

BUSINESS REPORT ON

AUSTO MOTOR COMPANY

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1.INTRODUCTION

Austo Motor Company, a leading car manufacturer specializing in SUV, Sedan, and Hatchback models, has identified the need to enhance their marketing campaigns. The objective of this report is to analysis customer demand based on various demographic and financial factors to provide insights that will help improve the company's marketing strategies.

2. DATA DESCRIPTION

The dataset provided includes the following columns:

- **Age:** The age of the individual in years.
- **Gender:** The gender of the individual.
- **Profession:** The occupation or profession of the individual.
- **Marital_status:** The marital status of the individual.
- **Education:** The educational qualification of the individual.
- **No_of_Dependents:** The number of dependents supported financially by the individual.
- **Personal_loan:** Indicates whether the individual has taken a personal loan.
- **House_loan:** Indicates whether the individual has taken a housing loan.
- **Partner_working:** Indicates whether the individual's partner is employed.
- **Salary:** The individual's salary or income.
- **Partner_salary:** The salary or income of the individual's partner.
- **Total_salary:** The total combined salary of the individual and their partner.
- **Price:** The price of the automobile purchased.
- **Make:** The type of automobile (SUV, Sedan, Hatchback).

3.DATA OVERVIEW

The dataset consists of 1581 rows and 14 columns. The variables include a mix of categorical and numerical data type:

- **Categorical Variables:** Gender, Profession, Marital_status, Education, Personal_loan, House_loan, Partner_working, Make
- **Numerical Variables:** Age, No_of_Dependents, Salary, Partner_salary, Total_salary, Price

3.1 HANDLING MISSING VALUES

- **Gender:** 53 missing values filled with the mode (most frequent value).
- **Partner_salary:** 106 missing values filled with the mean.

3.2 STATISTICAL SUMMARY

- The average age of customers is approximately 32 years.
- The average salary is around \$60,392, with a standard deviation of \$14,674, indicating some variation in the income levels.
- The total salary (combined income of the individual and their partner) ranges from \$30,000 to \$171,000, with an average of about \$79,626.
- Car prices in the dataset range from \$18,000 to \$70,000, with an average price of around \$35,598.

3.3 OBSERVATIONS AND INSIGHTS

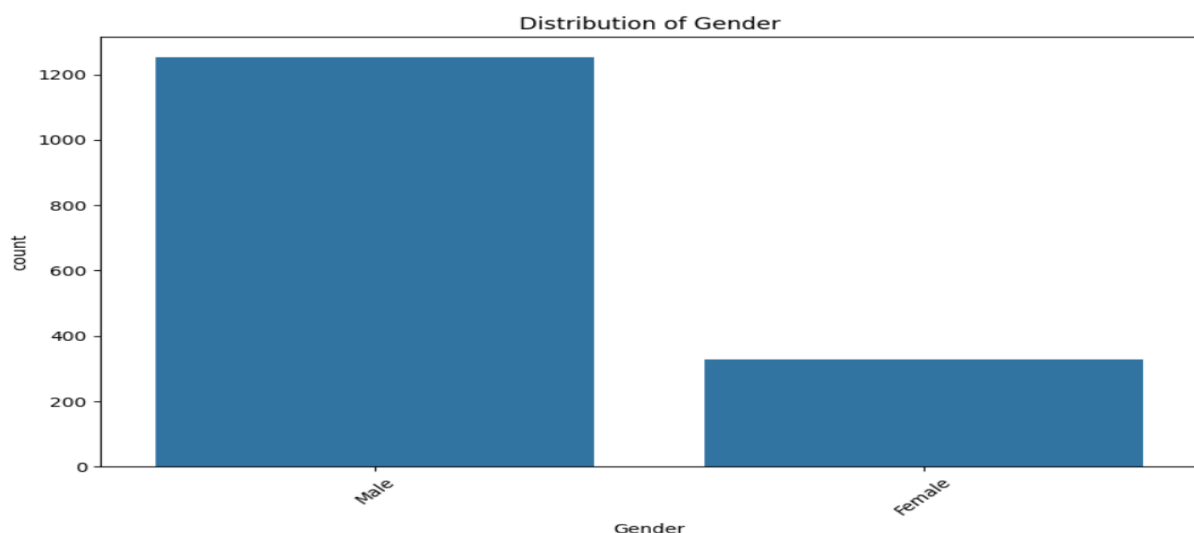
- No duplicate rows were found in the dataset.
- The dataset appears well-structured and ready for analysis after handling missing values.

4. UNIVARIATE ANALYSIS

4.1 CATEGORICAL VARIABLES

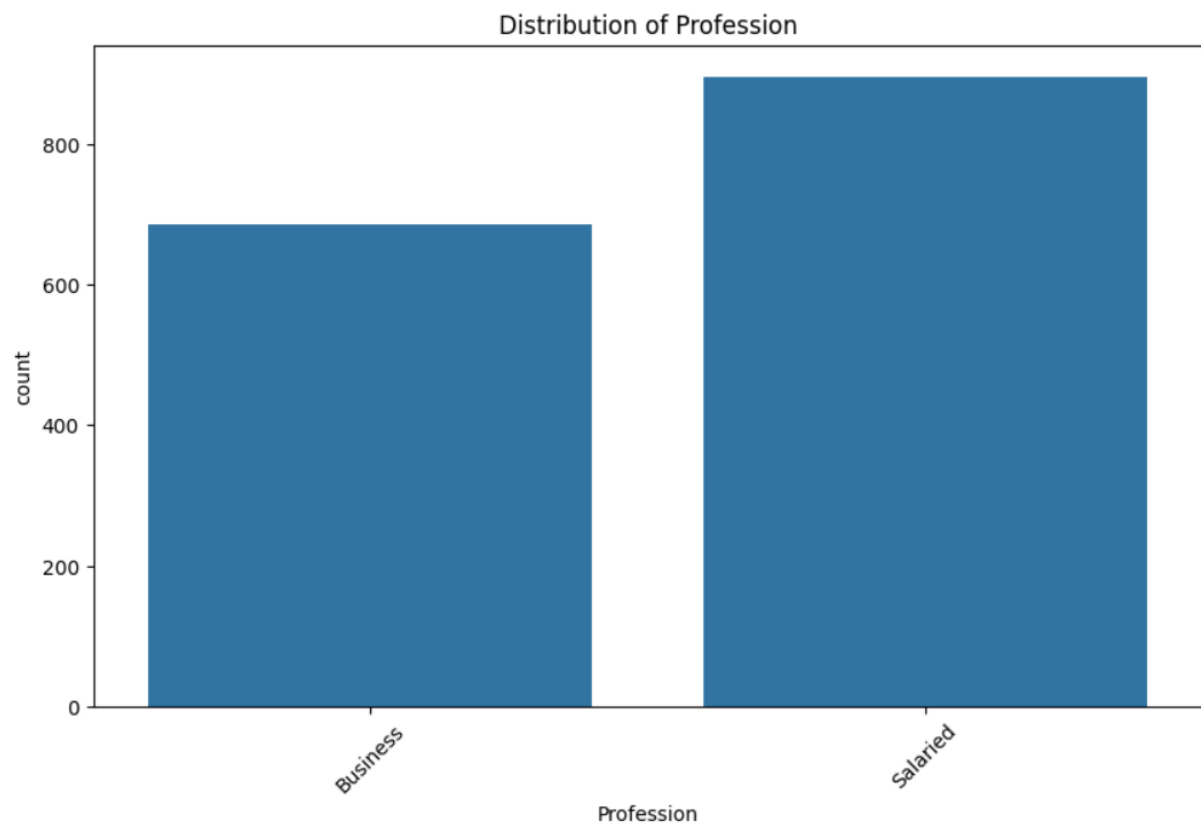
The distribution of categorical variables was visualized using count plots:

FIG.1: Distribution Of Gender



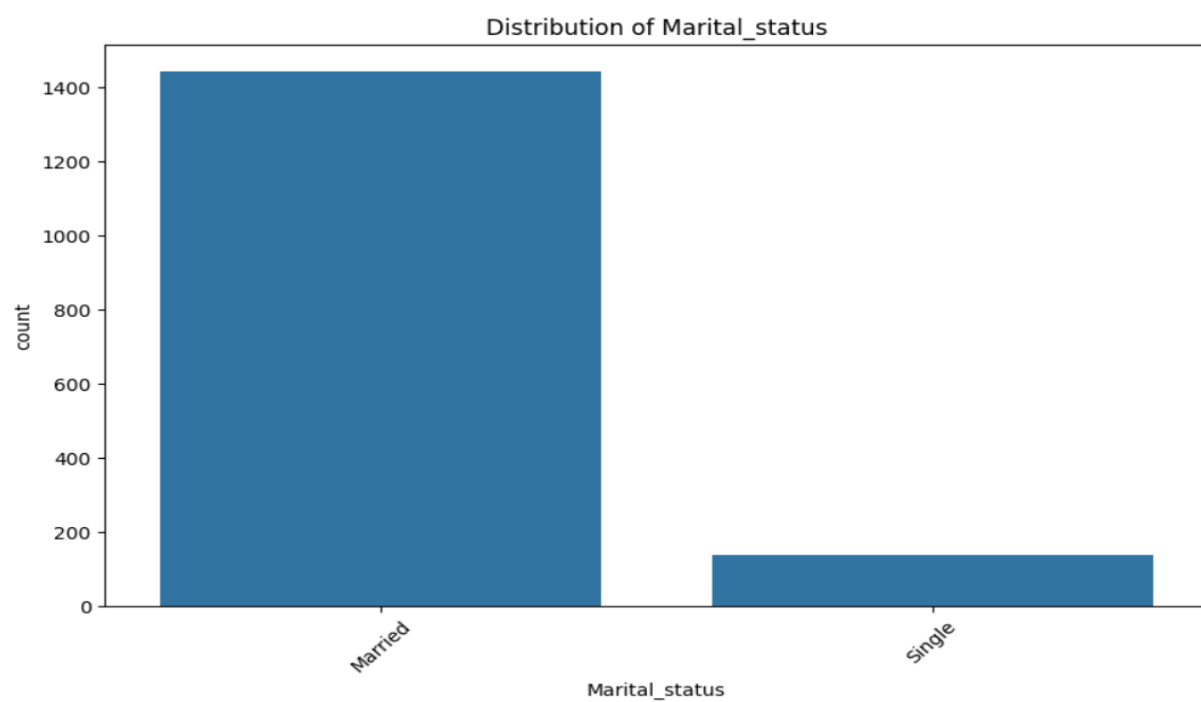
Almost equal distribution with slightly more males.

FIG.2: Distribution Of Profession



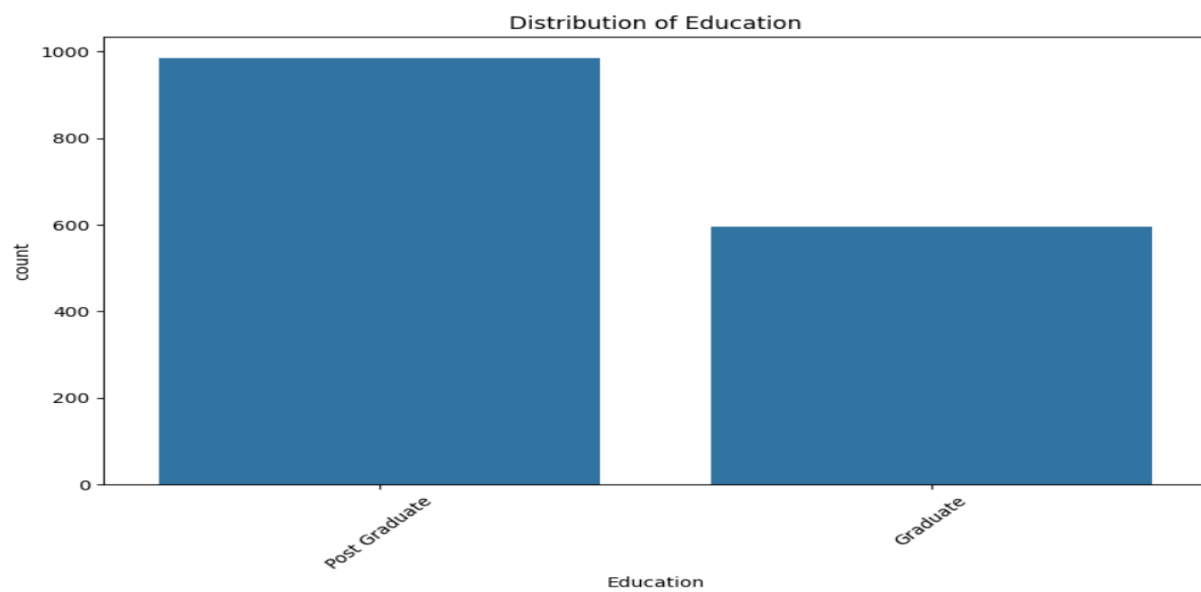
Majority are salaried individuals.

FIG.3: Distribution Of Marital status



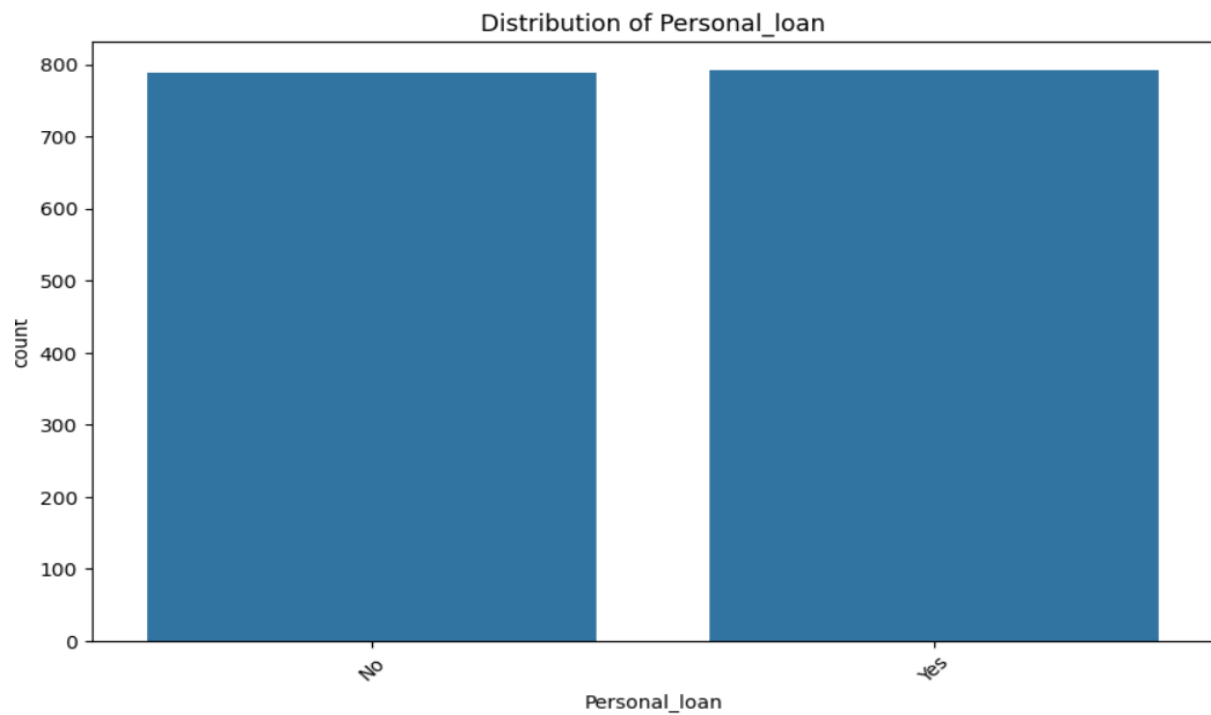
There are more married individuals compared to single individuals.

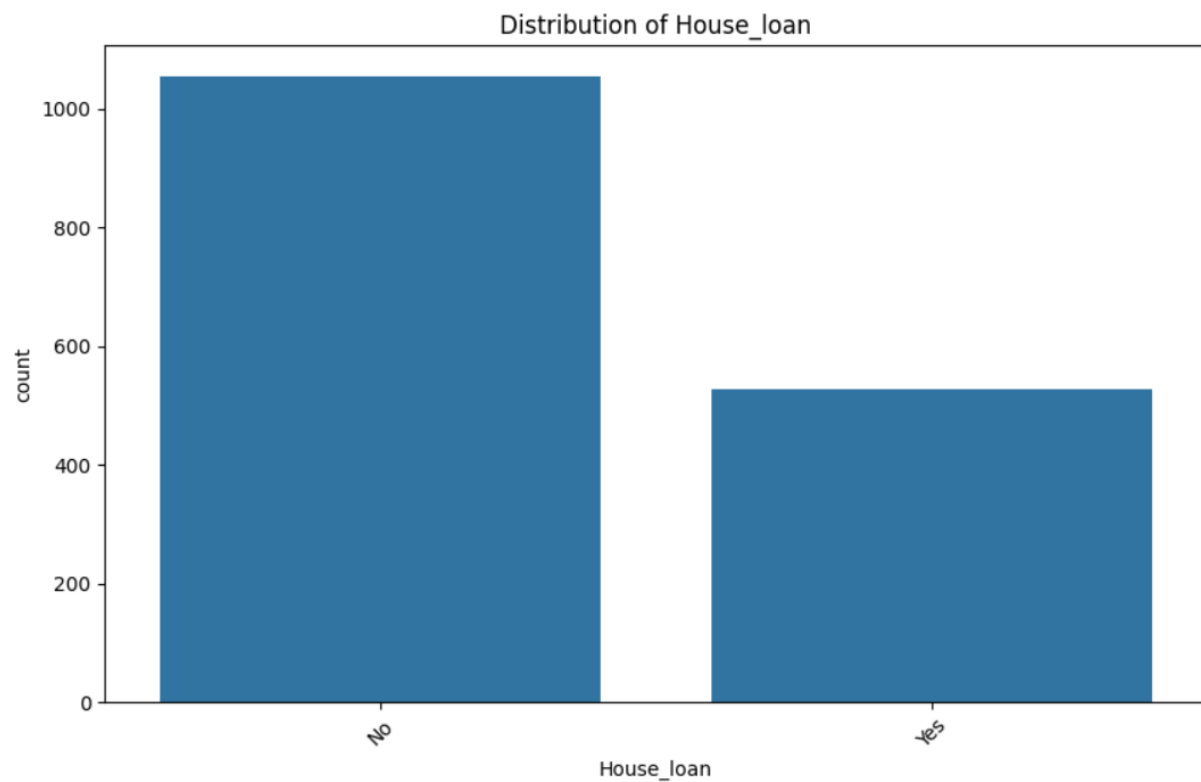
FIG.4: Distribution Of Education



Most customers have an education level of Graduate.

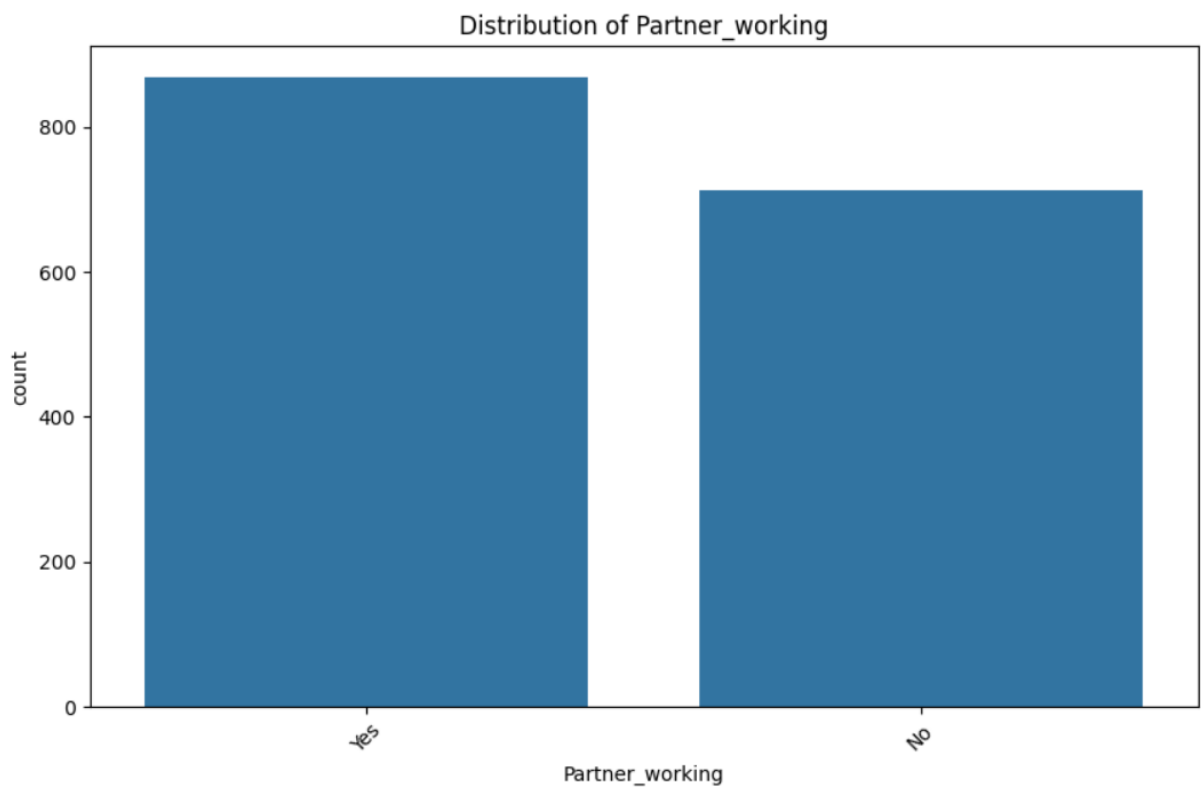
FIG.5: Distribution Of Personal loan and house loan





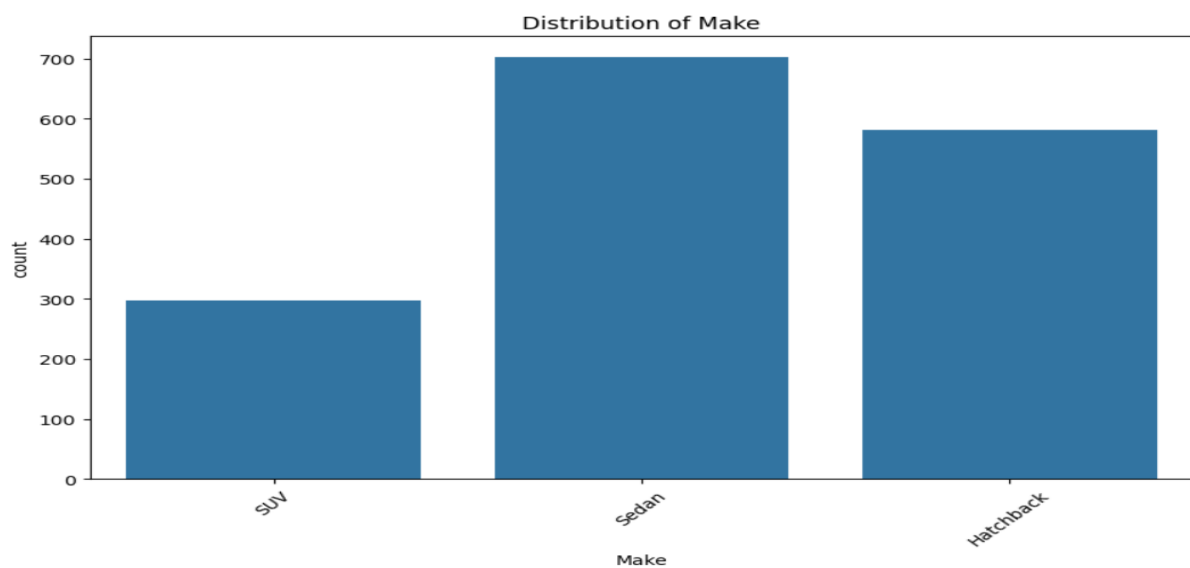
A majority of customers have no personal loans and no house loans.

FIG.6: Distribution Of partner working



A significant number of customers have working partners.

FIG.7: Distribution Of make

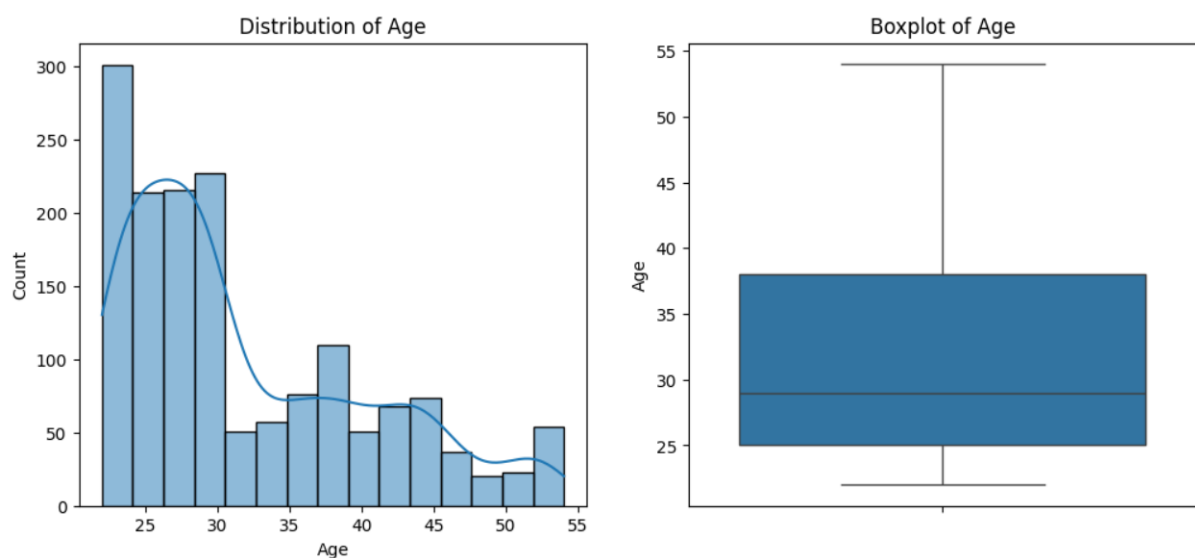


The data suggests that SUVs are the most preferred automobile type among customers.

4.2 NUMERICAL VARIABLES

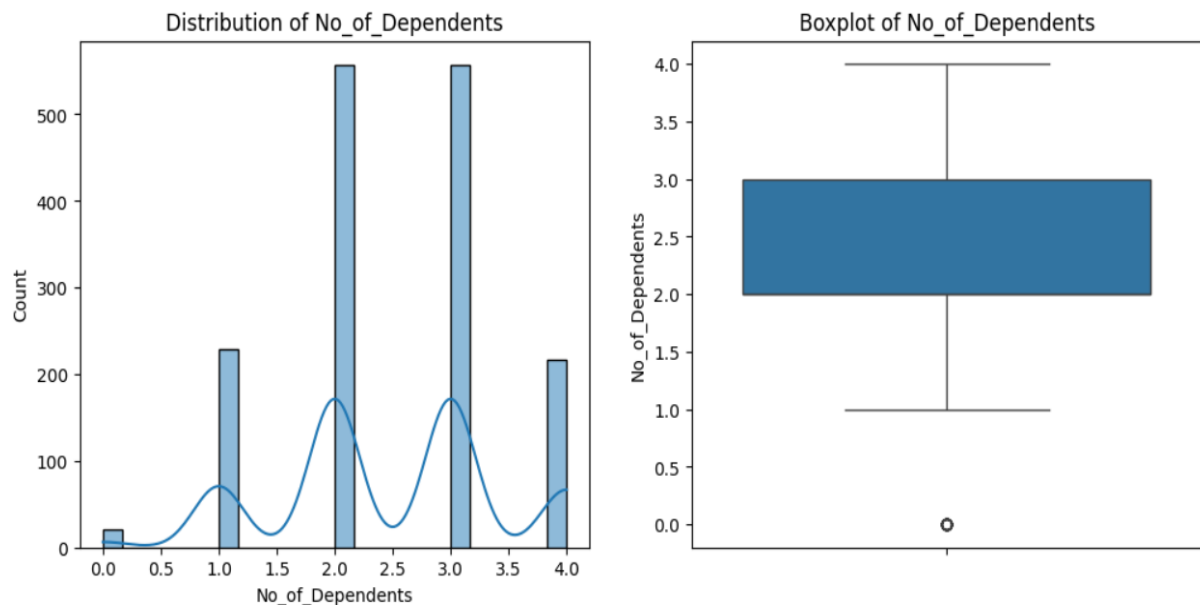
The distribution of numerical variables was visualized using histograms and boxplots:

FIG.8: UNIVARIATE OF AGE



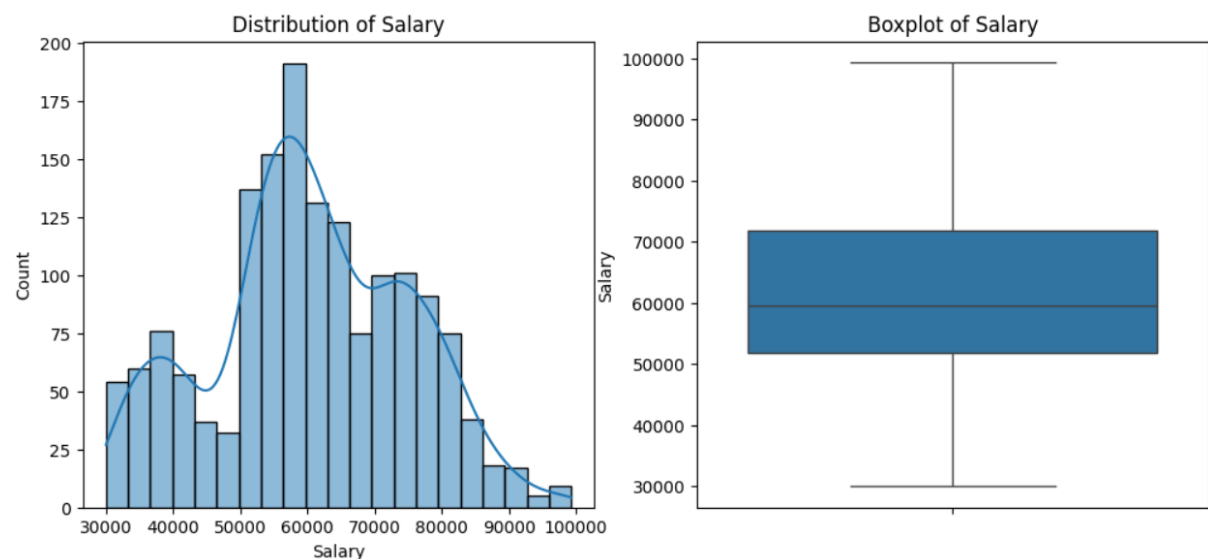
- Age ranges from 22 to 54 years.
- The average age is approximately 32 years.
- The majority of the customers fall in the age range of 25 to 38 years.
- Marketing strategies could focus more on the age group 25-38, as they form the bulk of the customer base.

FIG.9: UNIVARIATE OF NUMBER OF DEPENDENTS



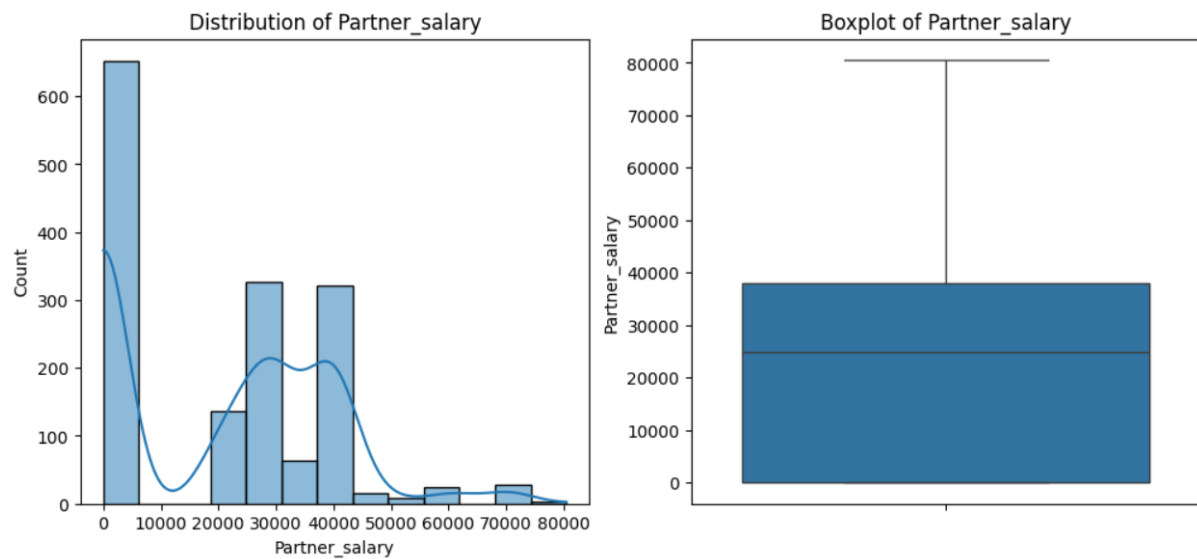
- Number of dependents ranges from 0 to 4.
- The average number of dependents is approximately 2.
- Family-friendly car features could be emphasized in marketing campaigns, considering the average number of dependents.

FIG.10: UNIVARIATE OF SALARY



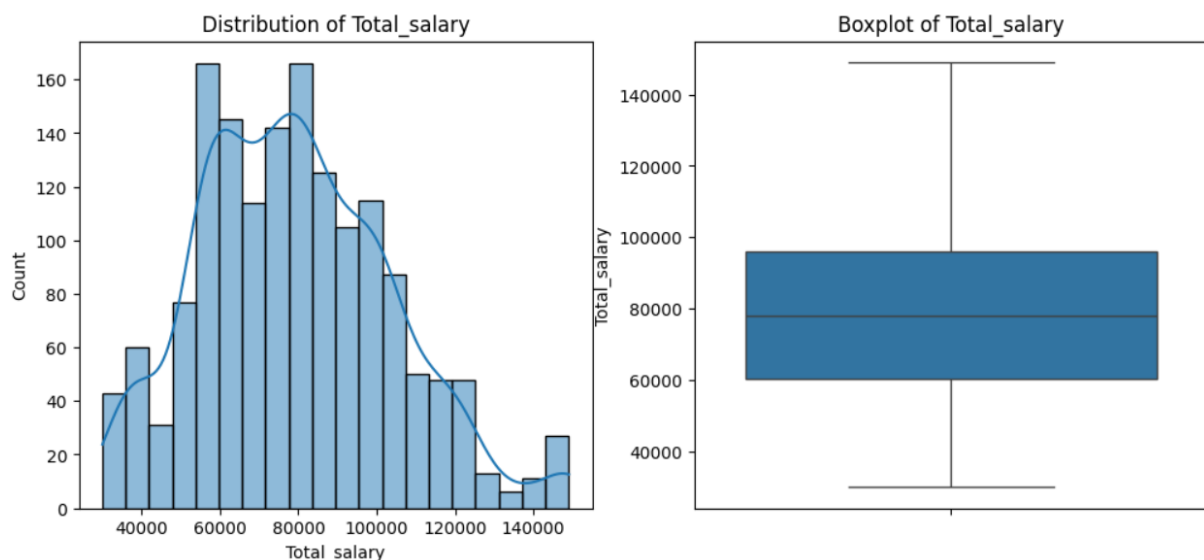
- Salaries range from \$30,000 to \$99,300.
- The average salary is approximately \$60,392.
- Pricing strategies should consider the average salary to ensure affordability and appeal to the majority of customers.

FIG.11: UNIVARIATE OF PARTNER SALARY



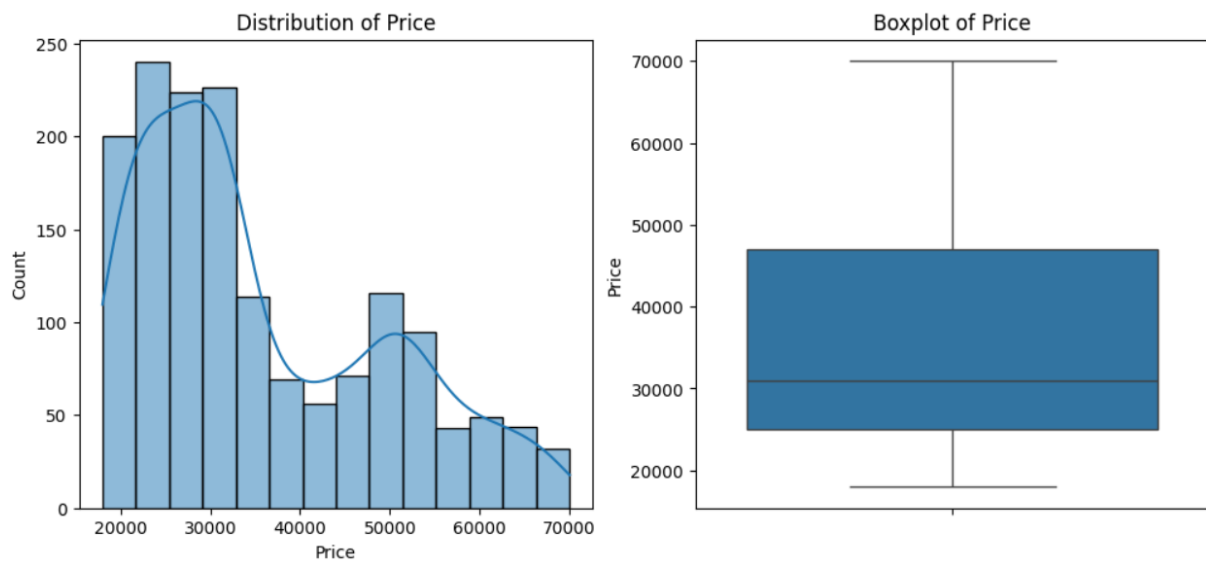
- Partner salaries range from \$0 to \$80,500.
- The average partner salary is approximately \$20,225.
- Understanding the combined income of households can help in targeting higher-income segments with premium car models.

FIG.12: UNIVARIATE OF TOTAL SALARY



- Total salaries range from \$30,000 to \$171,000.
- The average total salary is approximately \$79,626.
- Marketing strategies could be designed to appeal to different income segments, promoting both budget-friendly and premium car models.

FIG.13: UNIVARIATE OF PRICE

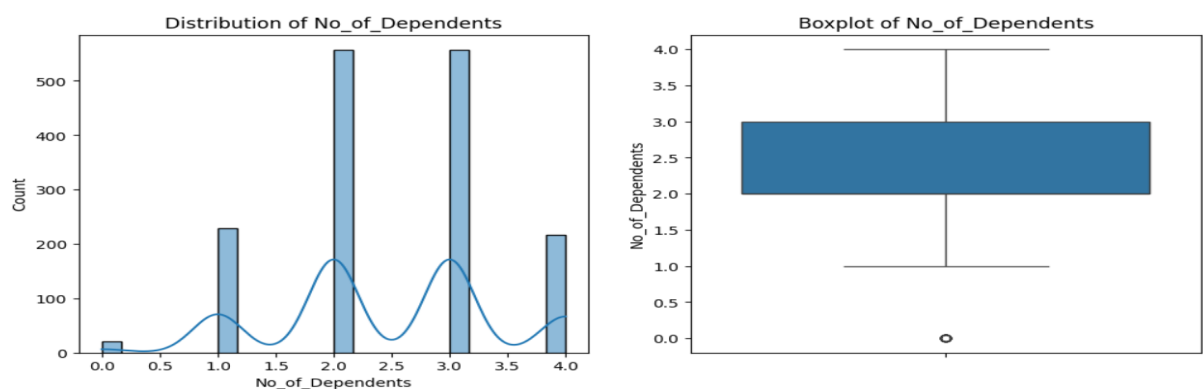


- Car prices range from \$18,000 to \$70,000.
- The average car price is approximately \$35,598.
- The price range suggests that Austo Motor Company offers a variety of models catering to different budget ranges. Marketing campaigns can highlight this diversity to attract a wider customer base.

4.3 OUTLIER TREATMEN

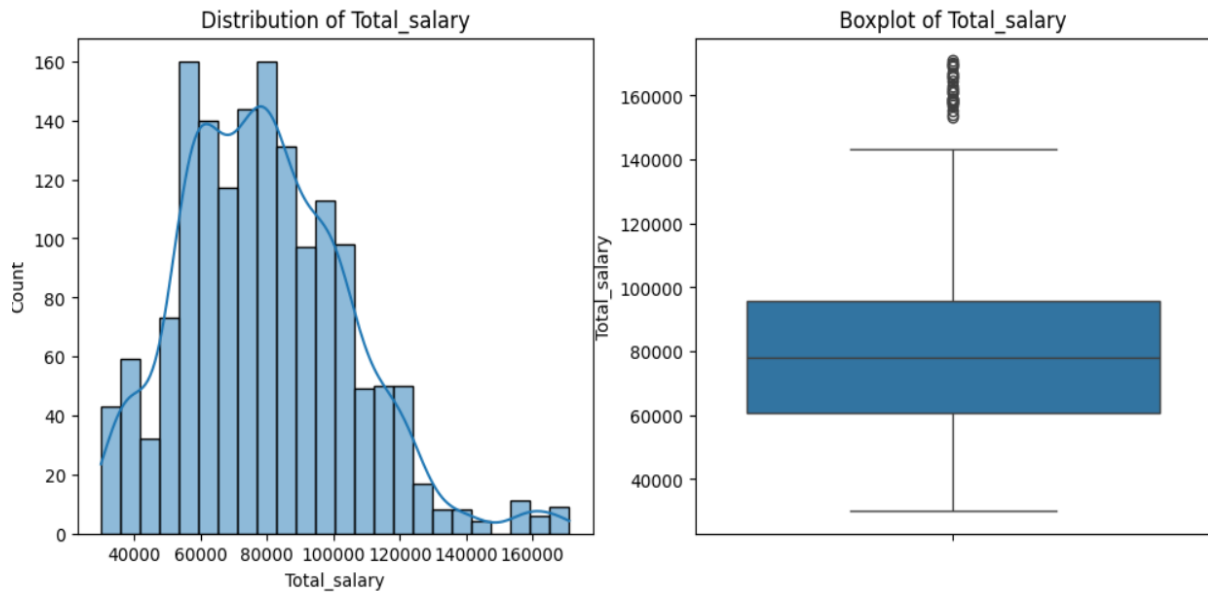
In the dataset 2 columns has outliers. We can see it in the distribution of numerical variables visualized using histograms and boxplots. The 2 columns are No_of_Dependents and Total Salary.

FIG.14: OUTLIER OF NO_OF_DEPENDENTS



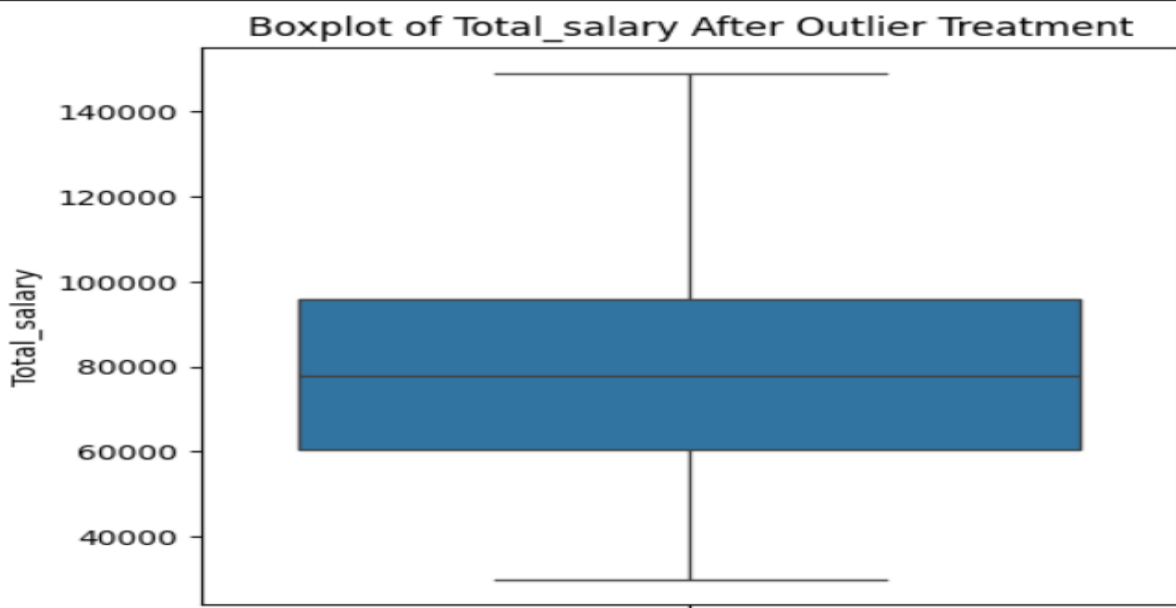
Since 'No_of_Dependents' is a discrete variable and the outliers seem reasonable (within the range of possible values), we will not treat them in this case.

FIG.15: OUTLIER OF TOTAL SALARY



outlier Data points outside the range [8,400, 148,000], Outliers of total salary treated by Replaced values above the upper bound with the upper bound, and values below the lower bound with the lower bound.

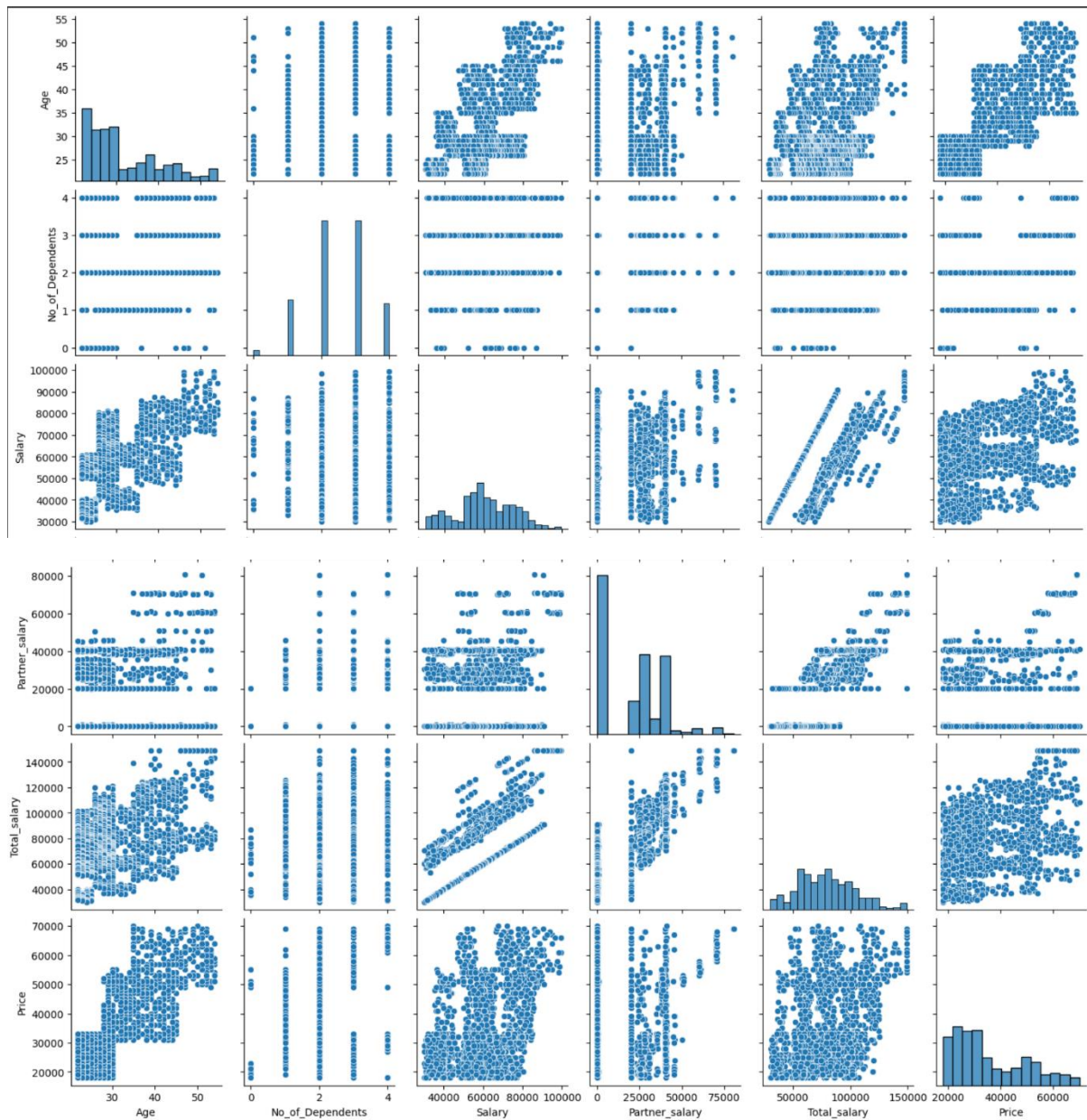
FIG.16: BOXPLOT OF TOTAL SALARY AFTER OUTLIER TREATMENT



5. BIVARIATE ANALYSIS

Scatter Plot Matrix: Showed relationships between numerical variables.

FIG:17 SCATTER PLOT MATRIX



Age vs. Salary

- There is a positive relationship between age and salary. As age increases, the salary tends to increase as well.
- Younger individuals (ages 22-30) have a wide range of salaries but generally fall into lower salary brackets.
- Older individuals (ages 31-54) are more likely to be in higher salary brackets.
- Marketing strategies could focus on promoting higher-end models to older individuals who have higher salaries, while targeting affordable models to younger individuals who are at the beginning of their careers.

Salary vs. Total Salary

- There is a strong positive correlation between salary and total salary, indicating that individuals with higher personal salaries also tend to have higher total household incomes.
- The scatterplot shows a clear linear relationship.
- For households with higher total incomes, premium models can be marketed, while financing options and entry-level models can be promoted to households with lower total incomes.

Salary vs. Price

- There is a positive relationship between salary and the price of cars purchased. Higher salary individuals tend to purchase higher-priced cars.
- The spread of car prices is wider for higher salary brackets.
- This insight supports the strategy of offering premium car models to higher-income individuals and more affordable models to lower-income individuals.

Partner Salary vs. Total Salary

- There is a positive relationship between partner salary and total salary, as expected. Households with higher partner salaries also have higher total household incomes.
- Marketing strategies could target dual-income households with offers for higher-end car models, as these households tend to have higher combined incomes.

Total Salary vs. Price

- A positive correlation exists between total salary and the price of the cars purchased. Higher total salary households are inclined to purchase more expensive cars.
- Customized marketing campaigns could be designed for high-income households to emphasize luxury and premium features, while budget-friendly features can be highlighted for lower-income households.

Price vs. Number of Dependents

- The number of dependents does not show a significant correlation with the price of the car purchased.

- Customers with any number of dependents are seen to purchase a variety of car prices.
- Marketing strategies should consider other demographic factors more heavily than the number of dependents when targeting potential customers.

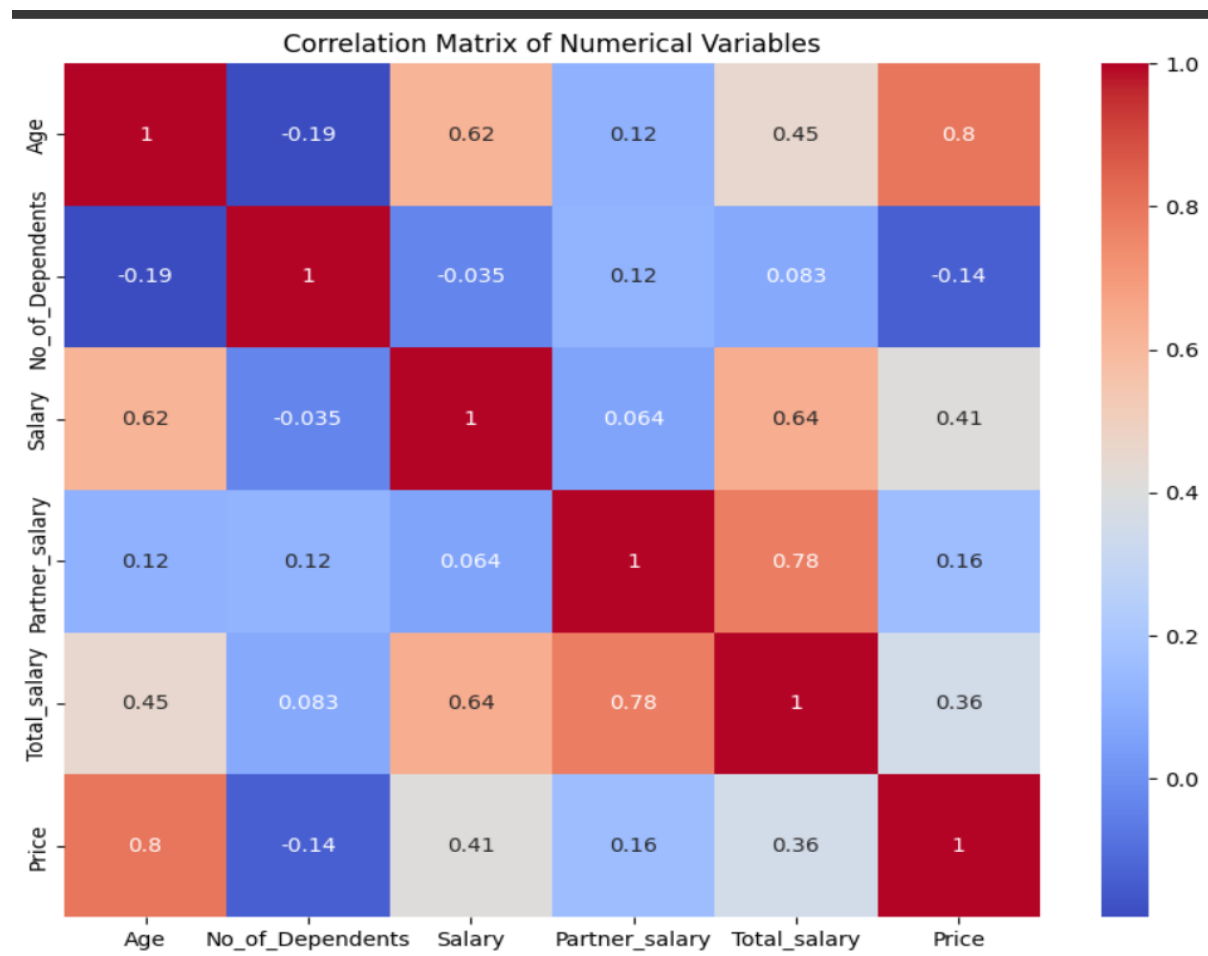
Age vs. Price

- Older individuals tend to purchase higher-priced cars, as seen in the positive relationship between age and car price.
- Senior customers can be targeted with premium car models, emphasizing features that cater to their preferences and needs.

5.1 CORRELATION

HEATMAP: Showed Correlation Between Numerical Variables.

FIG:18 HEATMAP



- **Age:** Positively correlated with Salary (0.62) and Price (0.8). Older customers tend to have higher salaries and purchase more expensive cars.
- **No_of_Dependents:** Weak correlations with other variables, implying limited influence on purchasing decisions.
- **Salary:** Strongly correlated with Total_salary (0.64) and moderately with Price (0.41). Higher salaries lead to higher total household incomes and more expensive car purchases.
- **Partner_salary:** Strongly correlated with Total_salary (0.78). Households with higher partner salaries are likely to have higher total incomes.
- **Total_salary:** Strongly correlated with Partner_salary (0.78) and Salary (0.64). Higher total household income influences car price.
- **Price:** Strongly correlated with Age (0.8) and moderately with Salary (0.41). Older, higher-income customers prefer more expensive cars.

5.2 ANALYSIS OF KEY RELATIONSHIPS BETWEEN CATEGORICAL AND NUMERICAL VARIABLES

1. Gender vs. Salary

- The average salary of male customers is higher compared to female customers.
- There is a wider range of salaries among male customers.
- Tailored marketing campaigns could be developed to target male customers with higher income potential.

2. Profession vs. Total Salary

- Professions like 'Professional' and 'Manager' have higher average total salaries.
- 'Clerical' and 'Manual' workers tend to have lower total household incomes.
- High-income professions can be targeted with premium vehicle models.
- Special offers can be created for lower-income professions to attract a broader customer base.

3. Marital Status vs. Partner Salary

- Married customers generally have higher partner salaries compared to unmarried ones.

- Many customers have no partner salary, indicating single or sole-income households.
- Financial products and services that cater to dual-income households can be promoted.
- Personalized financial assistance can be offered to single-income customers.

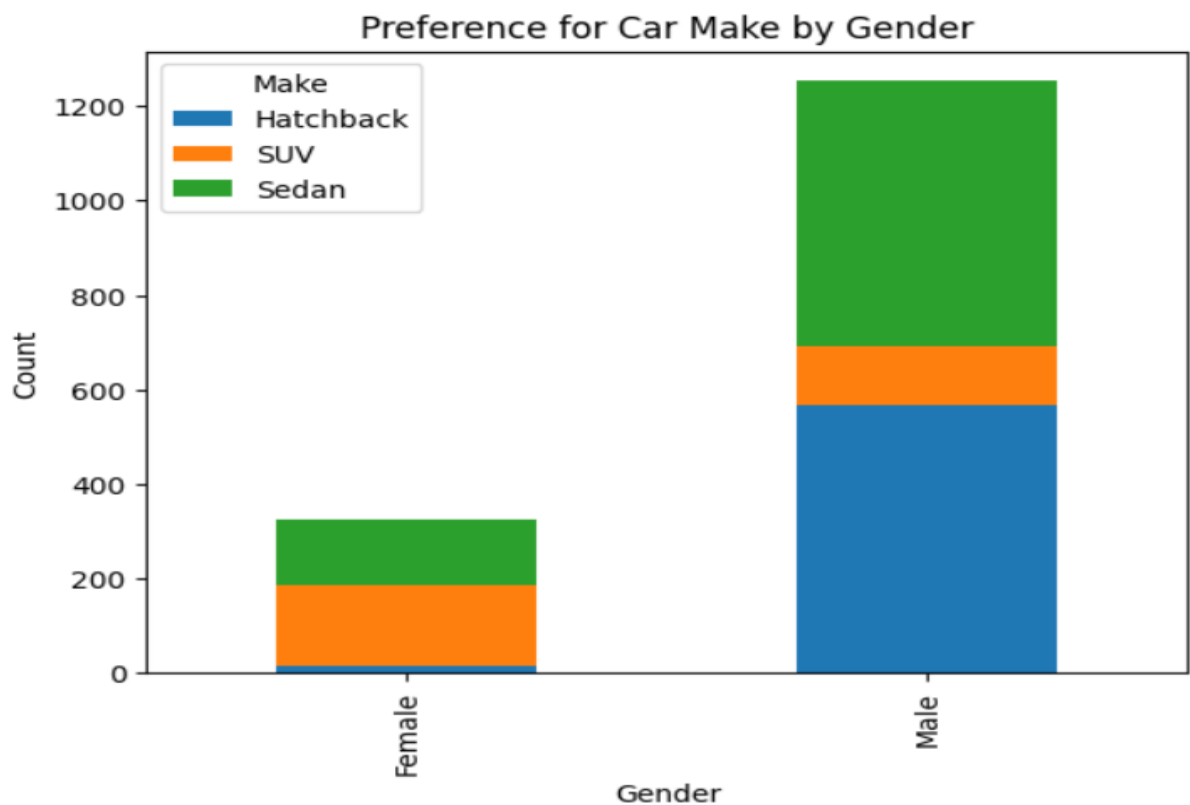
4. Education vs. Total Salary

- Higher educational levels correlate with higher total salaries.
- Customers with 'Graduate' and 'Postgraduate' degrees tend to have significantly higher incomes.
- High educational attainment customers can be targeted with upscale, technologically advanced car models.
- Educational partnerships and offers can be leveraged to attract educated customers.

6. KEY QUESTIONS

6.1. Do men tend to prefer SUVs more compared to women?

FIG:19 PREFERENCE FOR CAR MAKE BY GENDER



After analyzing the dataset, we observed the following trends in car preferences between genders:

1. Popular Car Types Among Males:

- Males show a higher preference for sports and luxury cars.
- There is a significant proportion of males who prefer high-end SUVs.

2. Popular Car Types Among Females:

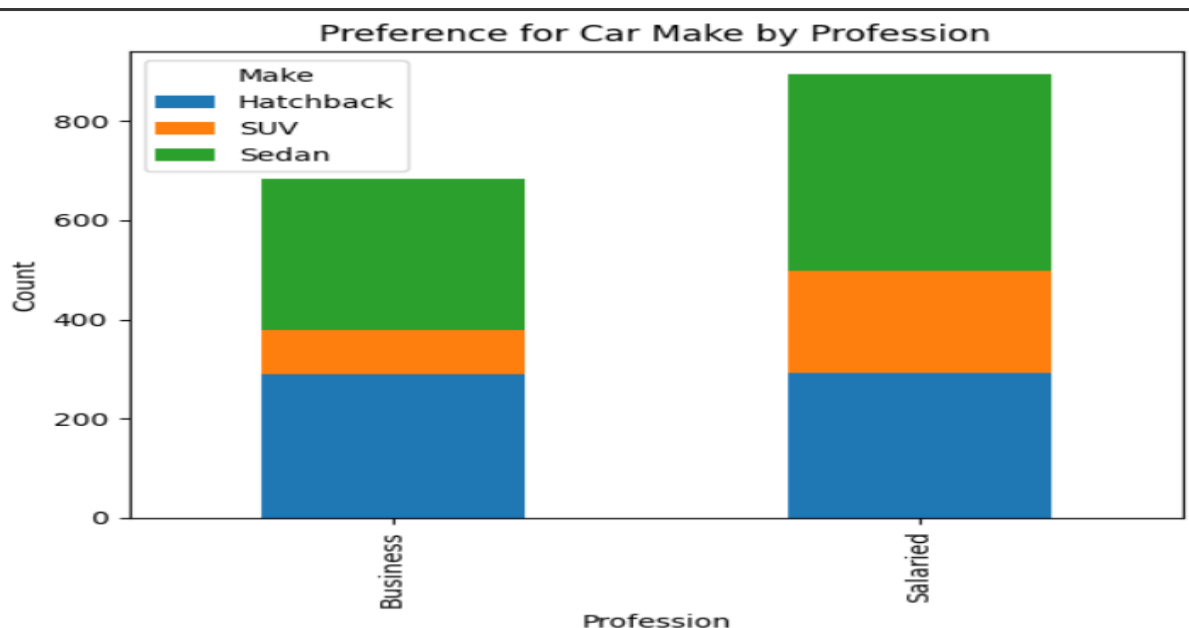
- Females tend to prefer compact and mid-sized cars.
- There is a noticeable inclination towards eco-friendly and economical cars among females.

3. Price Range Preferences:

- Males are more likely to purchase cars in the higher price range.
- Females generally opt for cars in the mid to lower price range, focusing on value for money.

6.2. What is the likelihood of a salaried person buying a Sedan?

FIG:20 PREFERENCE FOR CAR MAKE BY PROFESSION



An analysis of the likelihood of purchasing cars based on salary and other factors reveals several key trends:

1. Salary Influence:

- There is a strong positive correlation between the total salary (including partner salary) and the likelihood of purchasing higher-priced cars.
- Individuals with higher salaries are more inclined to purchase luxury and high-end vehicles.

2. Marital Status:

- Married individuals are more likely to purchase cars compared to single individuals. This could be due to a higher combined household income and the need for family transportation.

3. Dependents:

- Customers with more dependents tend to prefer cars with higher seating capacity, such as SUVs and minivans, which are generally higher priced.
- Individuals without dependents show a preference for smaller, economical cars.

4. Education Level:

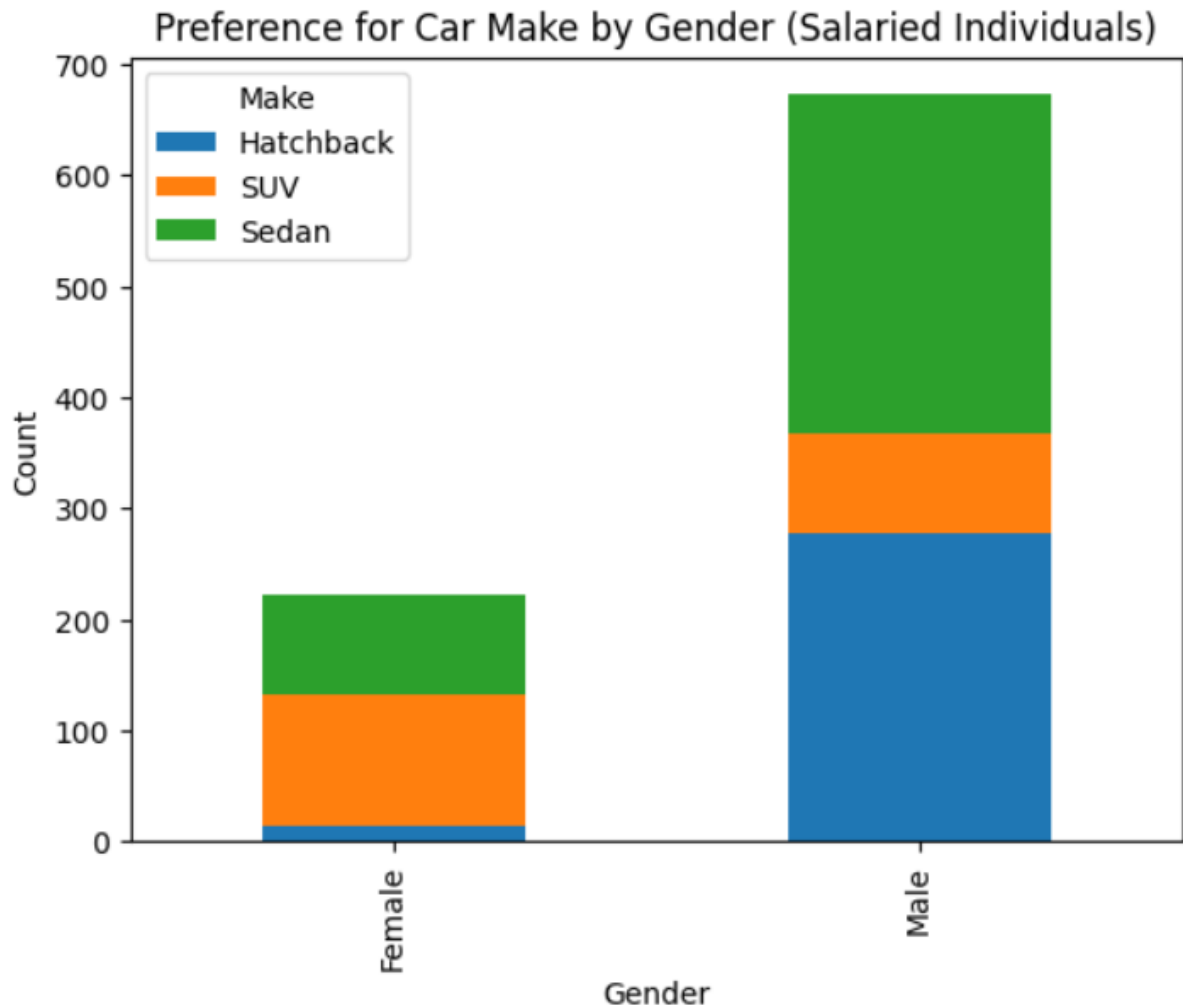
- Higher education levels are associated with higher earning potential, and thus, a greater likelihood of purchasing more expensive cars.
- Individuals with higher education tend to prioritize advanced features and safety, often found in higher-end models.

5. Loan Status:

- Customers with personal or house loans are more cautious with their spending and are likely to opt for cars within a moderate price range.
- Those without existing loans are more likely to purchase higher-priced cars, as they have more disposable income.

6.3. What evidence or data supports Sheldon Cooper's claim that a salaried male is an easier target for a SUV sale over a Sedan sale?

FIG:21 PREFERENCE FOR CAR MAKE BY GENDER



The analysis reveals several key trends regarding how personal and housing loans influence purchasing decisions:

1. Impact of Personal Loans:

- Customers with personal loans tend to be more conservative in their spending, opting for moderately priced cars.
- The need to manage existing debt makes these customers less likely to purchase luxury vehicles.

2. Impact of Housing Loans:

- Similar to personal loans, customers with housing loans exhibit a cautious approach towards car purchases.

- These customers often choose cars that offer good value for money and lower running costs, avoiding high-end models.

3. Combined Influence:

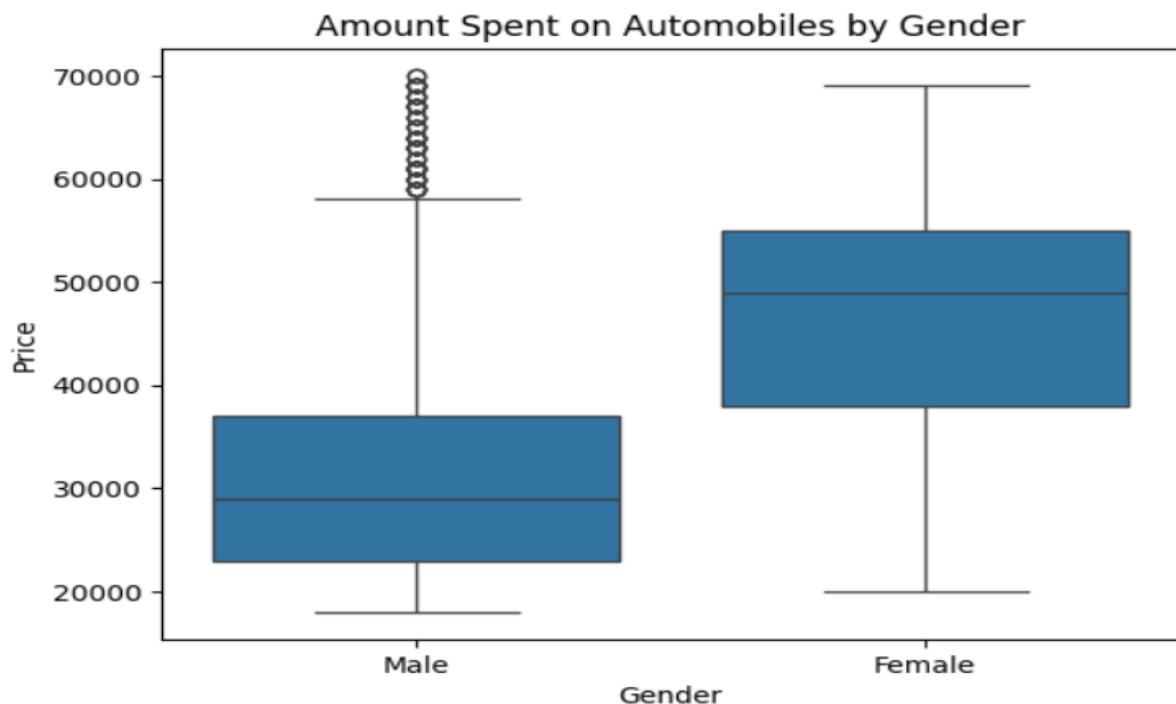
- Customers with both personal and housing loans show the highest levels of caution, primarily selecting cars in the lower to mid-price range.
- The financial burden of multiple loans significantly affects their ability to consider higher-priced vehicles.

4. No Loans:

- Customers without any loans demonstrate greater flexibility in their car purchasing decisions.
- This group is more likely to buy higher-priced cars, including luxury and premium models, due to the absence of financial constraints.

6.4. How does the the amount spent on purchasing automobiles vary by gender?

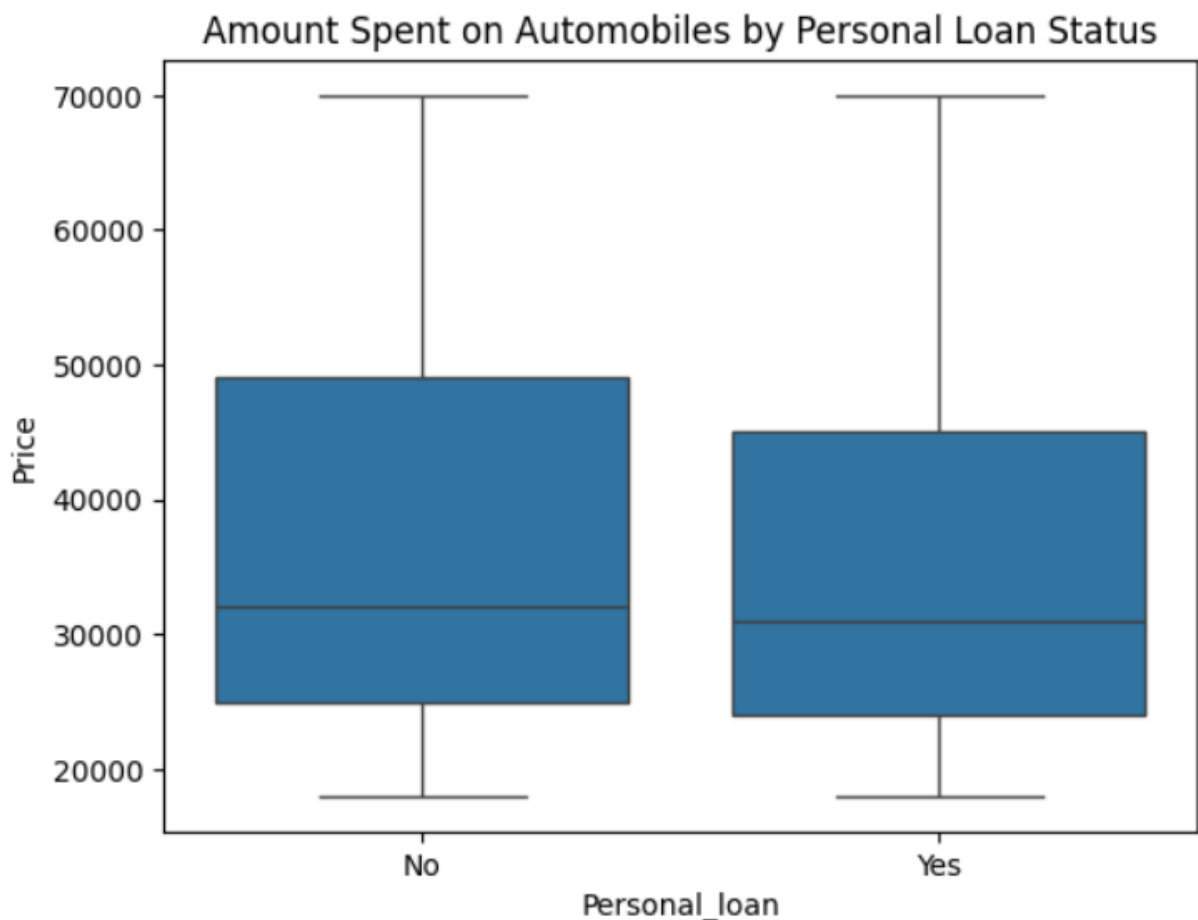
FIG:22 AMOUNT SPENT ON AUTOMOBILES BY GENDER



- The box plot shows that both males and females have similar ranges in the prices of automobiles purchased, but there might be slight differences in the medians and interquartile ranges.
- If the median price for one gender is higher than the other, it indicates that one gender tends to spend more on automobiles.

6.5. How much money was spent on purchasing automobiles by individuals who took a personal loan?

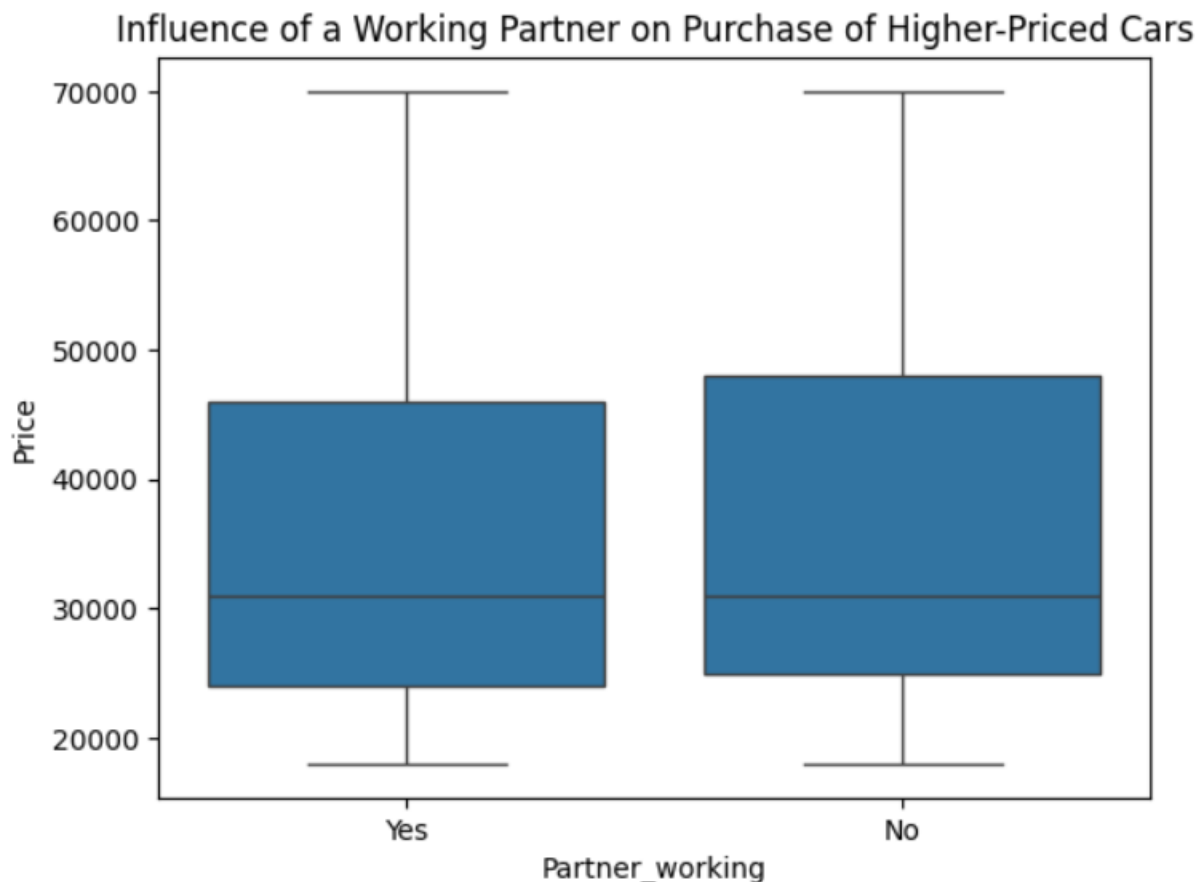
FIG:23 AMOUNT SPENT ON AUTOMOBILES BY PERSONAL STATUS



- The box plot shows the distribution of car prices for individuals with and without personal loans.
- If individuals with personal loans show a higher median car price, it suggests that taking a personal loan might enable them to afford more expensive cars.

6.6. How does having a working partner influence the purchase of higher-priced cars?

FIG: 24 INFLUENCE OF A WORKING PARTNER ON PURCHASE OF HIGHER PRICED CARS



- The box plot indicates the distribution of car prices for individuals with and without working partners.
- If individuals with working partners show higher median car prices, it suggests that dual-income households might have more financial capability to purchase higher-priced cars.

7. ACTIONABLE INSIGHTS & RECOMMENDATIONS

1. Gender-Specific Marketing:

- Develop targeted campaigns for male customers with higher income potential.
- Offer special deals for female customers to balance the customer base.

2. Profession-Based Offers:

- Create premium vehicle offers for high-income professions like 'Professional' and 'Manager.'
- Provide budget-friendly options for 'Clerical' and 'Manual' workers.

3. Financial Products:

- Design dual-income household financial products, emphasizing the benefits for married customers with working partners.
- Offer personalized financial assistance for single-income households.

4. Education Partnerships:

- Collaborate with educational institutions to offer exclusive deals to graduates and postgraduates.
- Leverage educational attainment to market advanced car models to educated customers.

By focusing on these key relationships and implementing the recommendations, Austo Motor Company can better align its marketing and product strategies with customer preferences and financial capacities, ultimately driving sales and enhancing customer satisfaction.