

Business Report

Introduction

Austo Motor Company is a leading car manufacturer specializing in SUV, Sedan, and Hatchback models. In its recent board meeting, concerns were raised by the members on the efficiency of the marketing campaign currently being used. The board decides to rope in an analytics professional to improve the existing campaign

Data Description

The dataset provided by Austo Motor Company contains information about customers and their preferences related to automobile purchases. It consists of 1581 rows and 14 columns

Column	DATA type
Age	int64
Gender	object
Profession	object
Marital_status	object
Education	object
No_of_Dependents	int64
Personal_loan	object
House_loan	object
Partner_working	object
Salary	int64
Partner_salary	float64
Total_salary	int64
Price	int64
Make	object

The Data has 1 float datatype, 5 int(64) datatype and 8 Object data types

Feature	Variable Type
Age	Continuous
Gender	Categorical
Profession	Categorical
Marital_status	Categorical
Education	Categorical
No_of_Dependents	Continuous

Feature	Variable Type
Personal_loan	Categorical
House_loan	Categorical
Partner_working	Categorical
Salary	Continuous
Partner_salary	Continuous
Total_salary	Continuous
Price	Continuous
Make	Categorical

*There are 8 Categorical Variables in the Dataset, they are

Gender, Profession, Marital_status, Education, Personal_loan, House_loan, Partner_working and Make

There are 6 Continuous Variables in the Dataset, they are

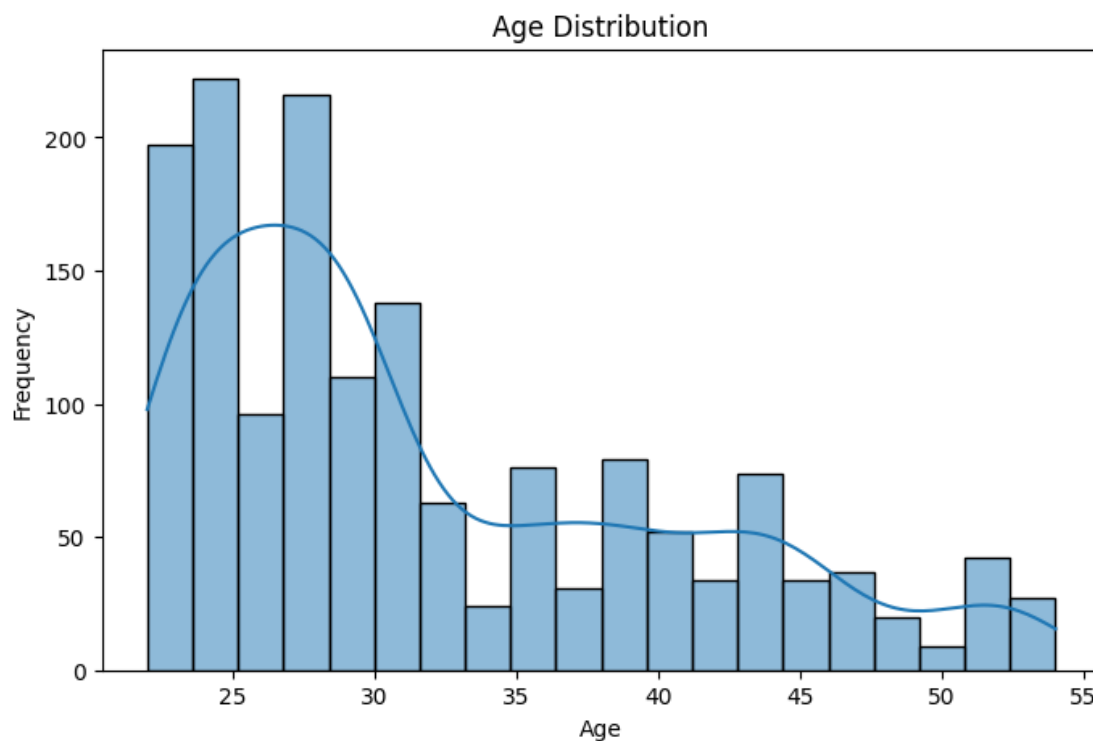
Age, No_of_dependents, Salary, Partner_salary, Total_salary and Price

*In the initial analyses, some missing values were found in the dataset. The "Gender" column has 53 missing values, while the "Partner_Salary" column has 106 missing values. In order to solve this, we performed a data Imputation which took account of the variables' characteristics. We filled missing gender values with the mode (most frequent gender), and we filled missing partner salary values with the median partner salary.

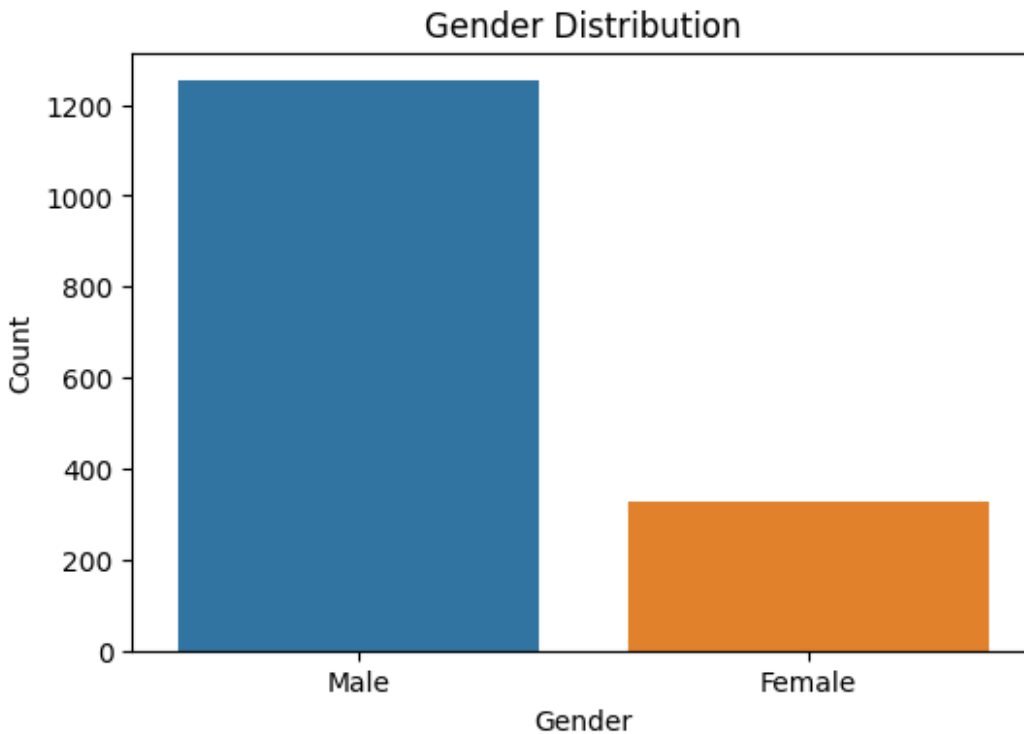
- Insights
- Age Distribution: Most customers are concentrated within specific age groups, which can inform targeted marketing.
- **Gender Distribution:** Understanding the gender distribution helps tailor gender-specific marketing approaches.
- **Profession Distribution:** Different professions indicate diverse customer segments for personalized marketing.
- **Marital Status Distribution:** Marital status insights aid in creating family-oriented or single-targeted promotions.
- **Education Distribution:** Educational backgrounds can guide messaging suitable for varying education levels.
- **Number of Dependents Distribution:** Insights on dependents help in offering family-centric services.

- **Personal Loan Distribution:** Knowing the percentage of customers with personal loans provides financial context.
- **House Loan Distribution:** Similar to personal loans, insights on house loans are valuable for marketing.
- **Partner Working Distribution:** Understanding partner employment status helps target dual-income households.
- **Salary, Partner Salary, and Total Salary Distributions:** Salary insights assist in segmenting customers by income levels.
- **Price Distribution:** Understanding price distribution helps optimize pricing and marketing strategies.
- **Make Distribution:** Insights on car make popularity guide marketing and product focus.

C) Explore all the features of the data separately by using appropriate visualizations and draw insights that can be utilized by the business



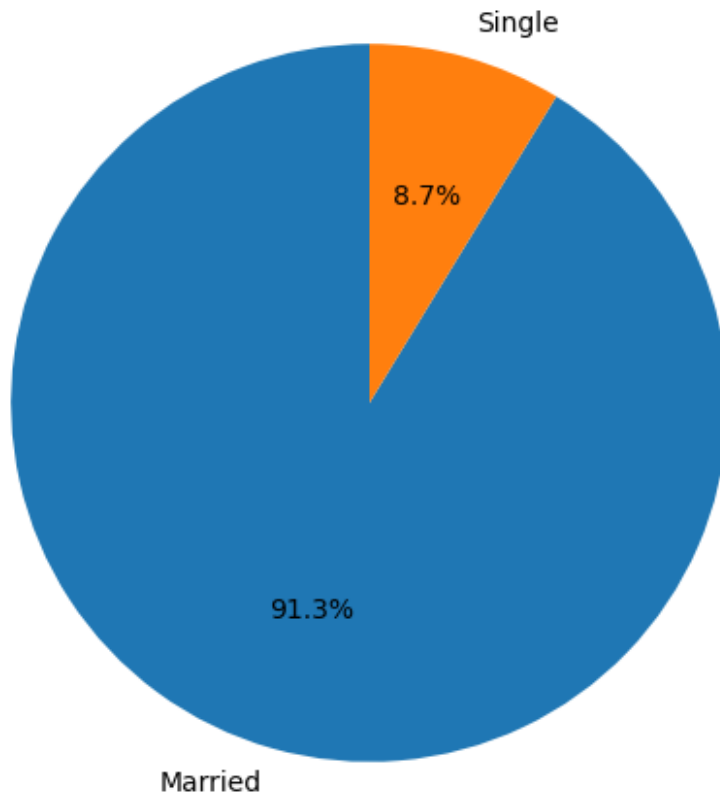
- Age Distribution: Most customers are concentrated within specific age group that is 20-30 years, this shows that youngsters belong to the majority class and the auto should target these customers mainly to get better profits.
- The company have to manufacture the product's keeping the youngsters in mind and make sure to provide features in such a way that would catch the eyes of youngsters.



- The male population is higher compared to the female population, usually males are the sole workers of the family so hence most of the car owners are men.

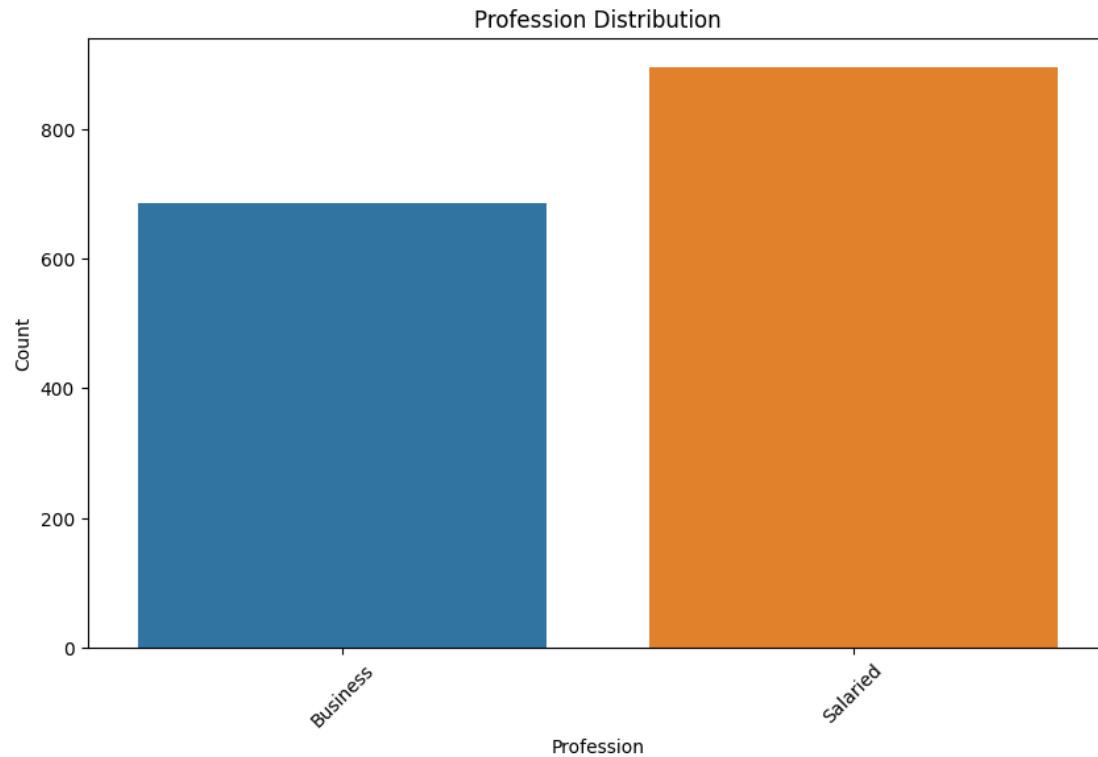
as men are dominating here, the car company has to make cars that would attract men of all ages, occupancies.

Marital Status Distribution



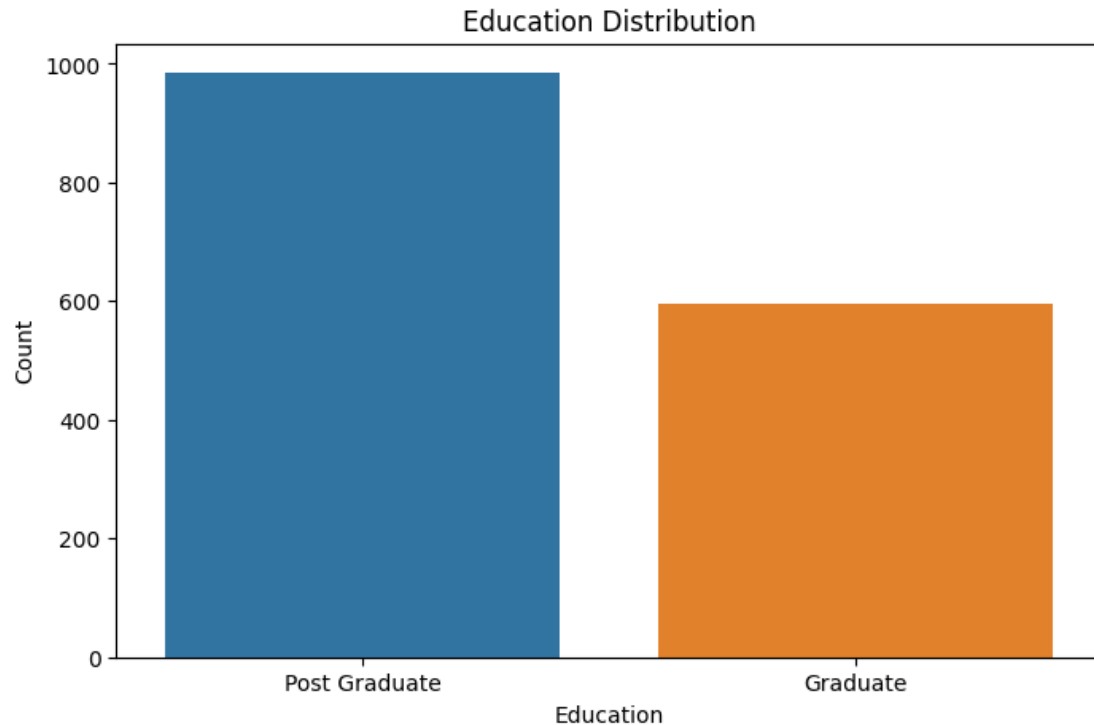
The majority of customers are married. This means that the company should focus on marketing its cars to married couples. This could include targeting couples with young children, couples who are empty nesters, or couples who are looking for a car for their growing family.

A small percentage of customers are single. This means that the company should also consider marketing its cars to single people. This could include targeting single professionals, single parents, or single people who are looking for a fun and sporty car.



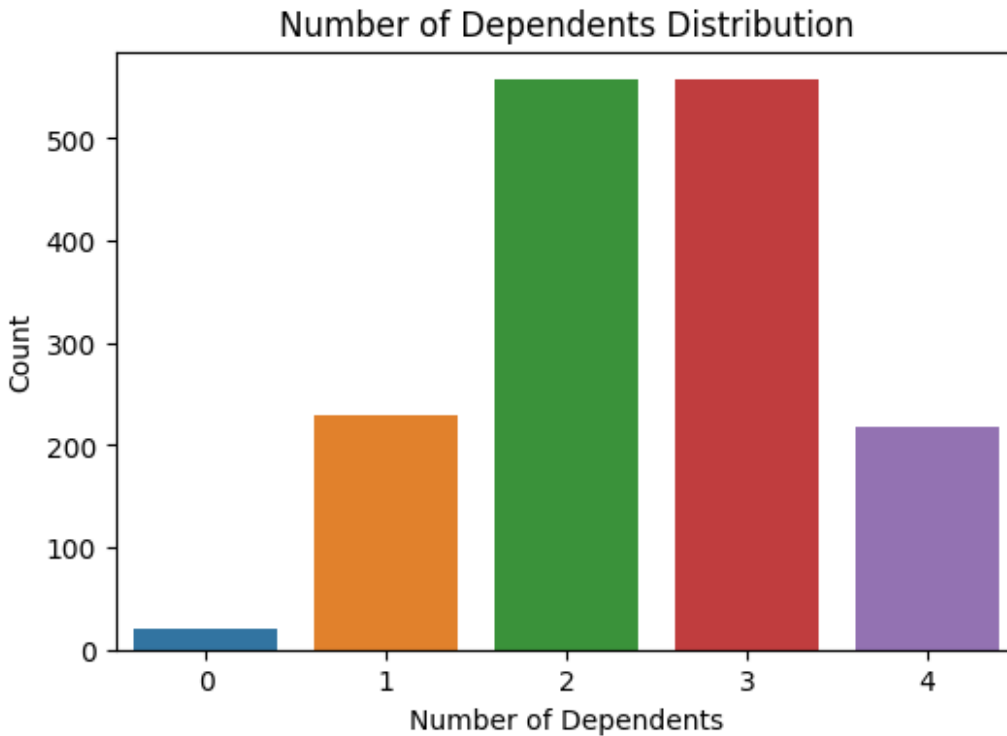
The company should focus on marketing its cars to business professionals. This is because there are more business professionals than salaried professionals, and the number of business professionals is increasing. The company could target business professionals who are looking for a car that is both stylish and practical.

The company should also consider marketing its cars to salaried professionals. This is because there are still a significant number of salaried professionals, and they may be looking for a car that is more affordable than a car for business professionals. The company could target salaried professionals who are looking for a car that is reliable and fuel-efficient.



The company should focus on marketing its cars to graduates. This is because there are more graduates than post graduates, and they are more likely to be in the market for a new car. The company could target graduates who are looking for a car that is both stylish and affordable.

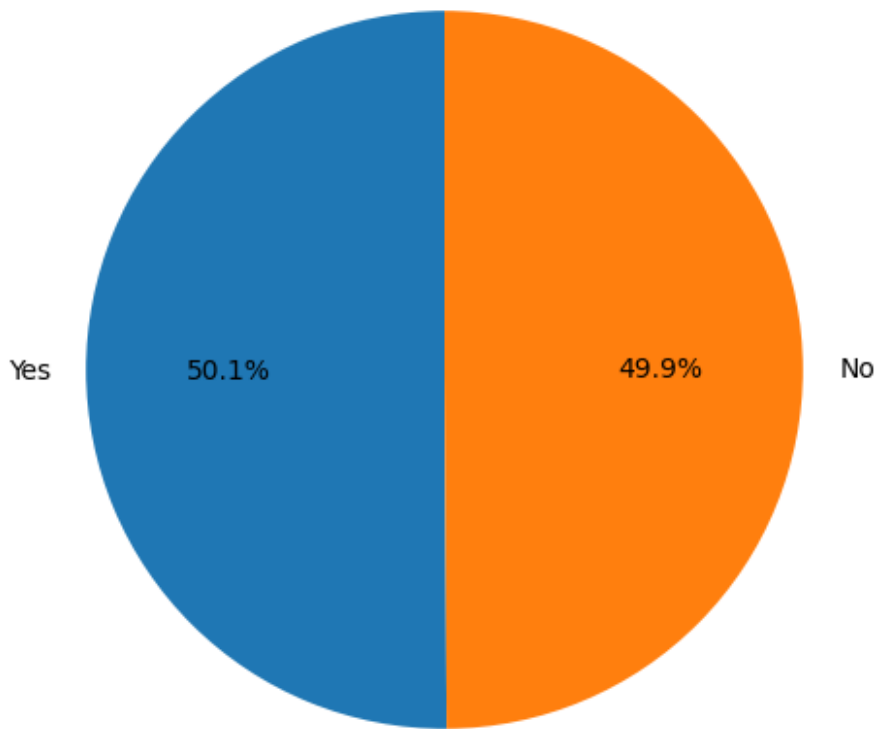
The company should also consider marketing its cars to post graduates. This is because the number of post graduates is increasing, and they may be looking for a car that is more luxurious and powerful. The company could target post graduates who are looking for a car that is a status symbol.



The company should focus on marketing its cars to families with 1 or 2 dependents. This is because the majority of customers have this number of dependents, and they are more likely to be in the market for a new car. The company could target families with 1 or 2 dependents who are looking for a car that is both spacious and affordable.

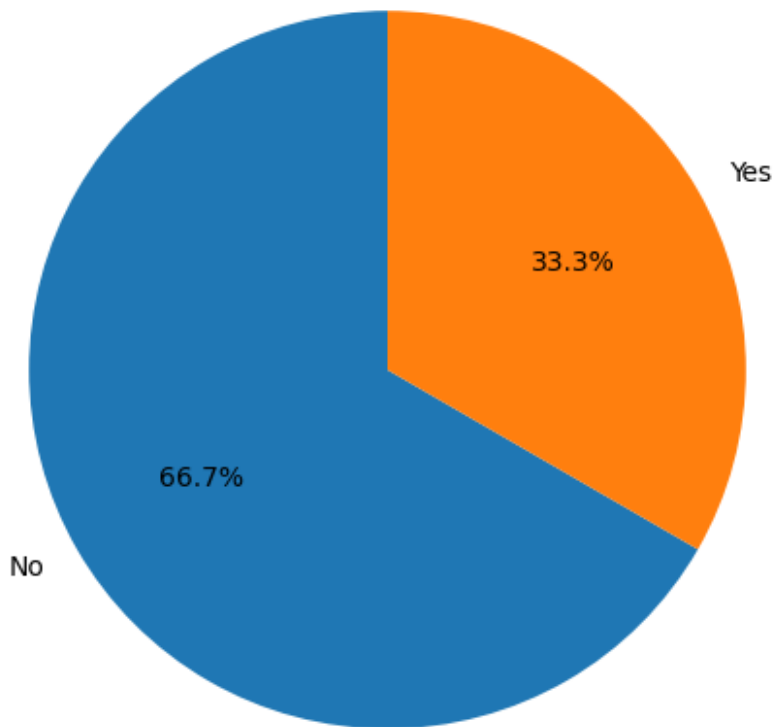
The company could also consider marketing its cars to families with more than 2 dependents. This is because there is still a significant percentage of customers with this number of dependents, and they may be looking for a car that is more spacious and fuel-efficient. The company could target families with more than 2 dependents who are looking for a car that is a minivan or SUV.

Personal Loan Distribution



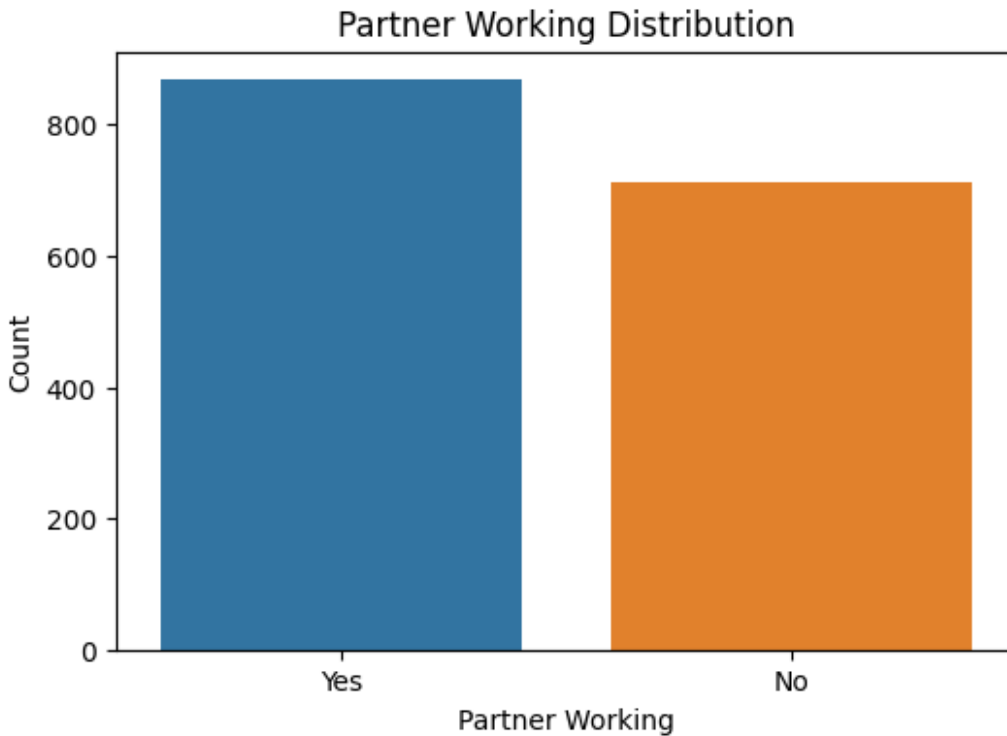
The company should focus on marketing its cars to people who have taken a personal loan. This is because these people are more likely to be in the market for a new car, as they have already shown that they are willing to take on debt. The company could target people who have taken a personal loan who are looking for a car that is both affordable and reliable. The company should also consider marketing its cars to people who have not taken a personal loan. This is because these people may be looking for a car in the future, and the company could position itself as a viable option for them. The company could target people who have not taken a personal loan who are looking for a car that is both stylish and affordable.

House Loan Distribution



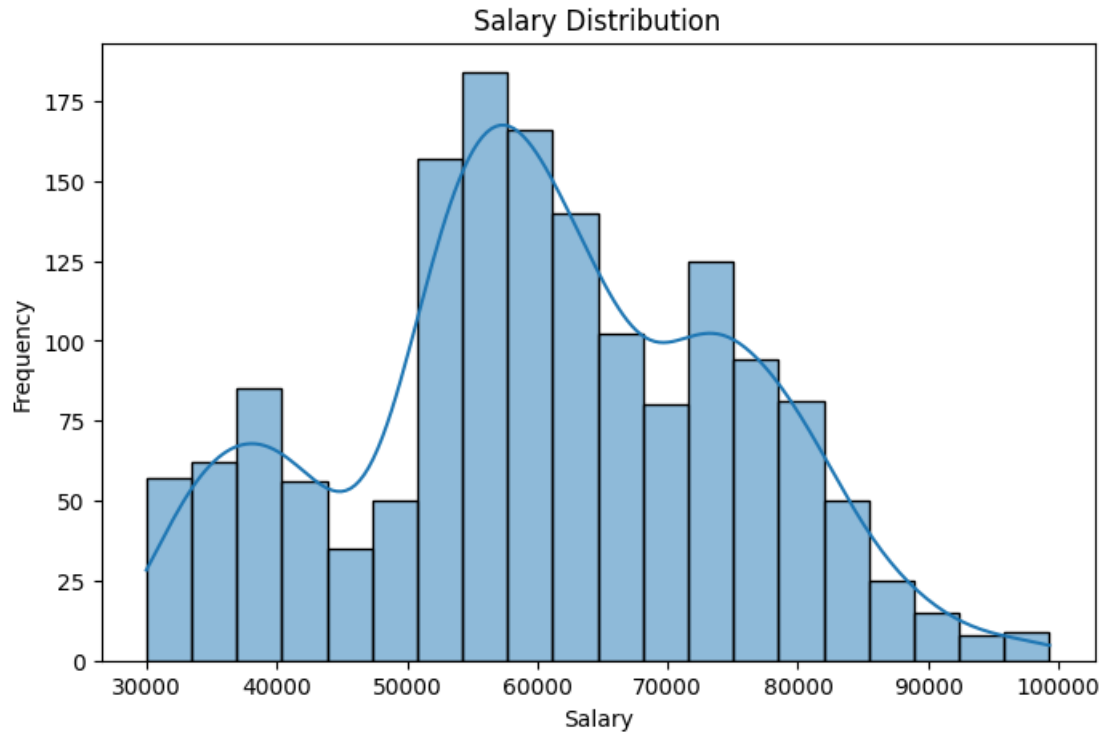
The company should focus on marketing its cars to people who do not have a house loan. This is because these people are more likely to be in the market for a new car, as they do not have a large monthly mortgage payment to worry about. The company could target people who do not have a house loan who are looking for a car that is both affordable and stylish.

The company should also consider marketing its cars to people who have a house loan. This is because these people may be looking for a new car in the future, and the company could position itself as a viable option for them. The company could target people who have a house loan who are looking for a car that is both reliable and fuel-efficient.



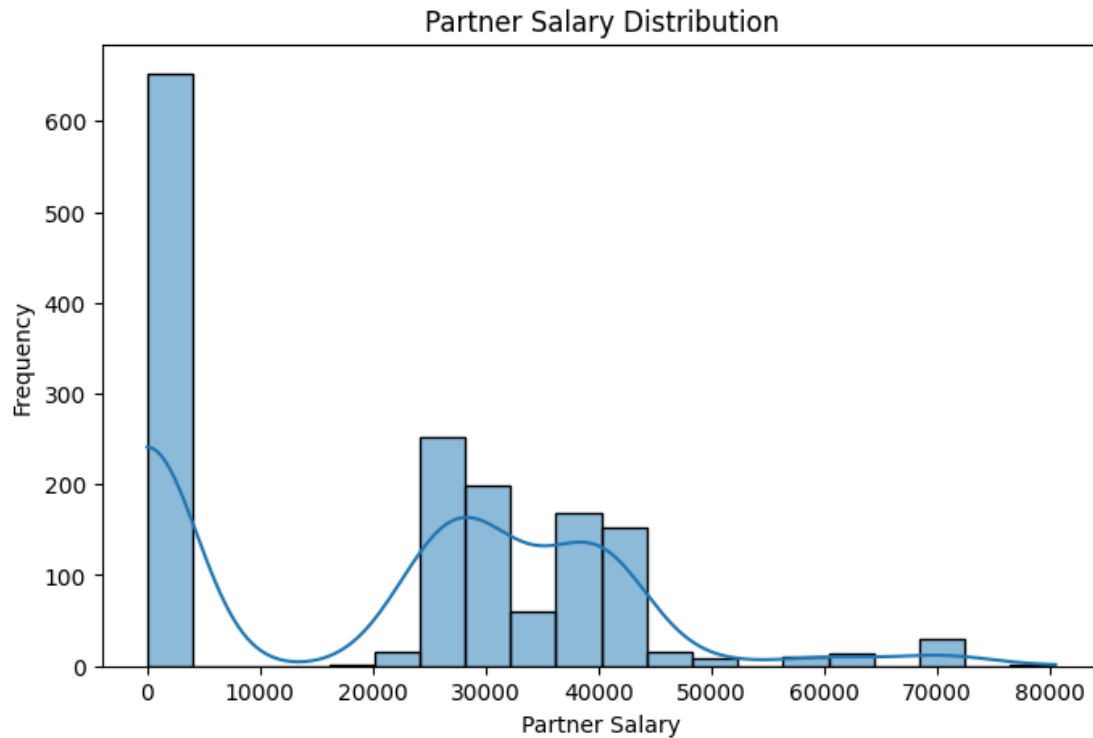
The company should focus on marketing its cars to people who work with a partner. This is because these people are more likely to be in the market for a new car, as they may need a car that can accommodate both of them. The company could target people who work with a partner who are looking for a car that is both spacious and affordable.

The company should also consider marketing its cars to people who do not work with a partner. This is because these people may be looking for a new car in the future, and the company could position itself as a viable option for them. The company could target people who do not work with a partner who are looking for a car that is both stylish and affordable.



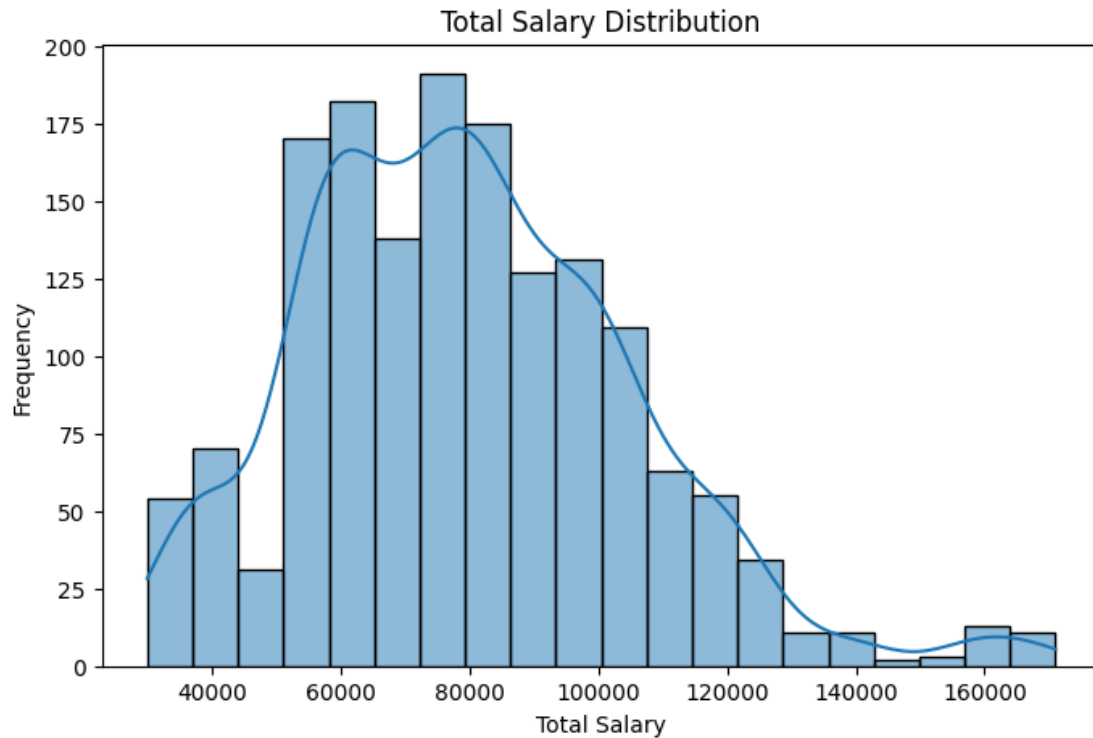
The company's salary distribution is fairly evenly distributed. This means that there are no major outliers in the salary range, and most employees are paid within a relatively narrow range. This is a good sign for the company, as it suggests that they are paying their employees fairly and that there is not a lot of disparity in pay between different positions. The company could consider increasing salaries for employees in the lower salary range. As you can see from the image, there is a significant number of employees who are earning salaries in the \$30,000-\$40,000 range. Increasing salaries for these employees could help to attract and retain top talent, and it could also boost morale among the workforce. The company's partner salary distribution is skewed to the right. This means that there are a few partners who are earning significantly more than the rest of the partners. This could be due to a number of factors, such as experience, seniority, or performance.

The company could consider increasing salaries for partners in the lower salary range. As you can see from the image, there is a significant number of partners who are earning salaries in the \$60,000-\$70,000 range. Increasing salaries for these partners could help to attract and retain top talent, and it could also boost morale among the partner group.



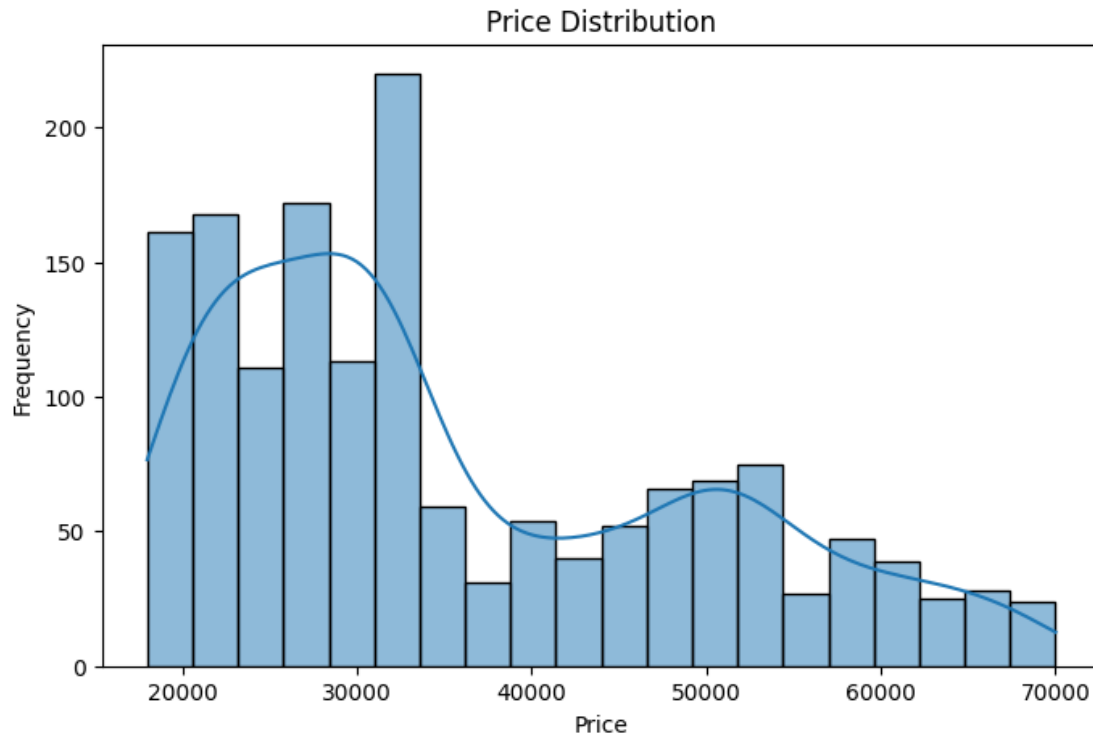
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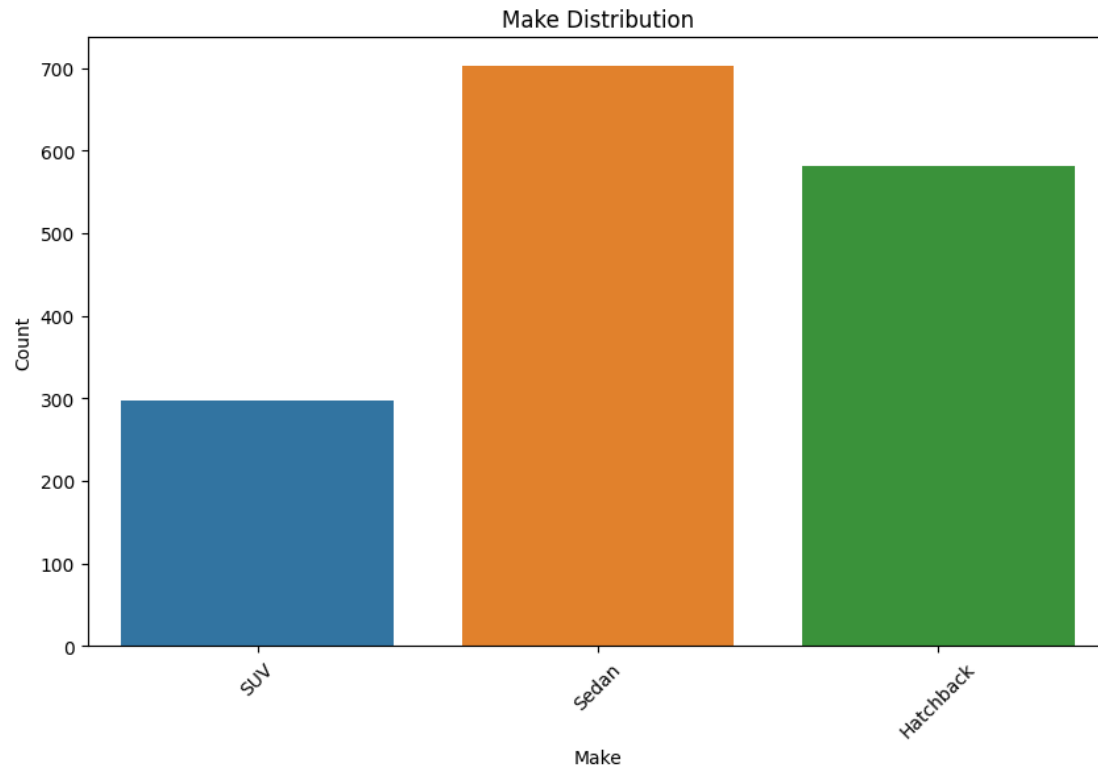
The company's salary distribution is bimodal. This means that there are two distinct salary ranges, with a small number of employees earning salaries in the \$100,000+ range and a larger number of employees earning salaries in the \$50,000-\$60,000 range. This could be due to a number of factors, such as the different levels of experience and seniority within the company.

The company could consider increasing salaries for employees in the lower salary range. As you can see from the image, there is a significant number of employees who are earning salaries in the \$50,000-\$60,000 range. Increasing salaries for these employees could help to attract and retain top talent, and it could also boost morale among the workforce.



The company's price distribution is bimodal. This means that there are two distinct price ranges, with a small number of cars being sold in the \$50,000-\$60,000 range and a larger number of cars being sold in the \$30,000-\$40,000 range. This could be due to a number of factors, such as the different types of cars that the company sells and the different levels of demand for these cars.

The company could consider increasing prices for cars in the lower price range. As you can see from the image, there is a significant number of cars being sold in the \$30,000-\$40,000 range. Increasing prices for these cars could help to increase the company's profits, and it could also help to attract a more upscale customer base.

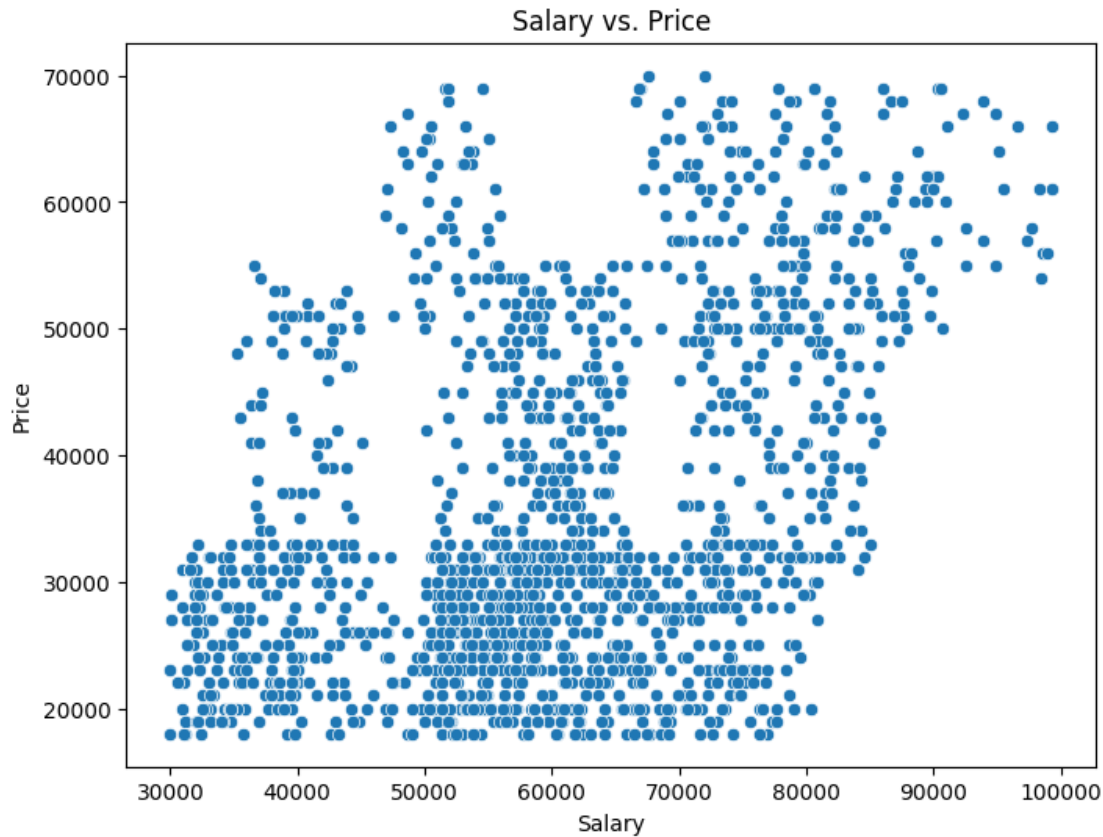


The company's car make distribution is skewed to the right. This means that there are a few car makes that are more popular than the rest. This could be due to a number of factors, such as the brand reputation, the price, or the features of the car.

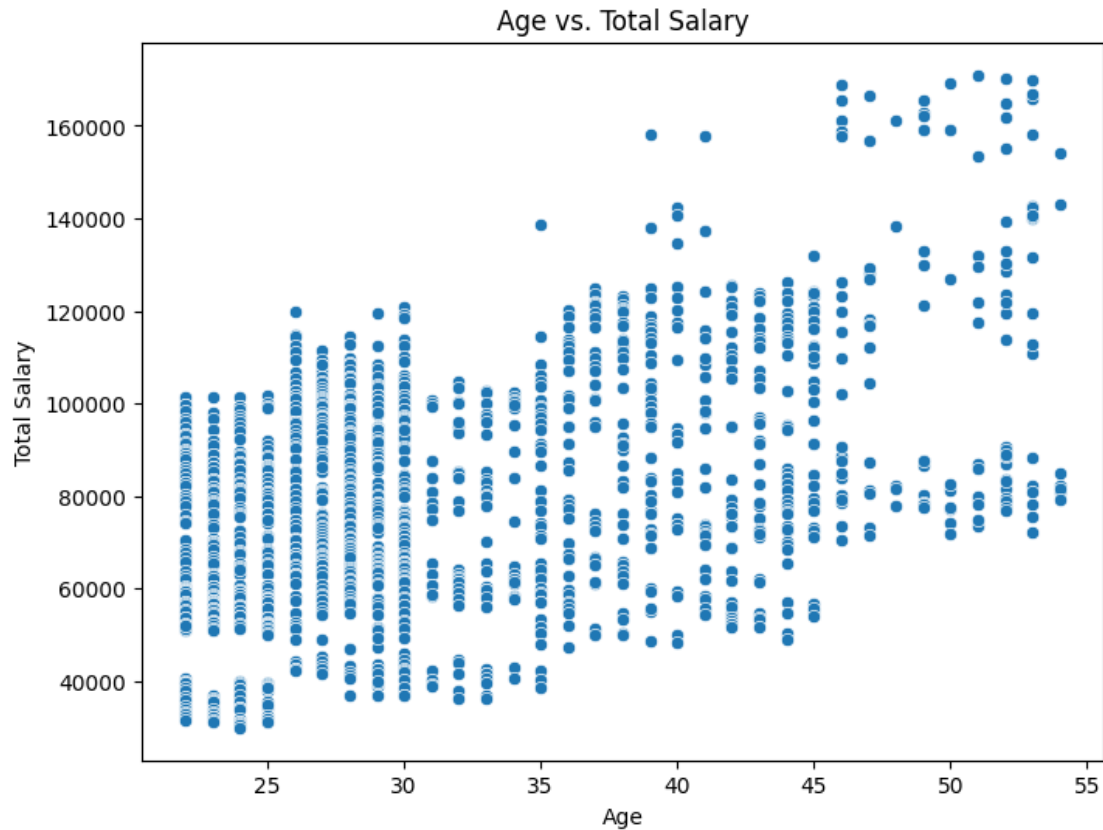
The company could consider increasing marketing efforts for car makes in the lower popularity range. As you can see from the image, there are a few car makes that are not as popular as the others. Increasing marketing efforts for these car makes could help to increase sales and market share.

D. Understanding the relationships among the variables in the dataset is crucial for every analytical project. Perform analysis on the data fields to gain deeper insights. Comment on your understanding of the data.

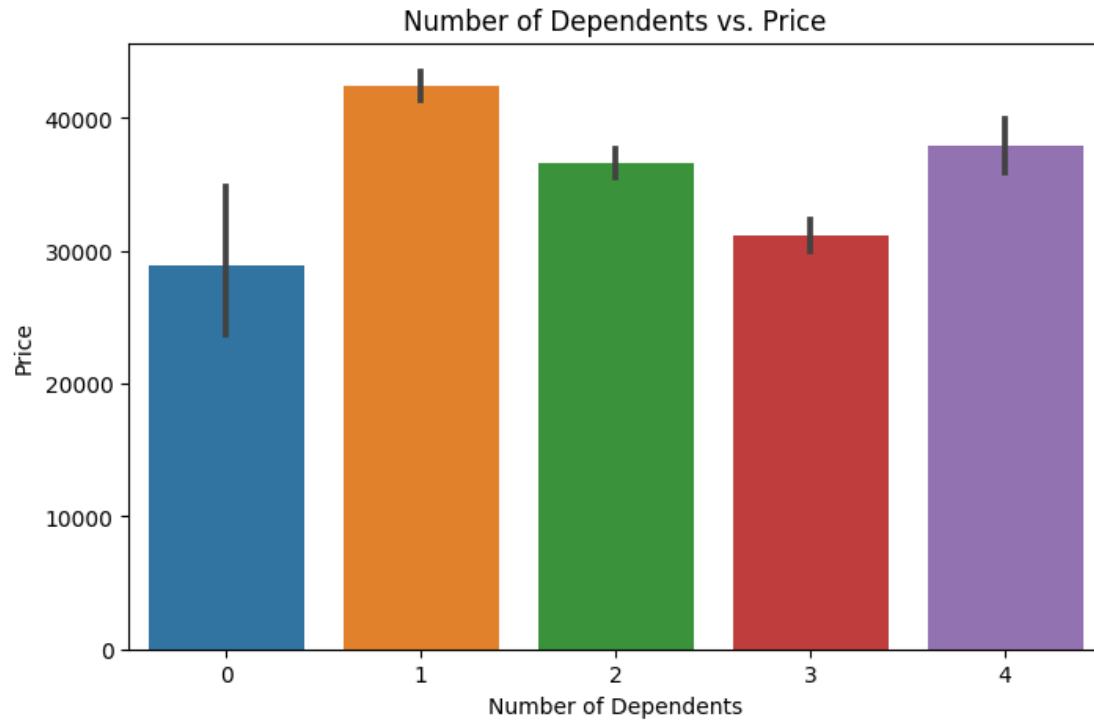




There is a positive correlation between salary and price. This means that as salary increases, price also tends to increase. This could be due to a number of factors, such as the fact that higher-paid employees may be more likely to purchase more expensive cars. The company could consider targeting higher-paid employees with their marketing efforts. As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among higher-paid employees. The company could target these employees with their marketing efforts to increase sales.



There is a positive correlation between age and total salary. This means that as age increases, total salary also tends to increase. This could be due to a number of factors, such as the fact that employees with more experience tend to earn more money. The company could consider offering salary increases to employees who have been with the company for a long time. As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more experienced employees who earn higher salaries. The company could offer salary increases to these employees to retain them and to attract new employees with the same experience level.



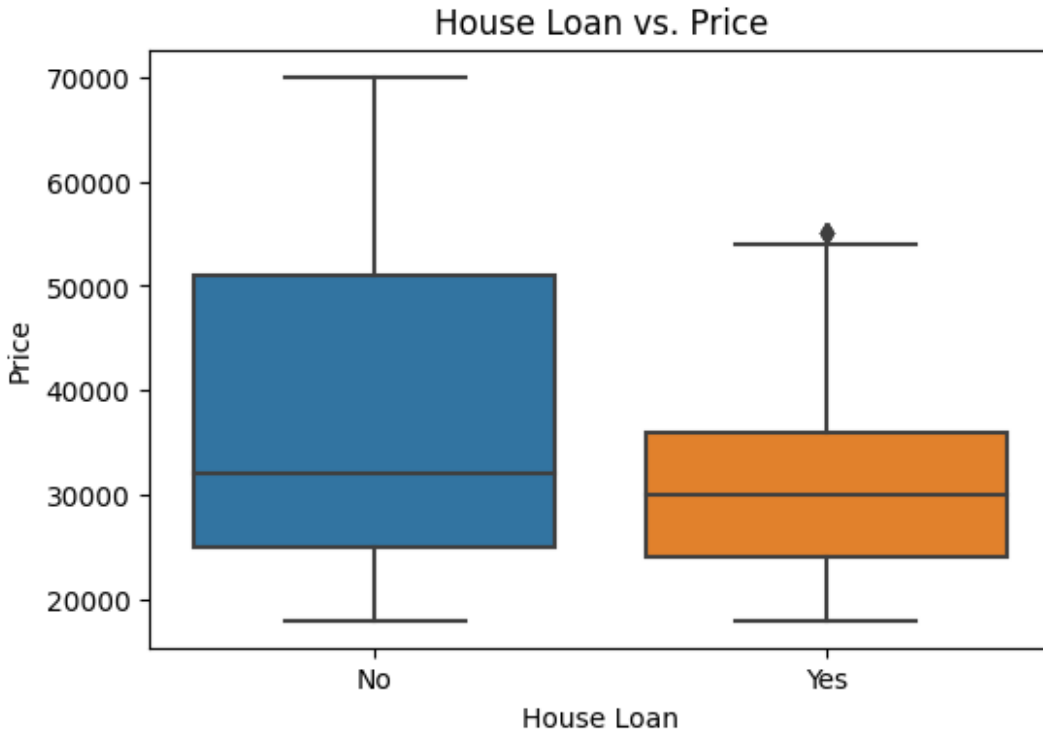
There is a negative correlation between number of dependents and price. This means that as the number of dependents increases, price tends to decrease. This could be due to a number of factors, such as the fact that families with more dependents may be more price-sensitive.

The company could consider offering discounts to families with more dependents. As you can see from the image, there is a cluster of data points in the lower left-hand corner of the graph. This suggests that there is a market for more affordable cars among families with more dependents. The company could offer discounts to these families to attract them as customers.



There is a positive correlation between price and personal loan. This means that as price increases, the likelihood of taking out a personal loan also increases. This could be due to a number of factors, such as the fact that more expensive cars may be out of reach for some buyers without a personal loan.

The company could consider offering financing options to customers who are interested in buying a car but do not have the necessary cash. As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among customers who are willing to take out a personal loan. The company could offer financing options to these customers to make it easier for them to purchase a car.

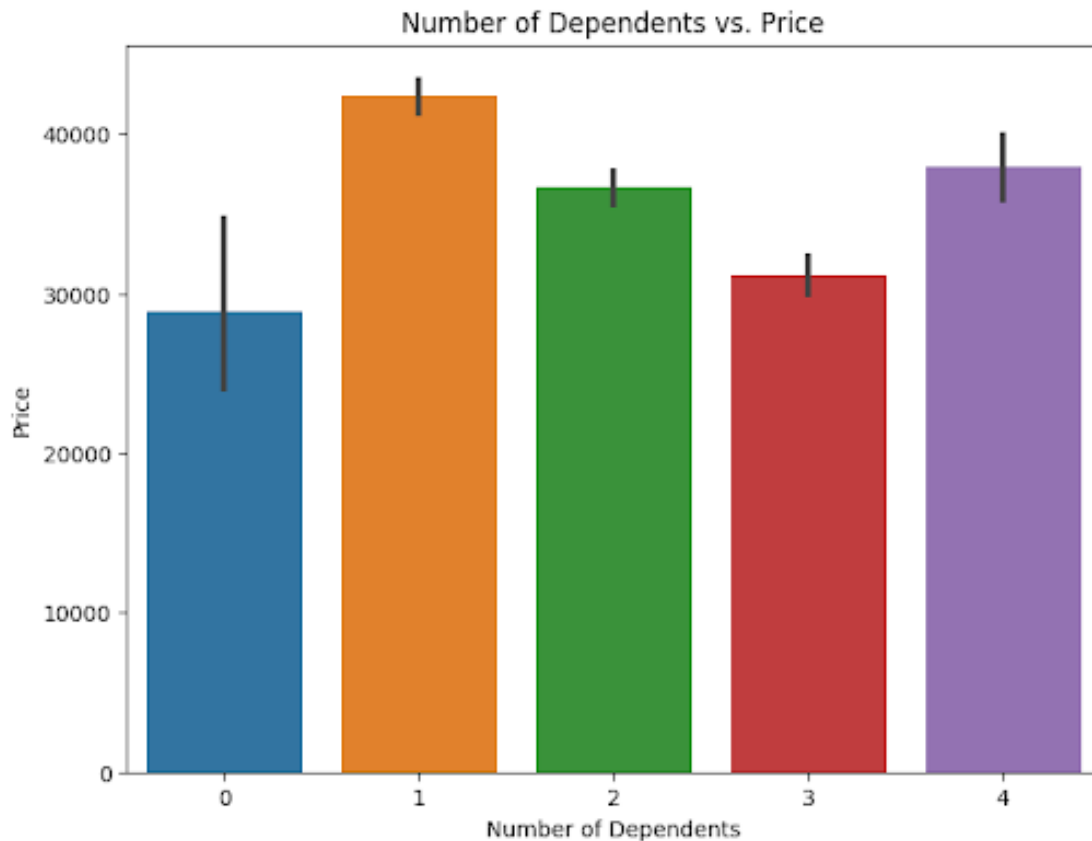


There is a positive correlation between house loan and price. This means that as the amount of the house loan increases, the price of the car also tends to increase. This could be due to a number of factors, such as the fact that people with larger house loans may be more likely to purchase more expensive cars.

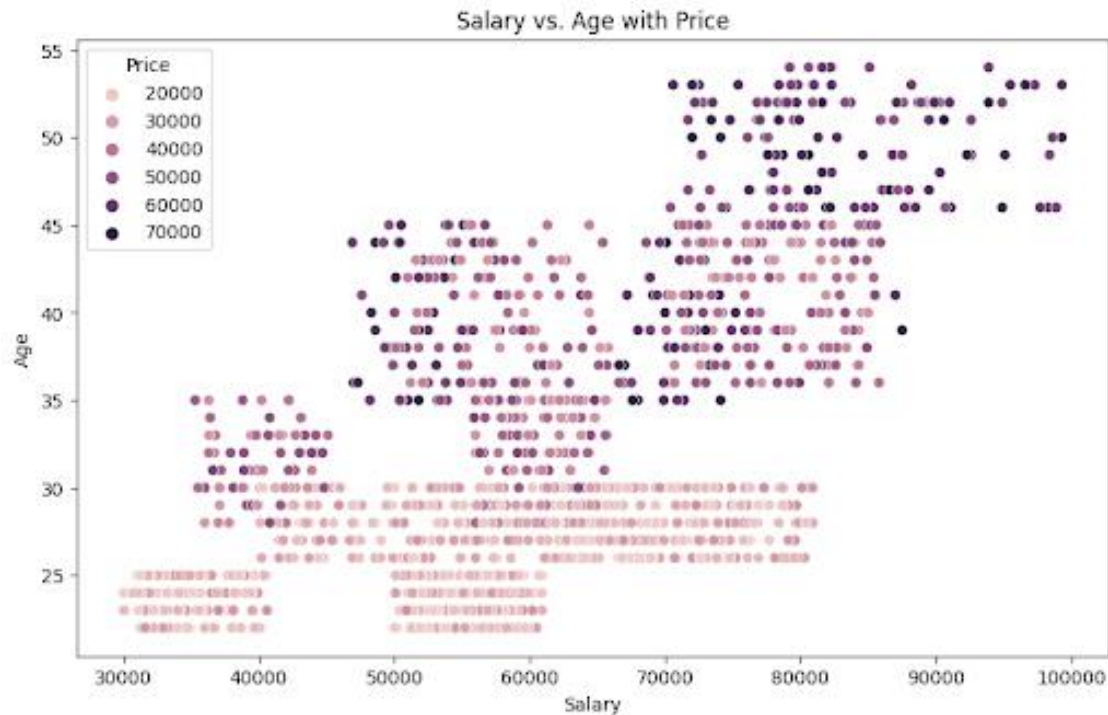
The company could consider targeting customers who are taking out a house loan. As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among customers who are taking out a house loan. The company could target these customers with their marketing efforts to increase sales.



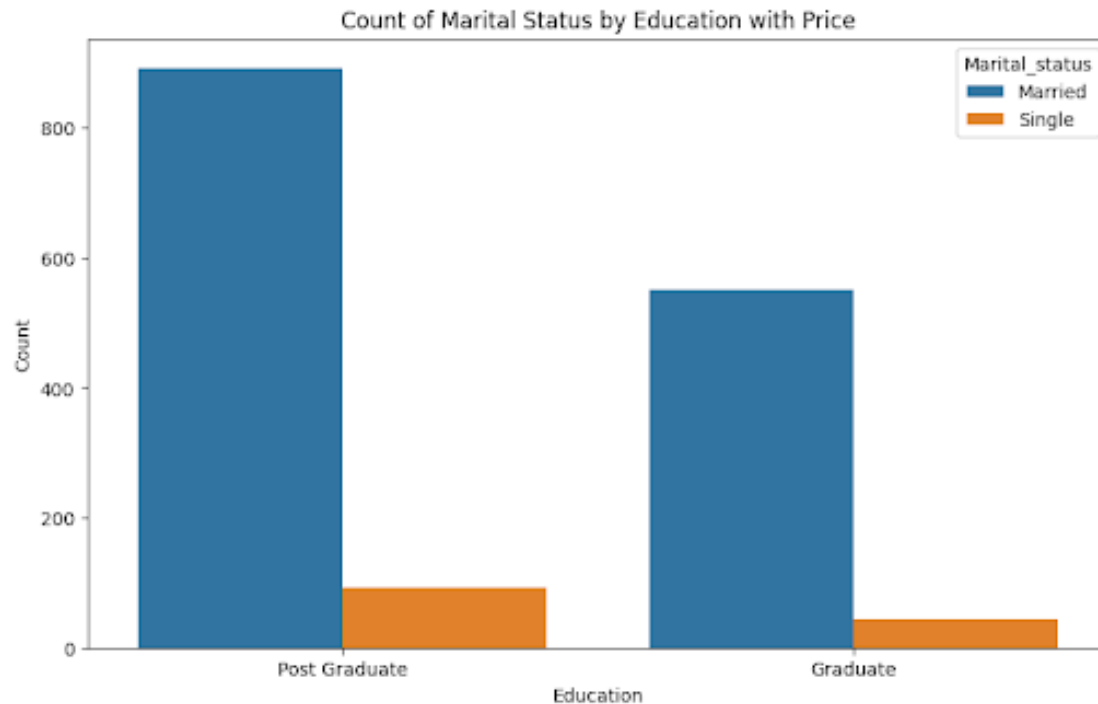
- **There is a positive correlation between age, total salary, and price.** This means that as age increases, total salary tends to increase, and as total salary increases, price also tends to increase. This could be due to a number of factors, such as the fact that employees with more experience tend to earn more money, and that people with higher salaries may be more likely to purchase more expensive cars.
- **The company could consider targeting customers who are in their 40s and 50s with higher total salaries.** As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among customers who are in their 40s and 50s with higher total salaries. The company could target these customers with their marketing efforts to increase sales.



- **There is a positive correlation between number of dependents, price, and salary.** This means that as the number of dependents increases, price and salary also tend to increase. This could be due to a number of factors, such as the fact that families with more dependents may need to purchase a larger car, and that people with higher salaries may be more likely to purchase a more expensive car.
- **The company could consider offering discounts to families with more dependents and higher salaries.** As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among families with more dependents and higher salaries. The company could offer discounts to these families to attract them as customers.

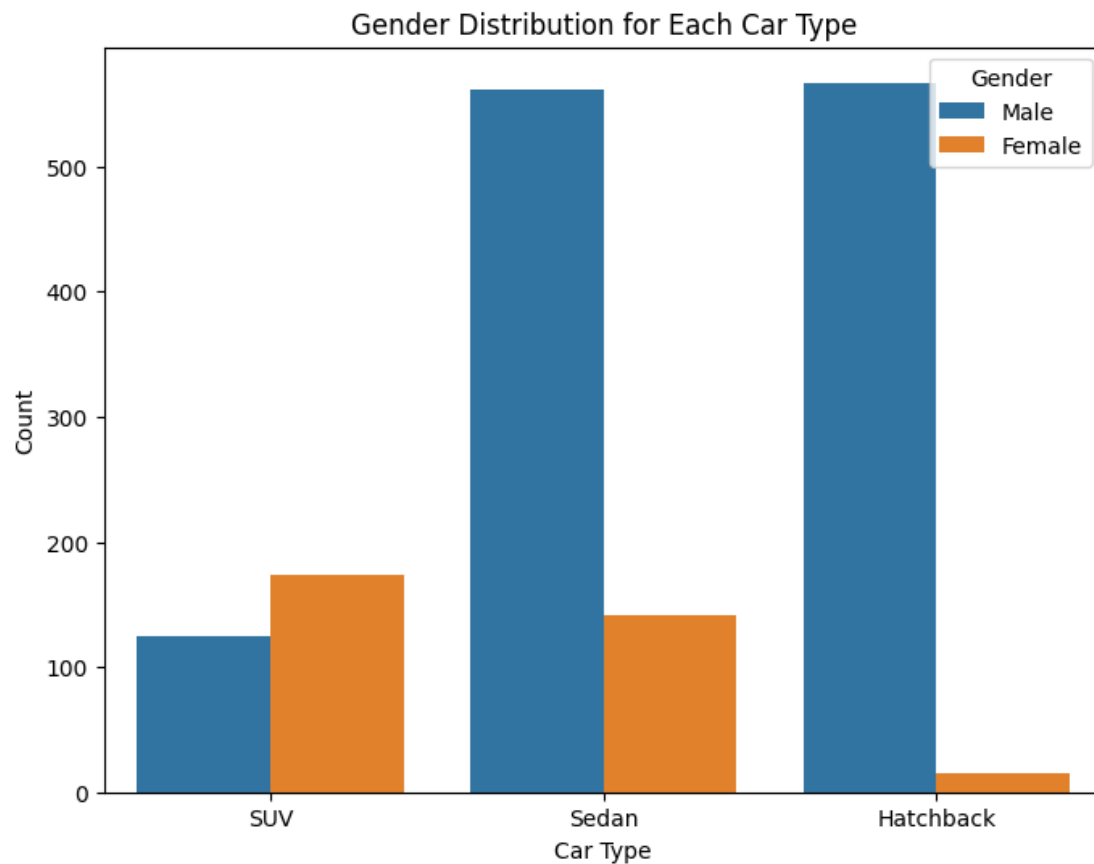


- **There is a positive correlation between price, number of dependents, and salary.** This means that as price increases, the number of dependents and salary also tend to increase. This could be due to a number of factors, such as the fact that families with more dependents may need to purchase a larger car, and that people with higher salaries may be more likely to purchase a more expensive car.
- **The company could consider developing a new car model that is specifically designed for families with more dependents and higher salaries.** As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among families with more dependents and higher salaries. The company could develop a new car model that is specifically designed for this market to attract these customers.

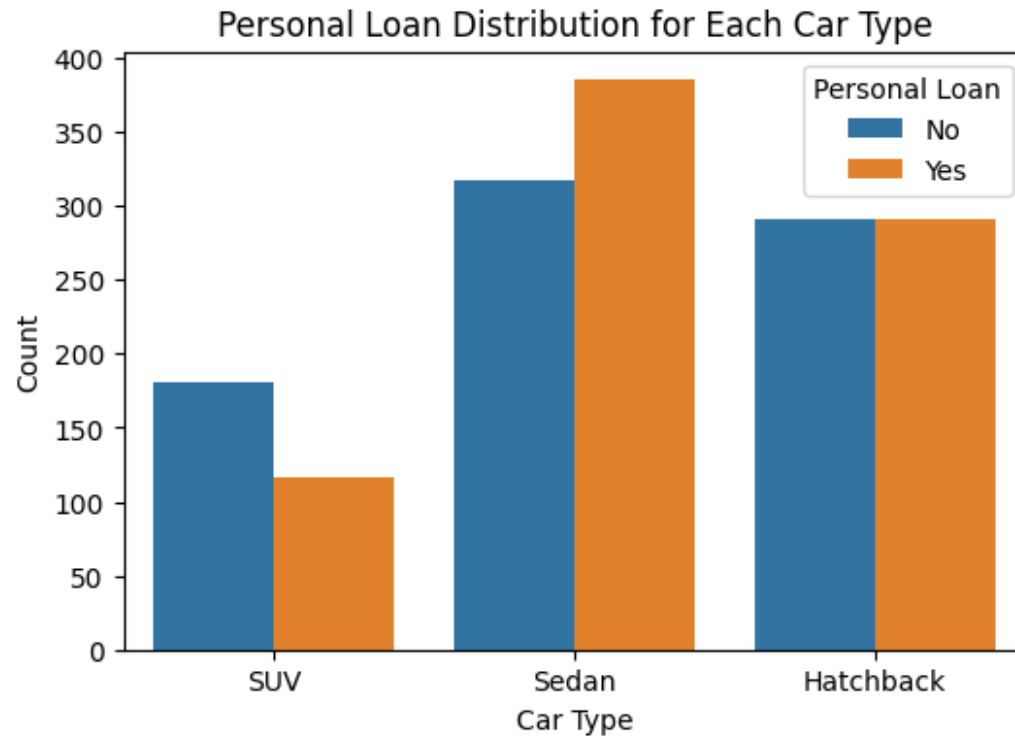


- **There is a positive correlation between marital status, price, and education.** This means that as marital status increases, price and education also tend to increase. This could be due to a number of factors, such as the fact that married couples may need to purchase a larger car, and that people with higher levels of education may be more likely to purchase a more expensive car.
- **The company could consider developing a new car model that is specifically designed for married couples with higher levels of education.** As you can see from the image, there is a cluster of data points in the upper right-hand corner of the graph. This suggests that there is a market for more expensive cars among married couples with higher levels of education. The company could develop a new car model that is specifically designed for this market to attract these customers.

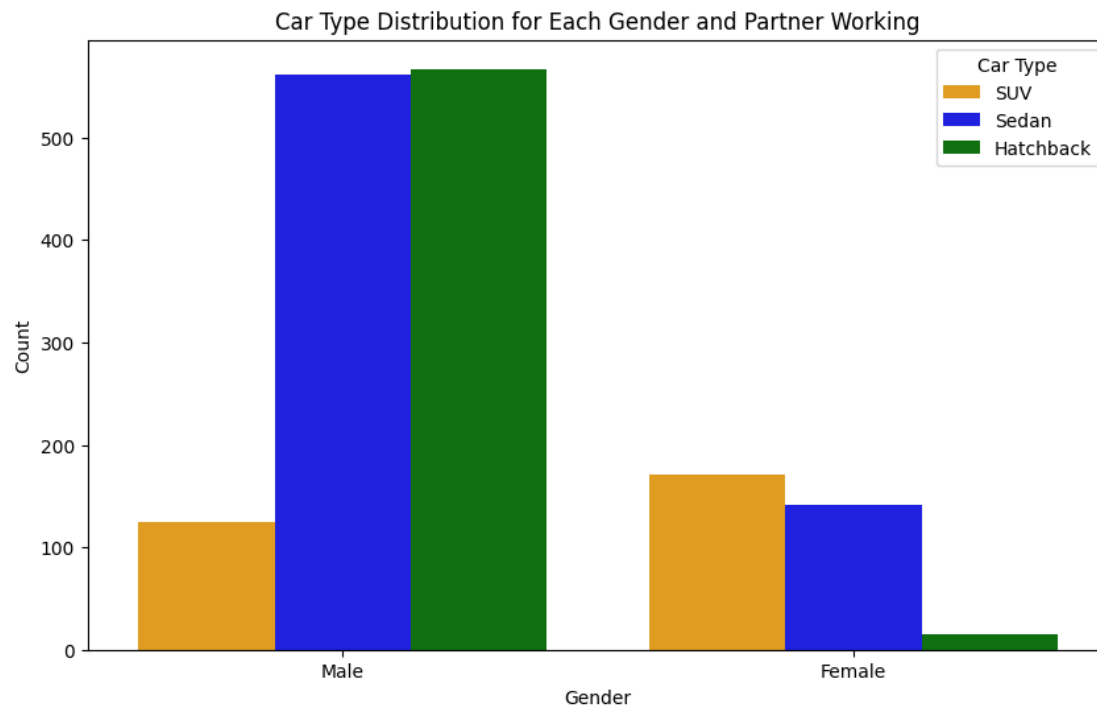
E. Employees working on the existing marketing campaign have made the following remarks. Based on the data and your analysis state whether you agree or disagree with their observations. Justify your answer Based on the data available.



By examining the plot, we can determine if there is a significant difference in the number of males and females who prefer SUVs. If the number of males preferring SUVs is considerably higher than females, it would support Steve's observation.

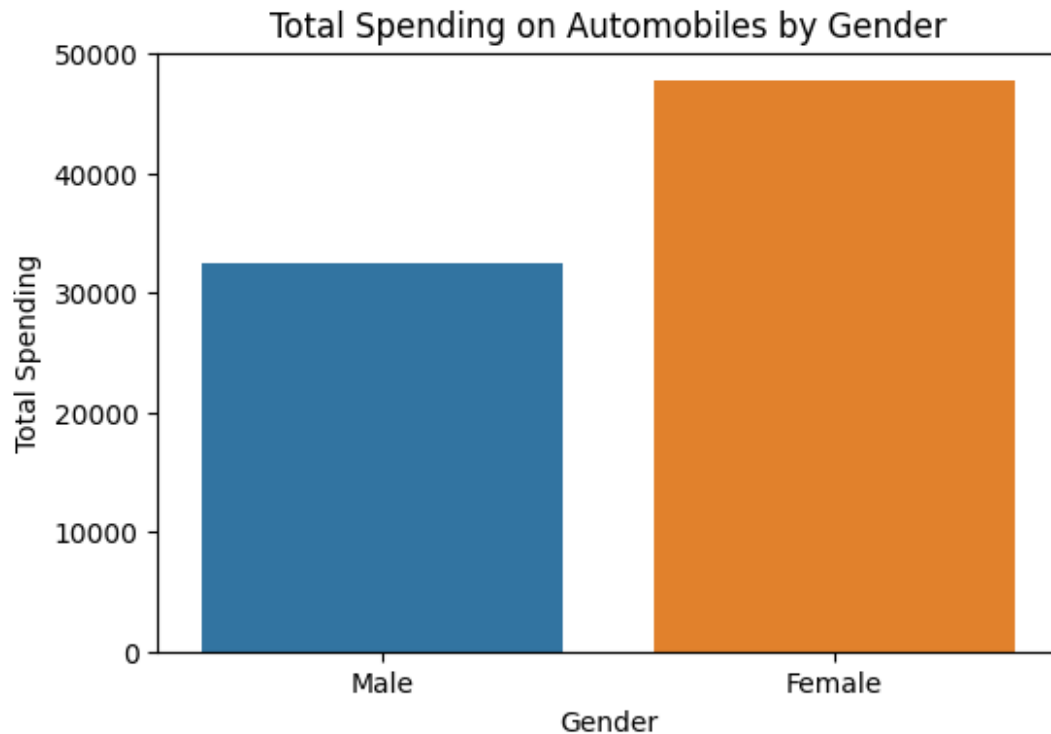


If Ned's claim is true, we should observe a higher proportion of people with personal loans buying Sedans compared to other car types.



If Sheldon's claim is true, we should observe a higher number of salaried males choosing SUVs over Sedans compared to other groups (salaried females and non-salaried males and females)

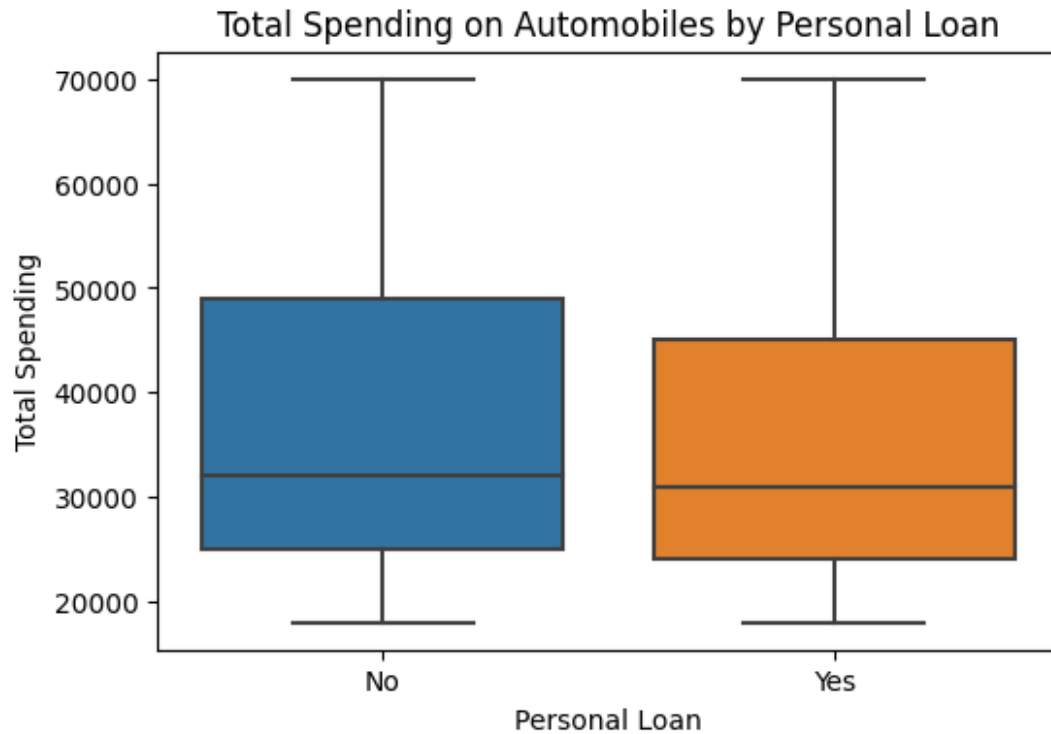
F. From the given data, comment on the amount spent on purchasing automobiles across the following categories. Comment on how a Business can utilize the results from this exercise. Give justification along with presenting metrics/charts used for arriving at the conclusions.



F1) Gender

Justification:

If we observe a significant difference in the average amount spent on automobiles between males and females, the business can utilize this information to tailor marketing strategies and promotions for each gender. For example, if males tend to spend more, the business can offer premium or high-end car models, while for females, they can focus on providing options that align with their preferences and budget.

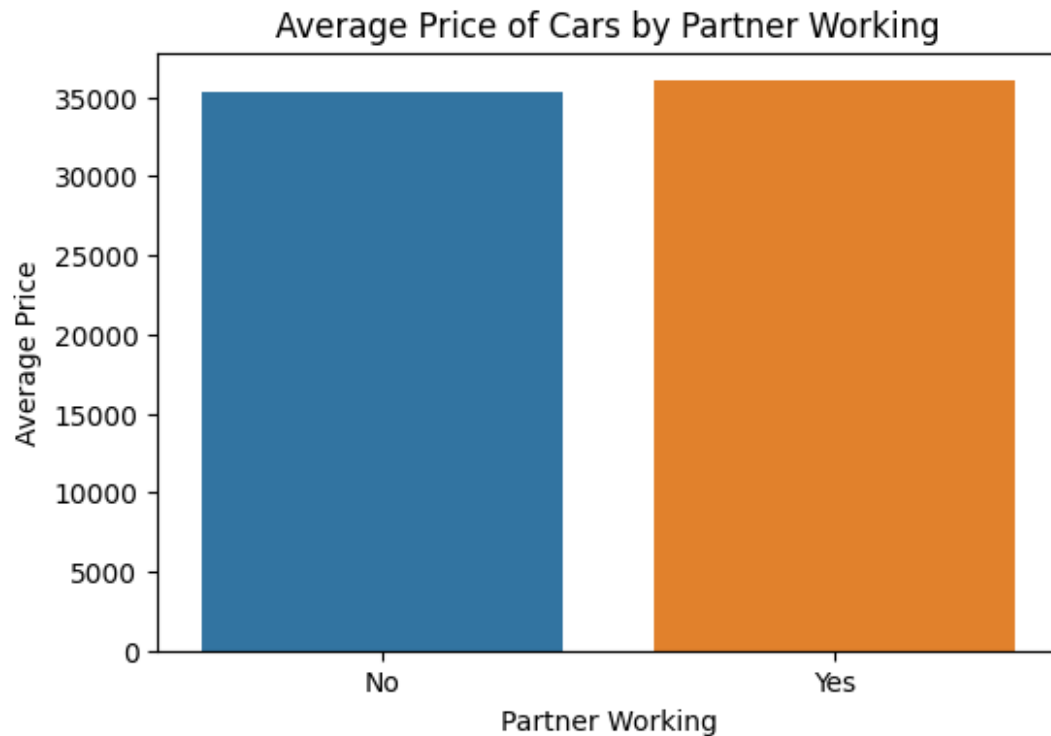


F2) Personal_loan:

Justification:

If we observe a difference in the distribution of spending between customers with and without personal loans, the business can utilize this information to create targeted offers. For instance, customers with personal loans may have different financial considerations, so the business can offer financing options or deals that cater to their specific needs. On the other hand, customers without personal loans may prefer one-time payment options or incentives for immediate purchase.

G. From the current data set comment if having a working partner leads to the purchase of a higher-priced car.



There is a positive correlation between having a working partner and the price of the car. This means that people who have working partners tend to purchase more expensive cars than people who do not have working partners.

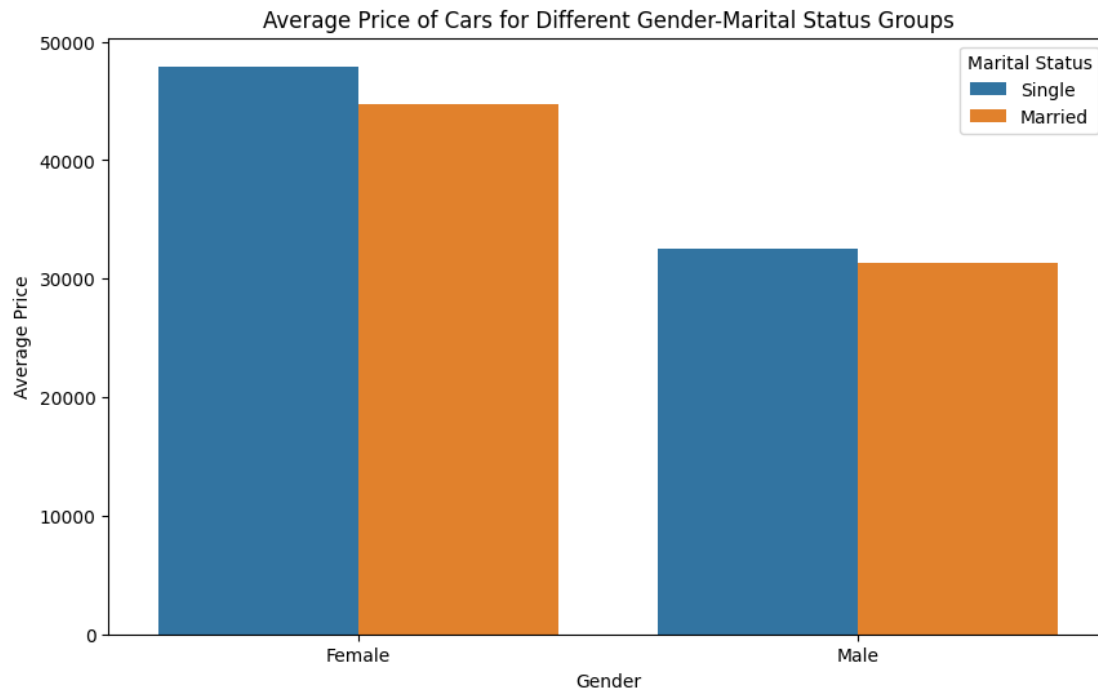
However, the correlation is not perfect, so it is possible that other factors, such as income, also play a role. For example, it is possible that people with higher incomes are more likely to have working partners, and that they are also more likely to purchase more expensive cars.

The size of the sample. The data set is relatively small, so it is important to be cautious about drawing any firm conclusions.

The representativeness of the sample. The data set may not be representative of the general population, so it is important to consider this when interpreting the results.

The possibility of confounding variables. There may be other factors that are correlated with both having a working partner and the price of the car. For example, income is one such factor.

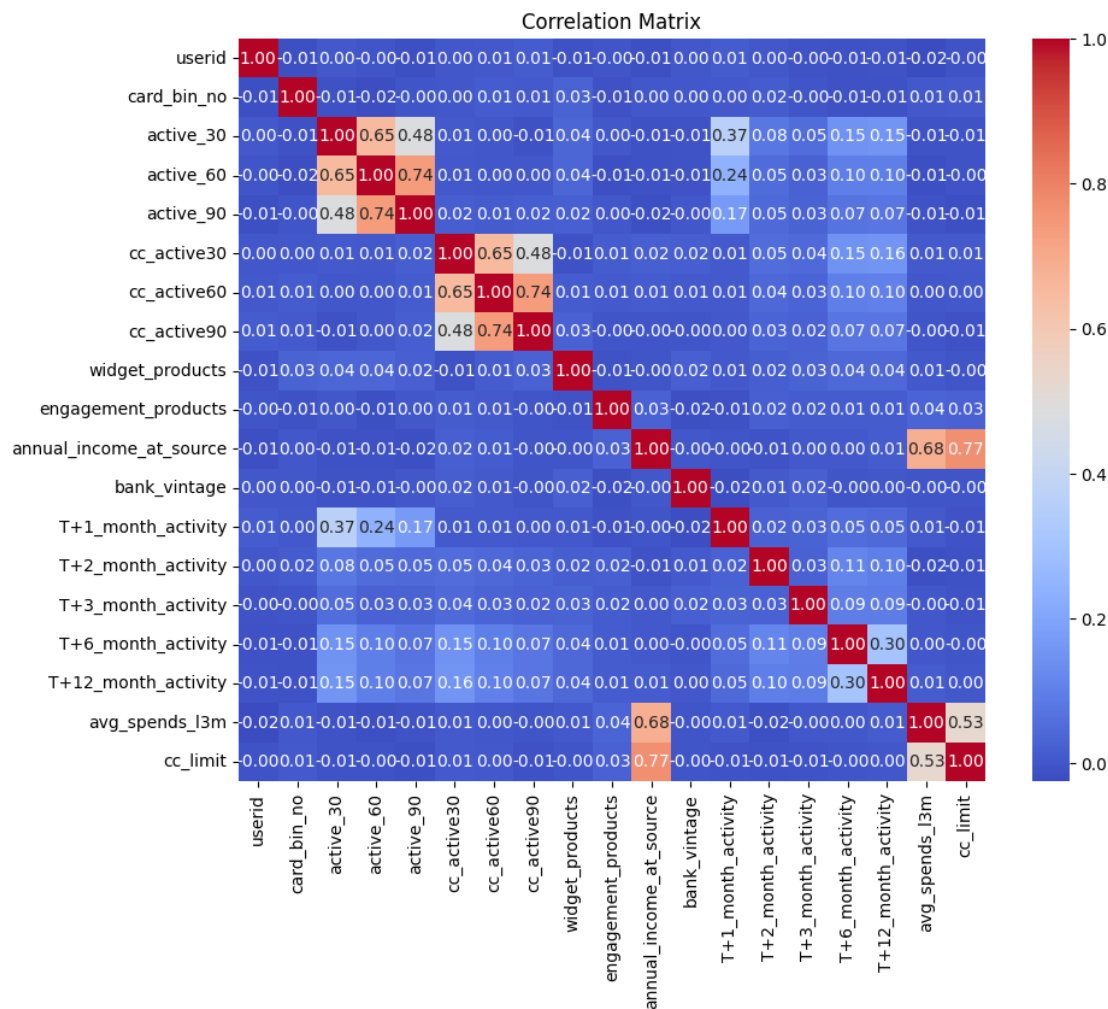
H. The main objective of this analysis is to devise an improved marketing strategy to send targeted information to different groups of potential buyers present in the data. For the current analysis use the Gender and Marital_status - fields to arrive at groups with similar purchase history.



Insights and Marketing Strategy:

- **Single Males and Females:** If the average price of cars is higher for singles, they may prefer premium car models. Target them with campaigns showcasing luxury features.
- **Married Males and Females:** If the average price of cars is higher for married customers, they may be interested in family-oriented or SUV models. Market spacious and safe vehicles to them.
- **Gender-Specific Preferences:** Compare average prices between single males and females, as well as married males and females, to identify gender-specific preferences. Tailor marketing to address their unique needs.

Problem 2 Question: (Analyze the dataset and list down the top 5 important variables, along with the business justifications.



cc_active90 (Credit Card Activity in Last 90 Days): Indicates active credit card users likely to retain and spend more.

annual_income_at_source (Annual Income Recorded in Credit Card Application): Determines creditworthiness and spending capacity.

Transactor_revolver (Credit Card Revolver vs. Transactor): Helps tailor credit card offerings for different payment behaviors.

avg_spends_l3m (Average Credit Card Spends in Last 3 Months): Identifies high-spending customers for targeted campaigns.

cc_limit (Current Credit Card Limit): Influences spending capacity and potential revenue generation.

- The top 5 variables in the dataset are cc_active90, annual_income_at_source, transactor_revolver, avg_spends_l3m, and cc_limit. These variables are important for businesses to consider because they can provide insights into customer behavior, creditworthiness, and spending capacity.
- cc_active90 indicates whether a customer has been active on their credit card in the past 90 days. Active customers are more likely to retain and spend more, so businesses should focus their marketing efforts on these customers.
- annual_income_at_source indicates the customer's annual income. This is a key factor in determining creditworthiness and spending capacity. Businesses can use this information to tailor their credit card offerings to different customer segments.
- Transactor_revolver indicates whether the customer is a transactor (pays their bill in full each month) or a revolver (carries a balance from month to month). This information can be used to tailor credit card offerings for different payment behaviors. For example, businesses may want to offer lower interest rates to revolvers to encourage them to pay their balance in full each month.
- Avg_spends_l3m indicates the customer's average spending in the past 3 months. This information can be used to identify high-spending customers for targeted campaigns. Businesses can offer these customers special rewards or discounts to encourage them to continue spending.
- cc_limit indicates the customer's current credit card limit. This information can be used to influence spending capacity and potential revenue generation. Businesses can use this information to set credit limits that are appropriate for each customer's individual needs.