking processes. Invest in better seating options and user-friendly online booking platforms.
- Improve the quality and variety of food and drink options on board. Ensure that the baggage handling process is efficient and reliable.
- Enhance legroom service and in flight Wi-Fi quality. Ensure that passengers have adequate space and access to reliable internet services during their flights.
- Tailor services based on gender preferences to ensure that both male and female customers have a positive experience.
- Invest in improving seat comfort and making the online booking process seamless and efficient.
- Provide personalized services and offers that cater to female customers' preferences and needs.
- Regularly assess and improve legroom service to ensure passenger comfort, especially on long-haul flights.
- Invest in high-quality in flight Wi-Fi to meet the growing demand for connectivity during flights.
- Streamline the baggage handling process to minimize delays and issues, ensuring a smooth experience for passengers.

Machine Learning (Loyalty)



Recommendations to Increase Customer Loyalty Based on the analysis, here are detailed recommendations to improve customer loyalty:

1. Enhance In flight Entertainment:

- Action: Invest in a wide range of high-quality entertainment options such as movies, TV shows, music, and interactive games.
- Impact: Engaging entertainment options can enhance the travel experience, making customers more likely to stay loyal.

2. Improve Flight Time Convenience:

- Action: Optimize flight schedules to ensure they align with customer preferences for convenient departure and arrival times.
- Impact: Convenient flight times reduce travel stress and improve overall satisfaction, contributing to loyalty.

3. Streamline Online Booking Process:

- Action: Ensure the online booking platform is user-friendly, fast, and efficient, with clear instructions and minimal steps.

- Impact: A seamless booking experience can reduce frustration and make customers more likely to book with the airline again.

4. Provide Excellent Online Support:

- Action: Offer robust online support, including live chat options, quick response times, and comprehensive FAQs.
- Impact: Effective online support can resolve issues promptly, leading to higher loyalty levels.

5. Improve Onboard Service:

- Action: Train staff to provide exceptional service onboard, ensuring that all passenger needs are met.
- Impact: Excellent service onboard can create a memorable experience, encouraging customers to remain loyal.

6. Enhance Seat Comfort:

- Action: Upgrade seats to provide better cushioning and support, and consider offering more legroom, especially in economy class.
- Impact: Comfortable seating can significantly improve the travel experience, making customers more likely to stay loyal.

7. Simplify Online Boarding:

- Action: Improve the online boarding process by making it more intuitive and providing clear instructions.
- Impact: A smoother boarding process can reduce stress and enhance the start of the travel experience.

8. Improve Food and Drink Options:

- Action: Offer a wider variety of high-quality food and beverage options, including dietary-specific choices.
- Impact: Better food and drink options can enhance the inflight experience and satisfy customer needs.

9. Enhance Inflight Wi-Fi Service:

- Action: Invest in reliable and high-speed Wi-Fi services, and offer affordable pricing options or complimentary access.
- Impact: Reliable Wi-Fi is increasingly important to travelers for both leisure and work purposes.

10. Improve Baggage Handling:

- Action: Streamline the baggage handling process to minimize delays and ensure luggage is handled with care.
- Impact: Efficient baggage handling can reduce the likelihood of lost or damaged luggage, leading to higher loyalty.

11. Maintain Cleanliness:

- Action: Ensure that all aircraft are cleaned thoroughly before each flight, with special attention to high-touch areas.

- Impact: A clean and hygienic environment is essential for customer comfort and health, promoting loyalty.

12. Optimize Gate Locations:

- Action: Ensure that gates are conveniently located and provide clear signage to help passengers navigate the airport.
- Impact: Convenient gate locations can reduce the stress of navigating through the airport and improve the overall experience.

13. Improve Check-in Services:

- Action: Streamline the check-in process by utilizing technology such as mobile check-ins and self-service kiosks.
- Impact: Efficient check-in processes can reduce wait times and improve the start of the travel experience.

By focusing on these key areas, Invistico Airlines can enhance customer loyalty by addressing the most significant factors influencing their experience. Regularly monitoring and addressing these factors will help maintain high levels of customer loyalty and encourage repeat business.

Conclusion

The analysis of Invistico Airlines reveals critical insights into customer satisfaction, loyalty, and overall service quality. The data indicates specific areas requiring improvement, such as in-flight entertainment, food and beverage offerings, and the convenience of flight times. By implementing the recommended improvements, Invistico Airlines can significantly enhance the customer experience, leading to increased satisfaction and loyalty. Regular monitoring and continuous enhancements based on customer feedback will be essential in maintaining high standards and ensuring long-term success in a competitive industry.