AUSTO MOTOR

BUSINESS REPORT

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PGP-DSBA (PGPDSBA.O.JULY24.A)

Contents

List of Figures:-

List of Tables

1. Introduction

Background:-

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.

Objective:-

They want to analyze the data to get a fair idea about the demand of customers which will help them in enhancing their customer experience. Suppose you are a Data Scientist at the company and the Data Science team has shared some of the key questions that need to be answered. Perform the data analysis to find answers to these questions that will help the company to improve the business.

Purpose of Report:-

The main purpose of this report to gain more depth analysis of customer data which will hep the company to make market strategies more enhance and in more effective way by targeting particular segment of customers. This report also answered those question raised in board meetings.

2. Understanding data and its structure:-

Overview of data set:-

- **Age**: The Age of customer(in years).
- **Gender**: The gender of customer (Male/Female).
- **Profession**: The profession of individual customer, salaried or businessman.
- **Marital_status**: The marital status of the Customer, such as married &, single
- **Education**: The educational qualification of Customer Graduate and Post Graduate
- **No_of_Dependents**: The number of dependents in each customer household.
- **Personal_loan**: Indicates whether customer avail for personal loan.
- **House_loan**: Indicates whether customer avail for House loan
- **Partner_working**: Indicate whether customer partner working or not.
- **Salary**: The Customer salary or income.
- **Partner_salary**: The salary or income of the customer's partner if working
- **Total_salary**: Combine salary of customer and their partner
- **Price**: The price of a car purchased by customer.
- **Make**: The type of automobile(SUV/Sedan/Hatchback)

Variables Types:

- **Categorical Variables**:

Gender, Profession, Marital_status, Personal_loan, House_loan, Partner_working, Make.

- **Numerical Variables**:-

Age, No_of_Dependents, Salary, Partner_salary, Total_salary, Price.

Initial Observations

- Data type of each columns which contains float, int64, object

Column Name	Non-Null Count	Data Type
Age	1581 non-null	int64
Gender	1528 non-null	object
Profession	1581 non-null	object
Marital_status	1581 non-null	object
Education	1581 non-null	object
No_of_Dependents	1581 non-null	int64
Personal_loan	1581 non-null	object
House_loan	1581 non-null	object
Partner_working	1581 non-null	object
Salary	1581 non-null	int64
Partner_salary	1475 non-null	float64
Total_salary	1581 non-null	int64
Price	1581 non-null	int64
Make	1581 non-null	object

Table 1

- There are 1581 rows and 14 columns in given data set.

- Some missing values also there.

3. Data Preparation and Cleaning

- No duplicate data in given data set

A. Handling Missing values:-

Feature	Missing
Age	0
Gender	53
Profession	0
Marital_status	0
Education	0
No_of_Dependents	0
Personal_loan	0
House_loan	0
Partner_working	0

Salary	0
Partner_salary	106
Total_salary	0
Price	0
Make	0

Table 2

- Gender has 53 null value in its columns were filled using the mode, which is the most frequent value in that column.

- For the Partner Salary column, missing values calculated by

$$\boxed{\text{Partner\_salary = Total\_salary - Salary}}$$

when the Partner_working column is marked as "Yes". If this column mark as "No" there salary will be 0.

B. Data Quality and Inconsistencies

- In gender column, found some inconsistencies where they contain '*Male', 'Femal', 'Female', 'Femle'*. Look like its typo error and that should be named as '*Female*'by using replace.

Statistical Summary:-

Feature	Count	Mean	Std Dev	Min	25%	50%	75%	Max
Age	1581.0	31.922201	8.425978	22.0	25.0	29.0	38.0	54.0
No_of_Dependents	1581.0	2.457938	0.943483	0.0	2.0	2.0	3.0	4.0
Salary	1581.0	60392.220114	14674.825044	30000.0	51900.0	59500.0	71800.0	99300.0
Partner_salary	1581.0	19233.776091	19670.391171	0.0	0.0	25100.0	38100.0	80500.0
Total_salary	1581.0	79625.996205	25545.857768	30000.0	60500.0	78000.0	95900.0	171000.0
Price	1581.0	35597.722960	13633.636545	18000.0	25000.0	31000.0	47000.0	70000.0

Table 3

Insights:-

- The age range of customer between 22 to 54. The average salary is 31.92 where median is 29 suggesting half customer younger than 29 and half older than that.
- Most people have 2 or 3 dependents, maximum goes to 4 dependent in a household.
- Salary stats shown mostly customers have income between 51900 to 71800. The average salary of customer is 60392.
- Average salary of Customer's partner is 19233 and median is 38100. The 25th percentile shown 0 signify that many customer's partner are not working.
- The average total salary of customer is 79625 and high variability in total income range from 30000 to 171000.
- The average price of car is 35597 where lowest price of car is 18000 and highest price of car goes to 70000.

4. Exploratory Data Analysis

1. Univarate Analysis
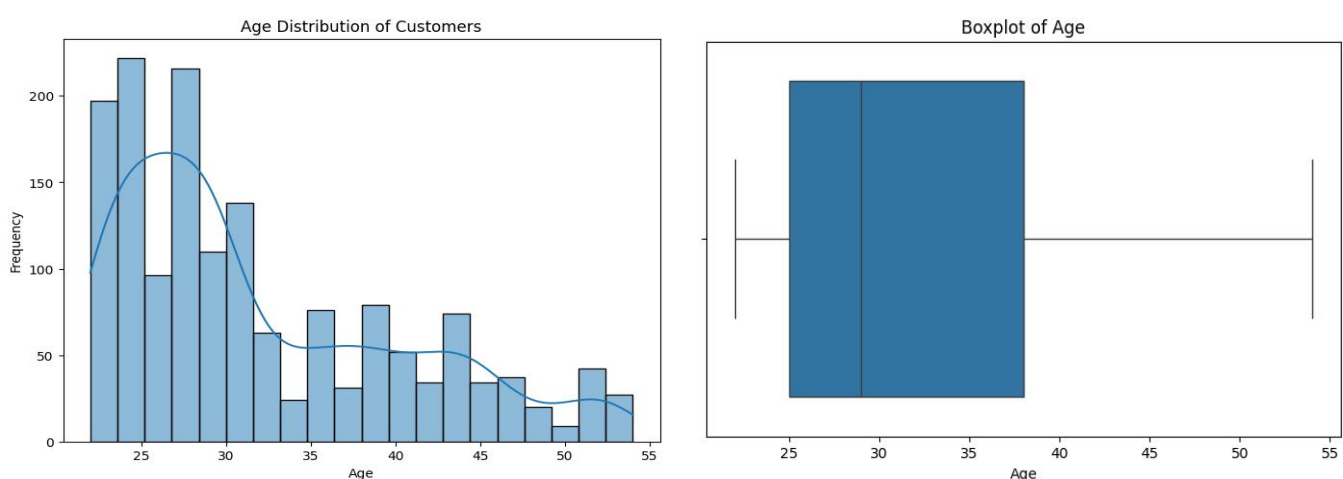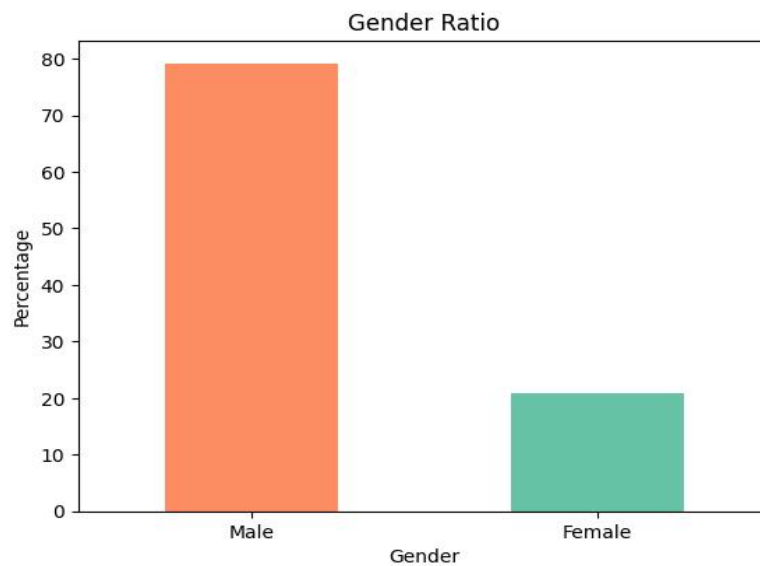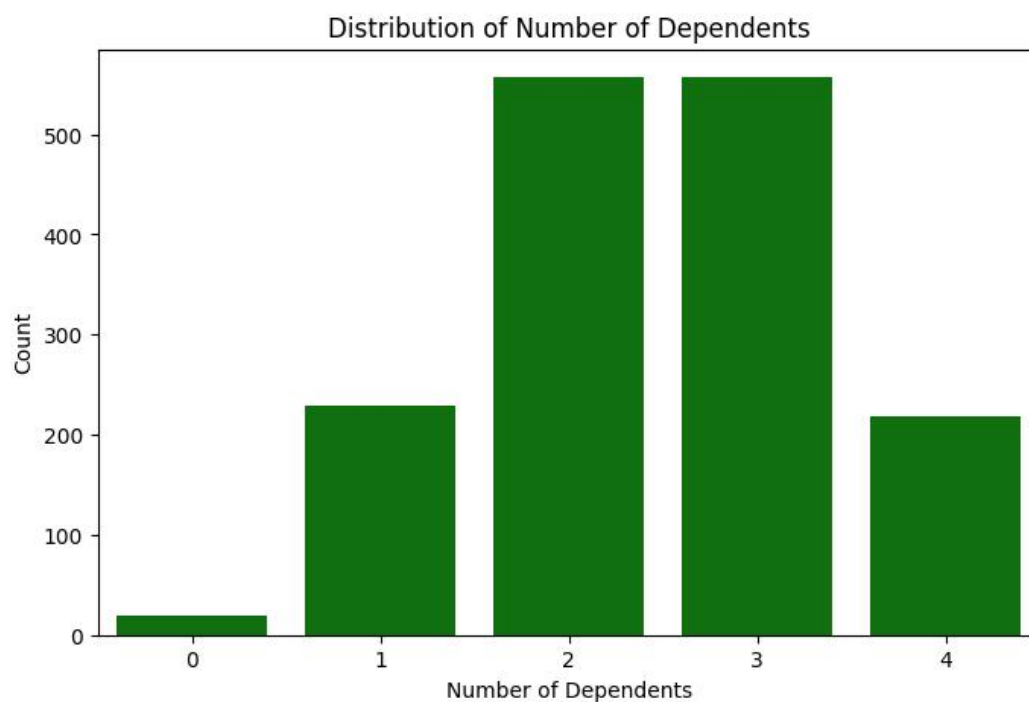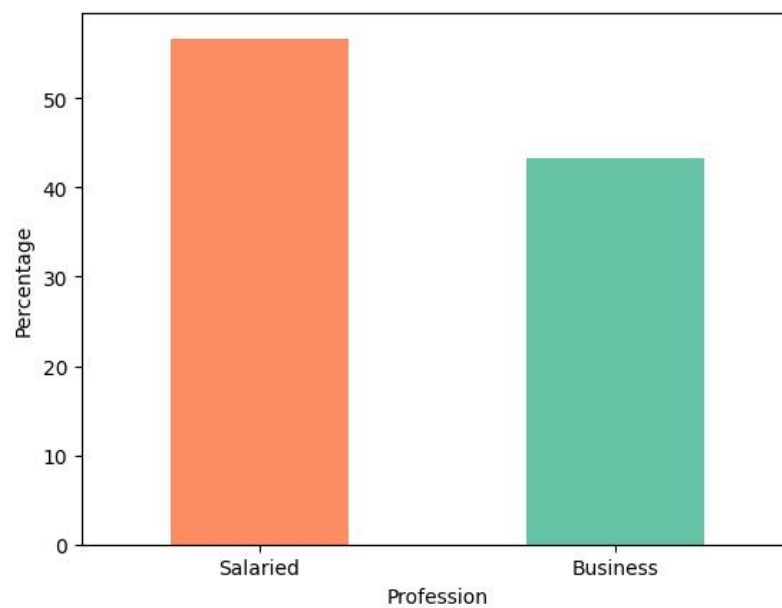
A) Age Distribution:-

Fig-1.1

- 60% customers are concentrated within 22-30 age groups, which can targeted marketing.
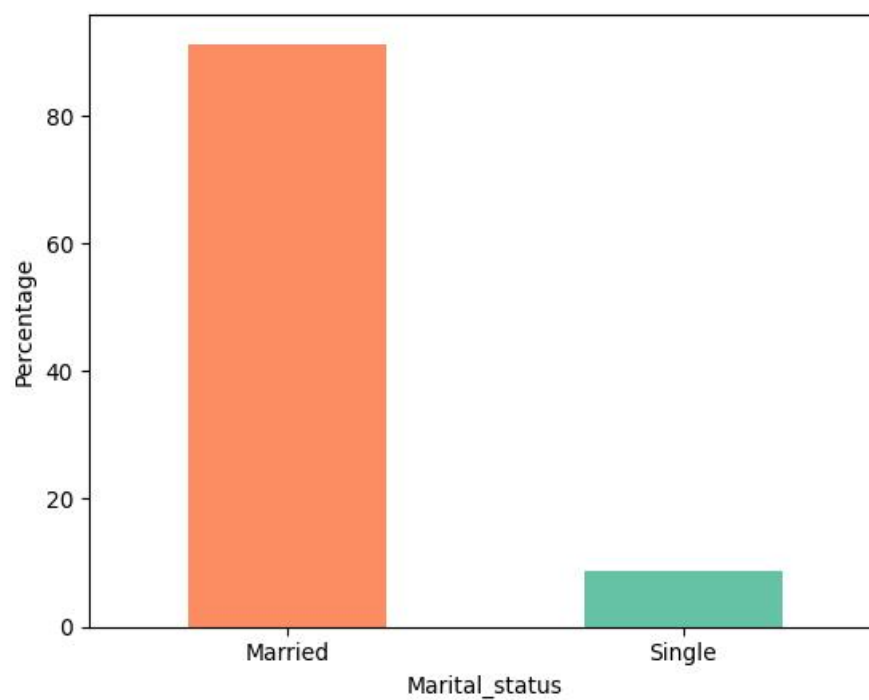
B) Gender ratio:-

Fig-1.2

- There are 78% of male and 22% of female are our customer.

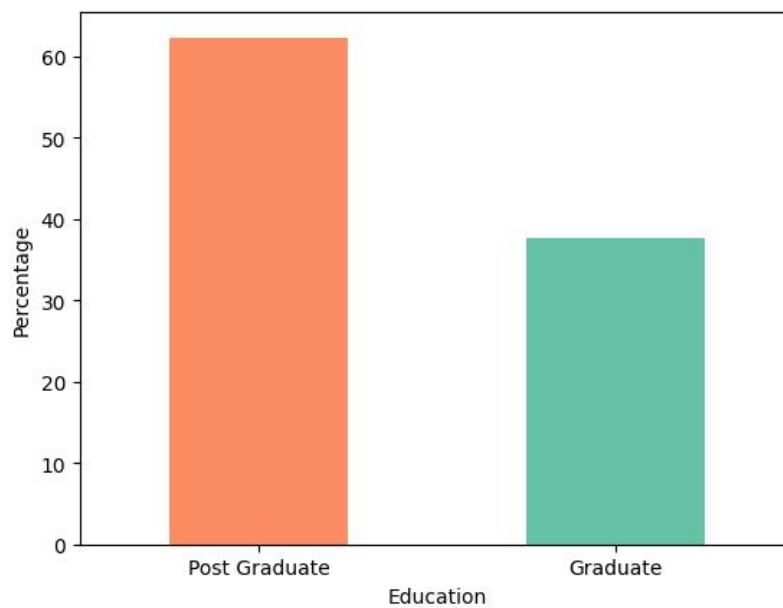## C) Dependents in household:-

Fig-1.3

- Larger group of customers have 2 or 3 dependents in their family i,e children, parents.

D) Profession wise distribution:-
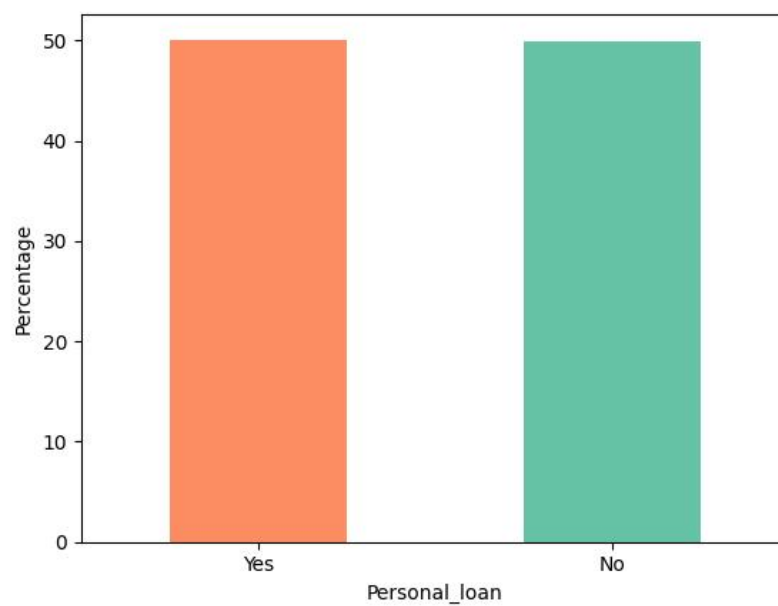

Fig-1.4

- There are 55% of Salaried and 45% of business doing are our customers.

E) Martial Status:-

Fig-1.5

- 85% are married and 15 % are singles in our customer's data.

F) Education Distribution:-

Fig-1.6

- Our 62% customers are post graduate in their qualification and 38% customers are graduate.

G) Personal Loan Distribution:-

Fig-1.7

- 50% of our customer availed or not availed for personal loan.
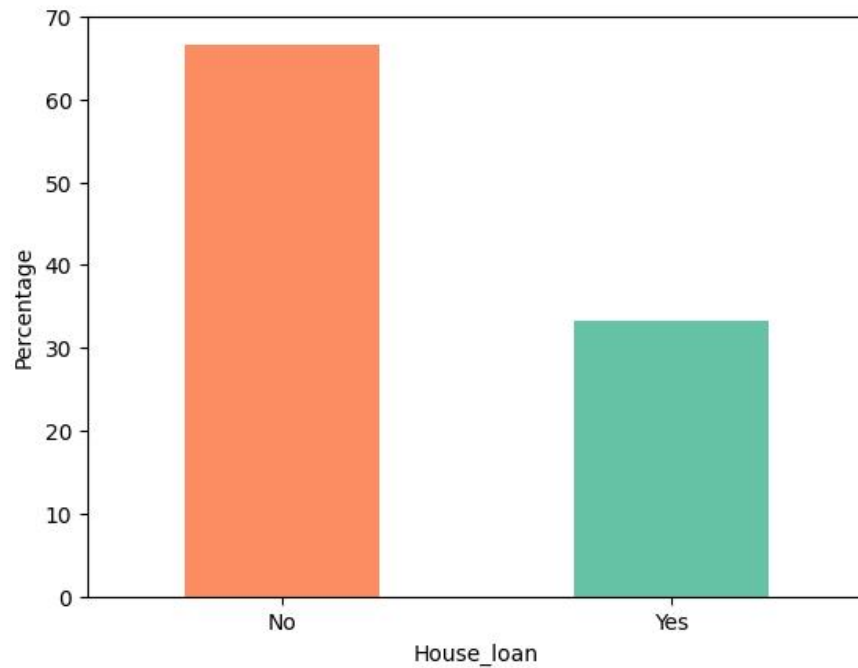
H) House Loan Distribution:-

Fig-1.8

- There are 67% are those customer who availed for House loan.
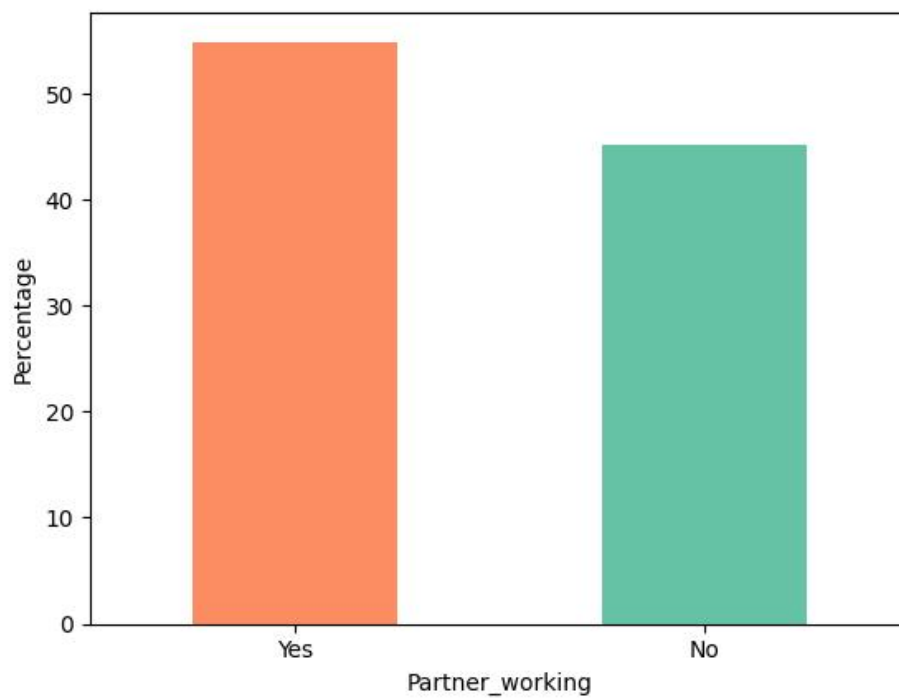
I) Partner Working Status:-

Fig-1.9

- 55% are those customer whose partner are working which help to make them financially strong.
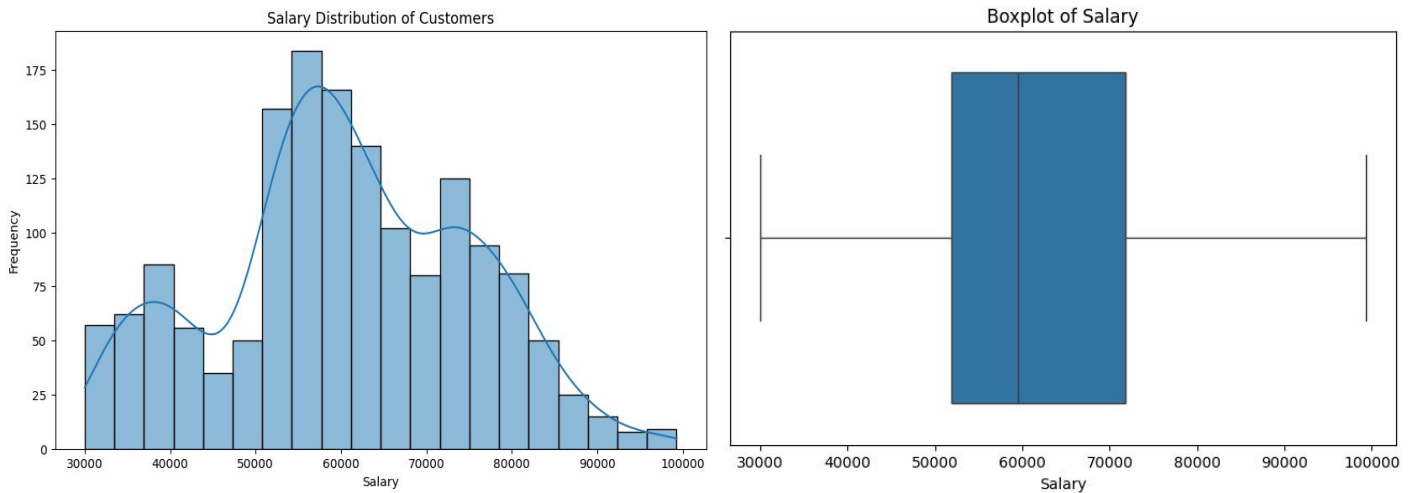
J) Salary Distribution of customer:-

Fig.-1.10

- Customer salary follows bell curve shape (normal distribution) means that most customers earn around the average salary, with fewer earning significantly more or less and there is no outliers.
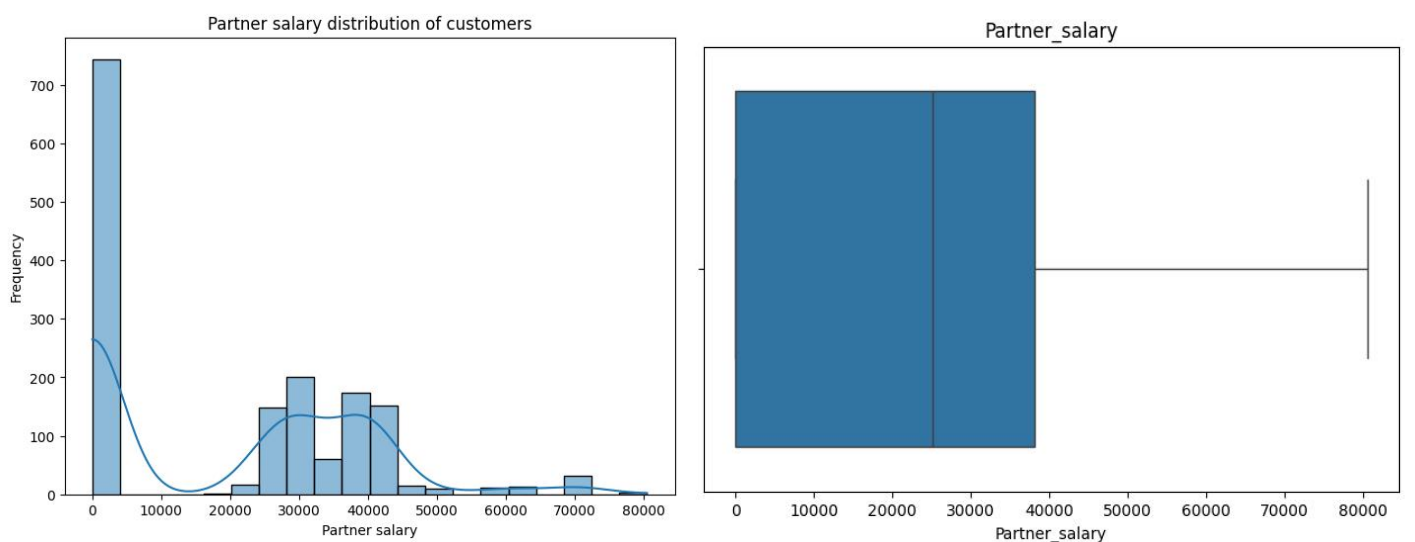
K) Partner Salary Distribution:-

Fig-1.11

- Customer's partner are right skewed due to significant potion of partners are not working.
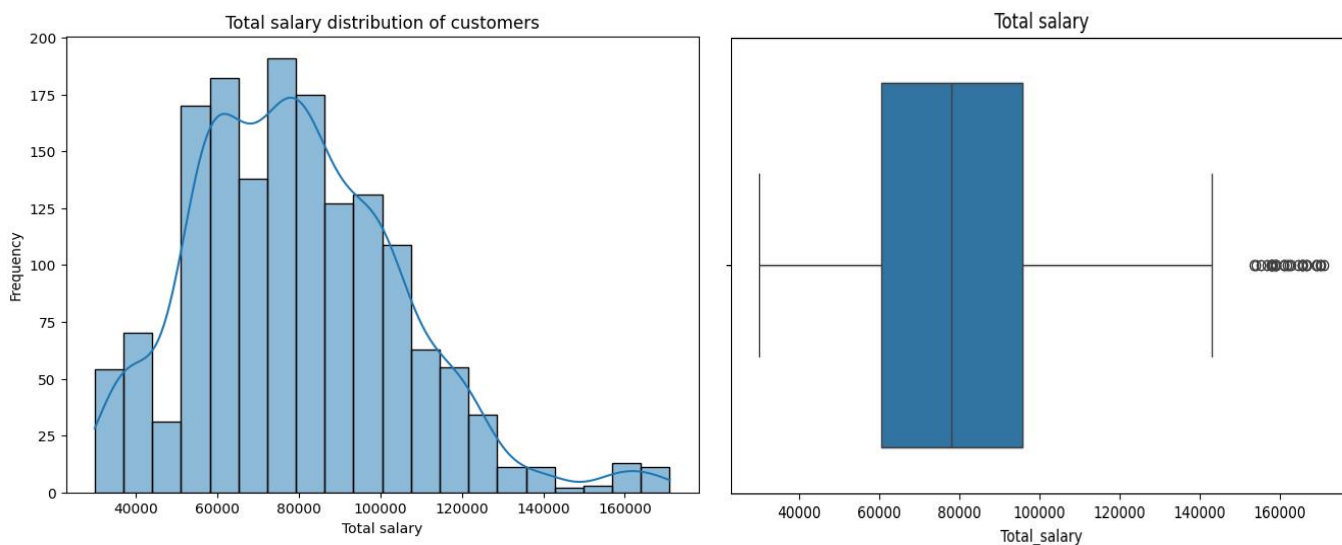
L) Total Salary Distribution:-

Fig-1.12

- Total salary of customers slightly right skewed and there is lots of outliers also.

M) Car Price Distribution:-

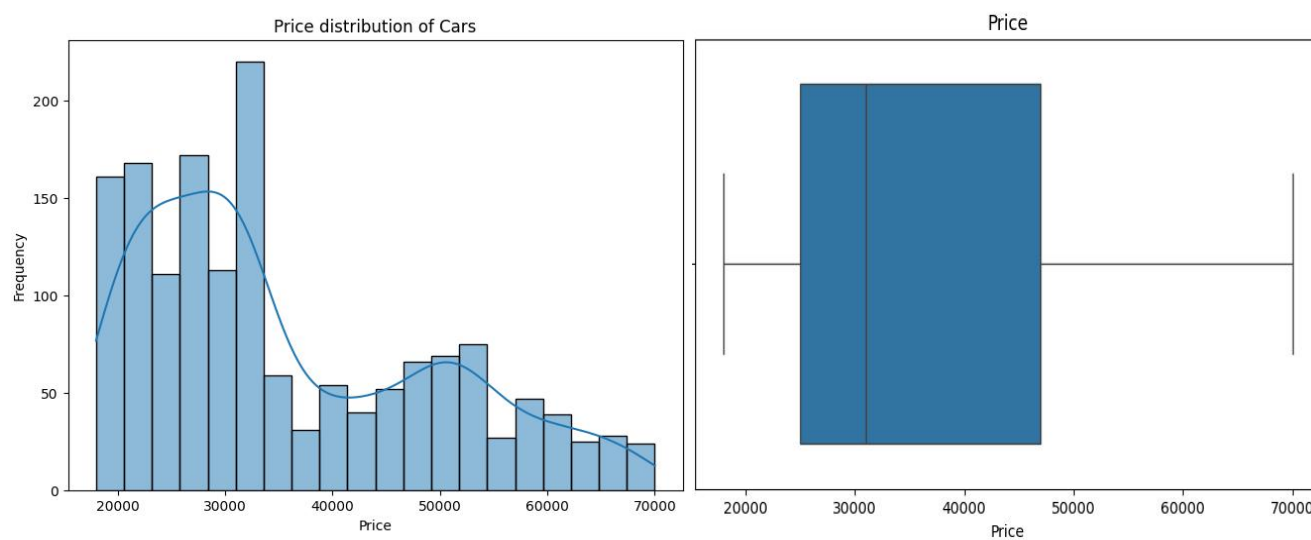
Fig-1.13

- Car prices are also right skewed with no outliers.

N) Car Type Distribution:-

Distribution of Car Makers
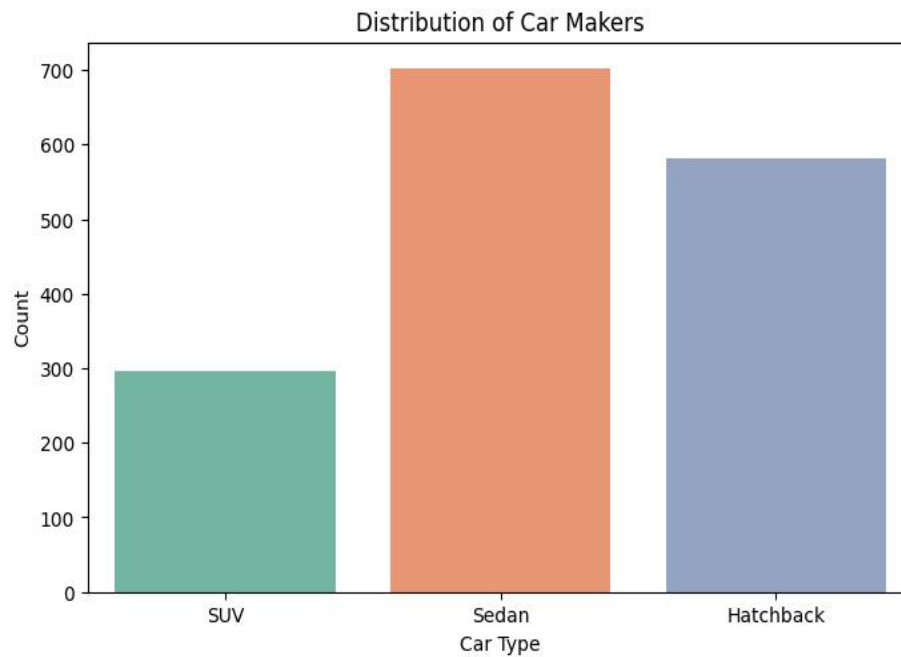
Fig-1.14

- Sedan car are more popular among the customers followed by hatchback and last SUV which least preferred.

2. Bivariate Analysis

A. <u>Relationship between All Numerical Variable</u>:-
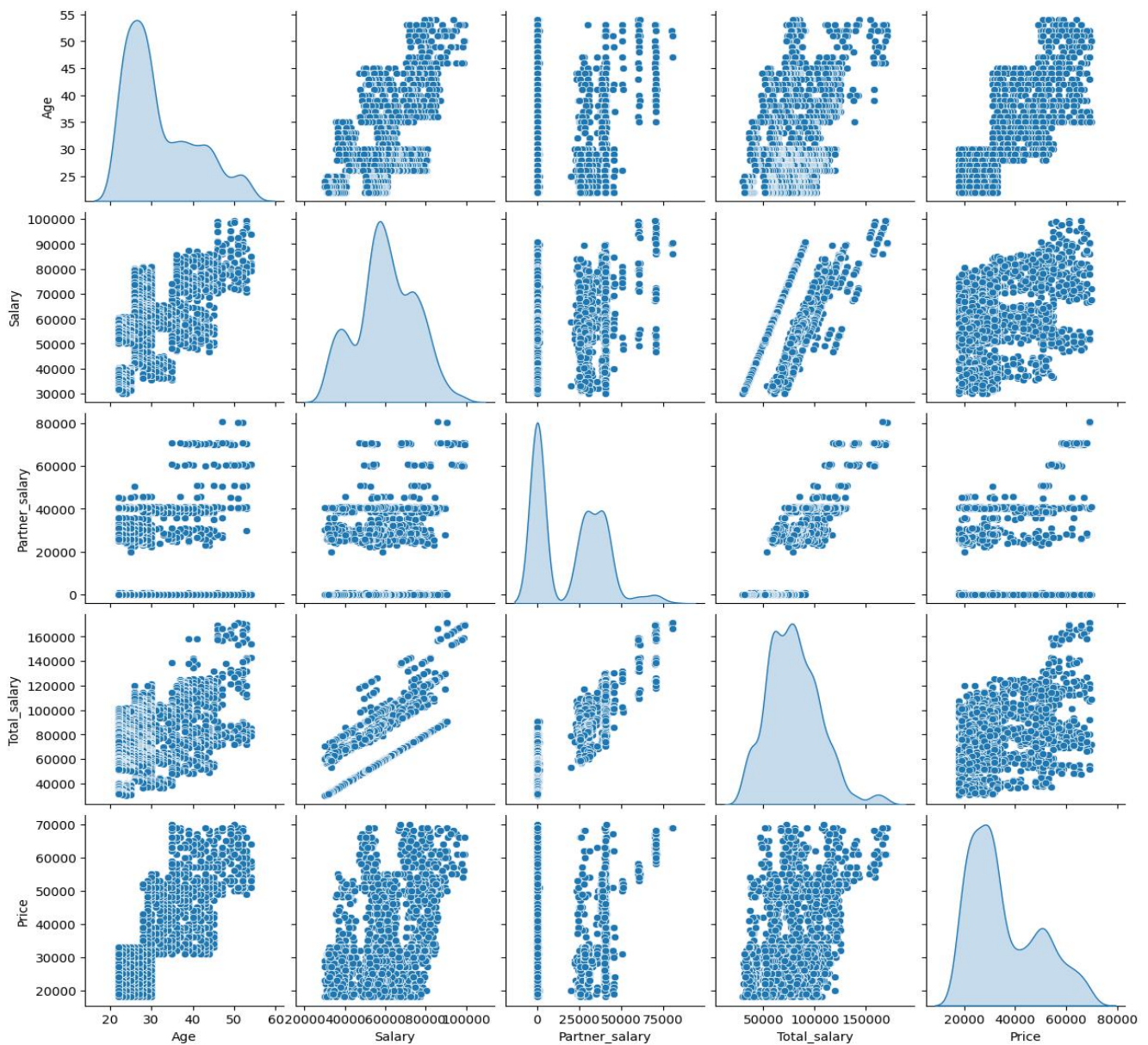
Fig.-2.1

<u>Observations</u>:-

Positive correlation between two variables are:-

- Age and price
- Salary and Total salary
- Age and Salary
- Partner Salary and Total Salary

B. <u>Correlation heatmap between numerical variables</u>
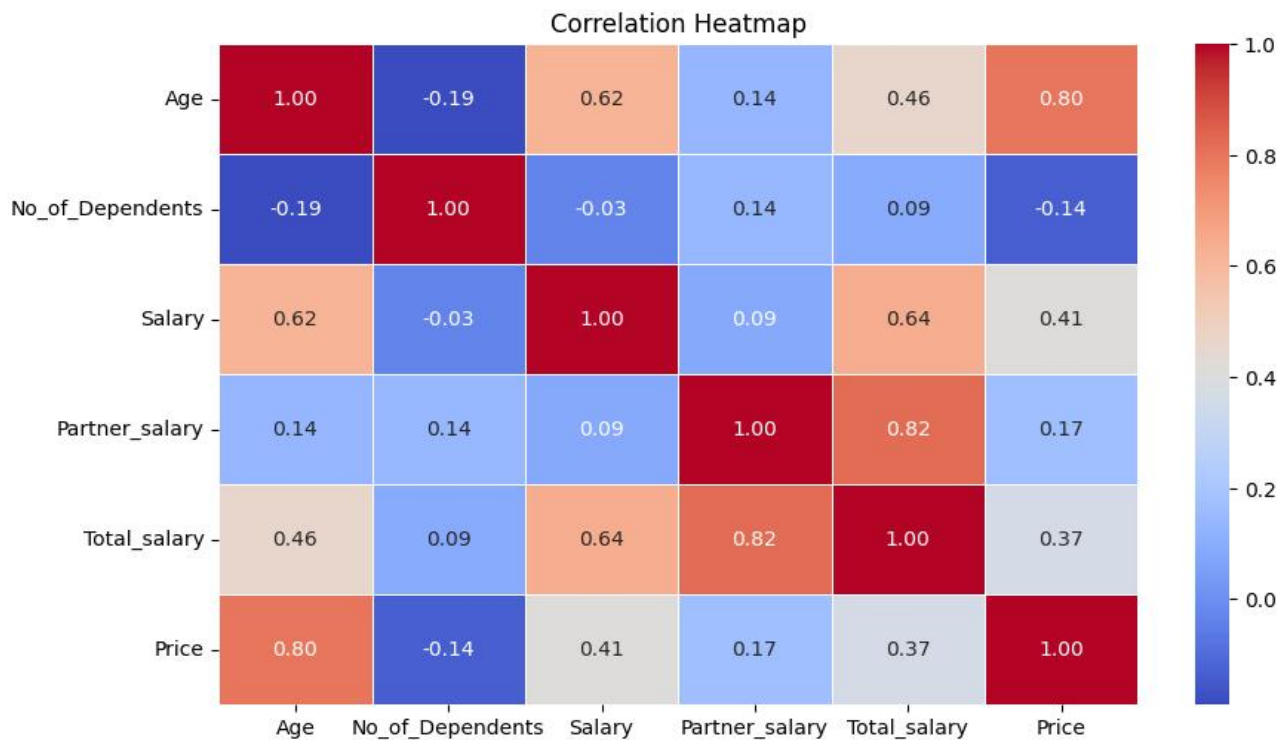

Fig.-2.2

Highly correlation between two variables are

- Partner salary and Total salary
- Age and price
- Age and salary
- Salary and Total Salary

C. <u>Mean Salary different profession</u>

Fig-2.3

- Female customer have salary more than male customer in both profession.

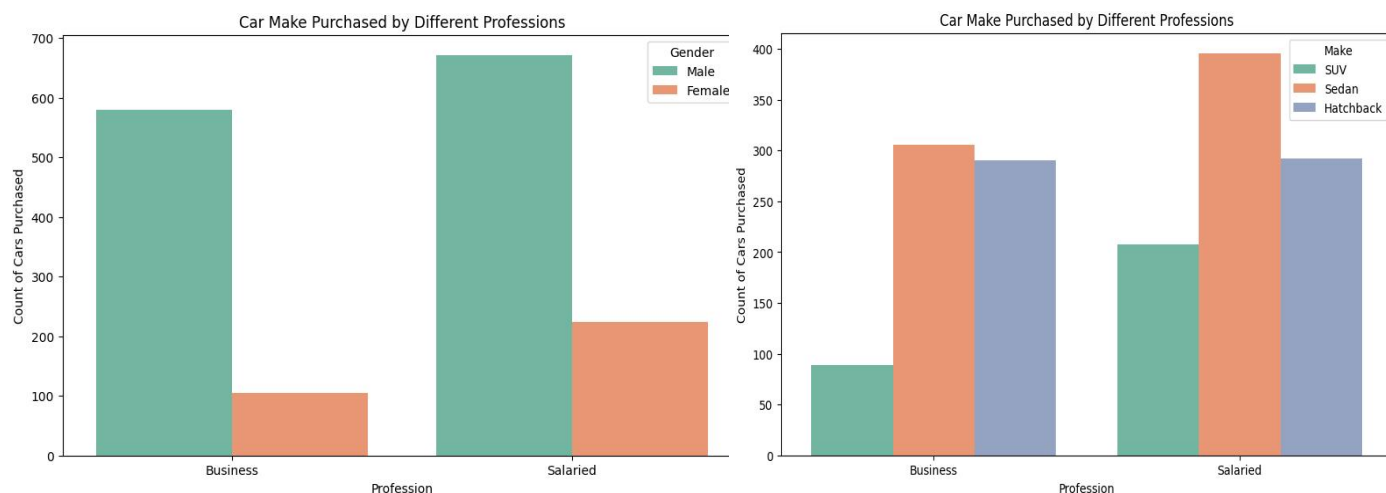## D. Car purchased by different profession

Fig.-2.4

- Male customers are most of our customer in both profession
- Both Salaried and business profession customers prefers sedan followed by hatchback and then SUV.

E. Effect of Loan on Car Purchasing
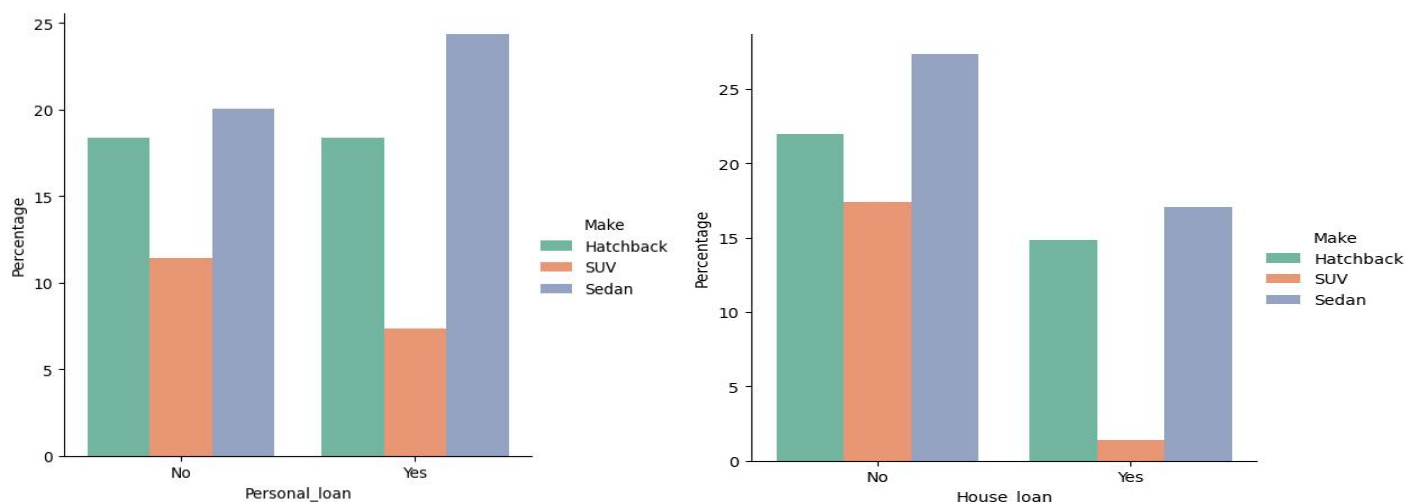
Fig-2.5

- Personal loan not affect that much as compare to house loan effect during purchasing cars.

F. How Education Influences Salary and Gender
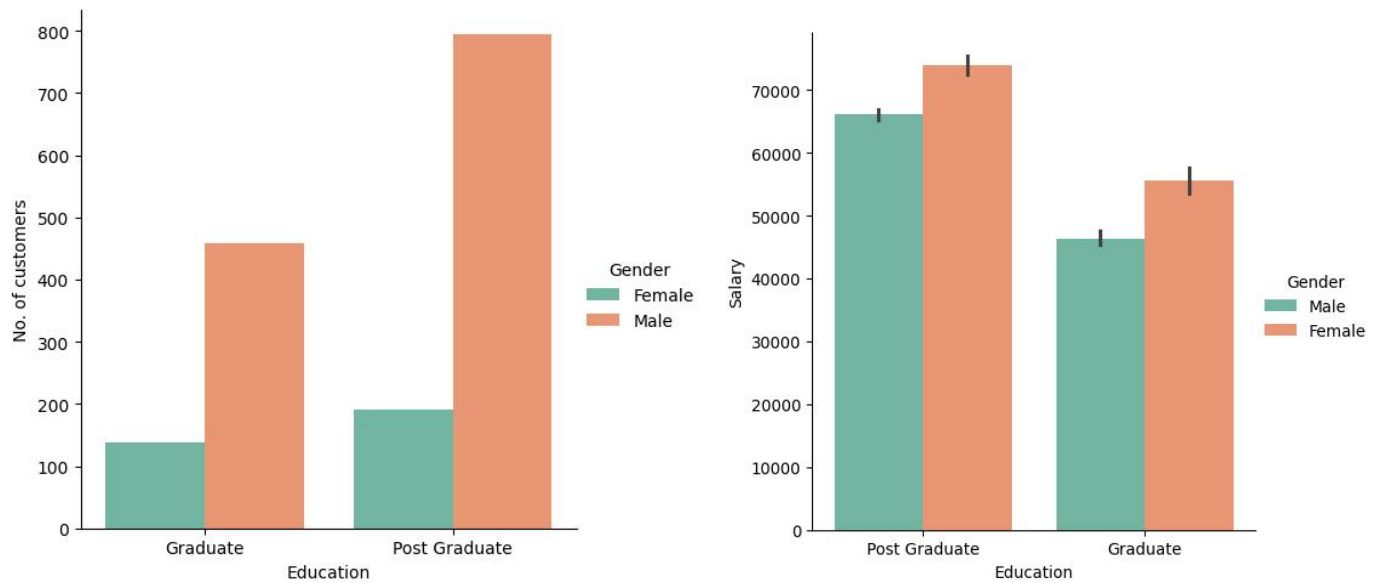
Fig-2.6

- Male Customer are highly postgraduate and graduate in their qualifications.
- Customers are those postgraduate have more salary compare to graduate peoples.

5. Key Questions

A. Do men tend to prefer SUV's more compared to women?
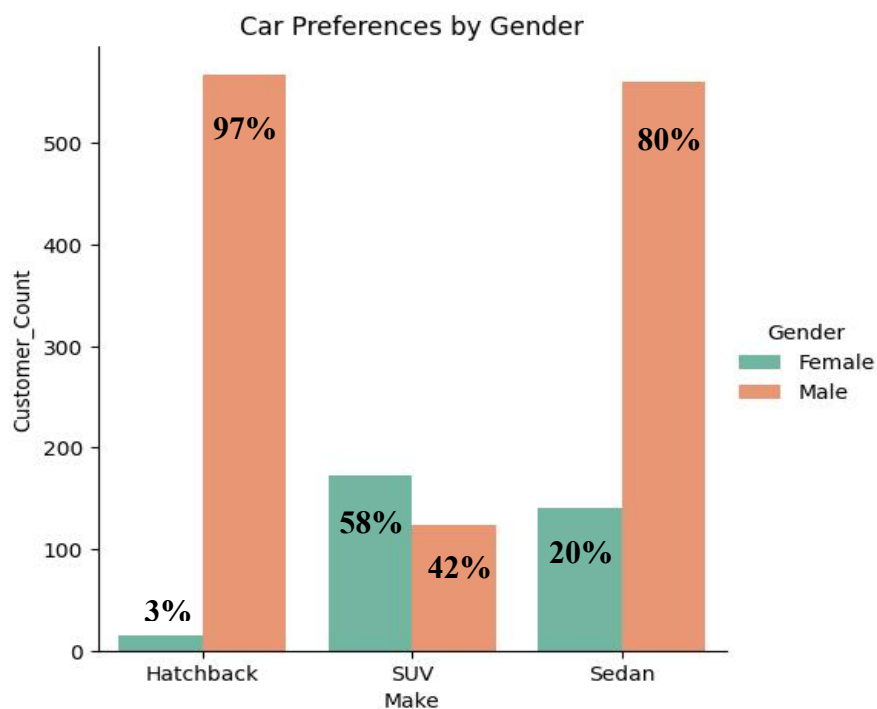
- From above graph, Female Customers are 58% more tend to prefer SUV's

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

Car Types Bought by Salaried Customers
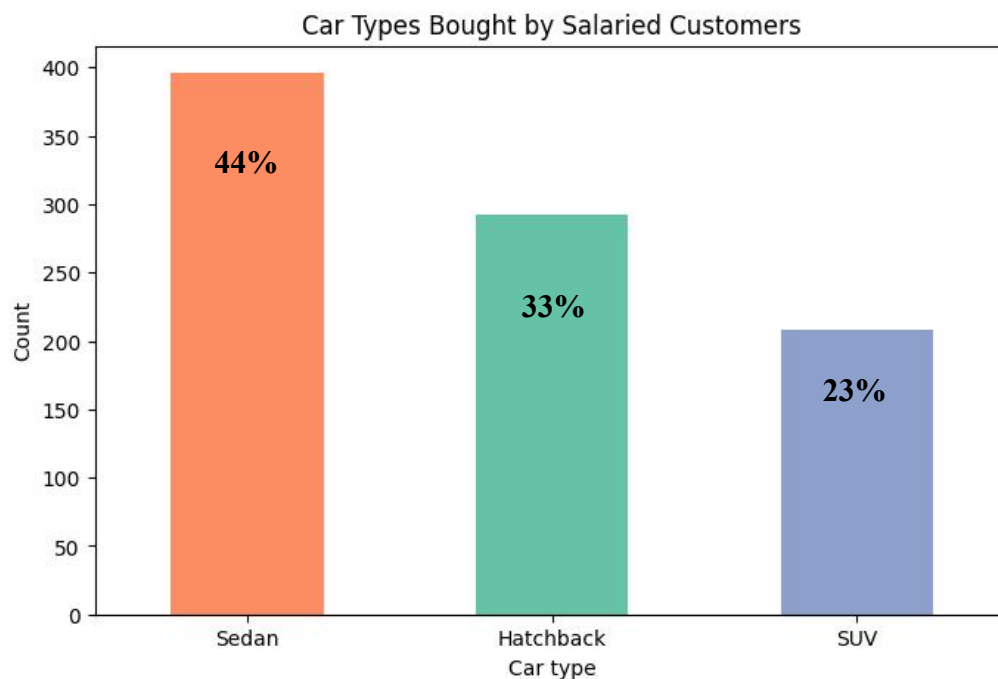
- From above plot, which results salaried person most prefer sedan car.

C. 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?

Car Types Bought by Salaried Males
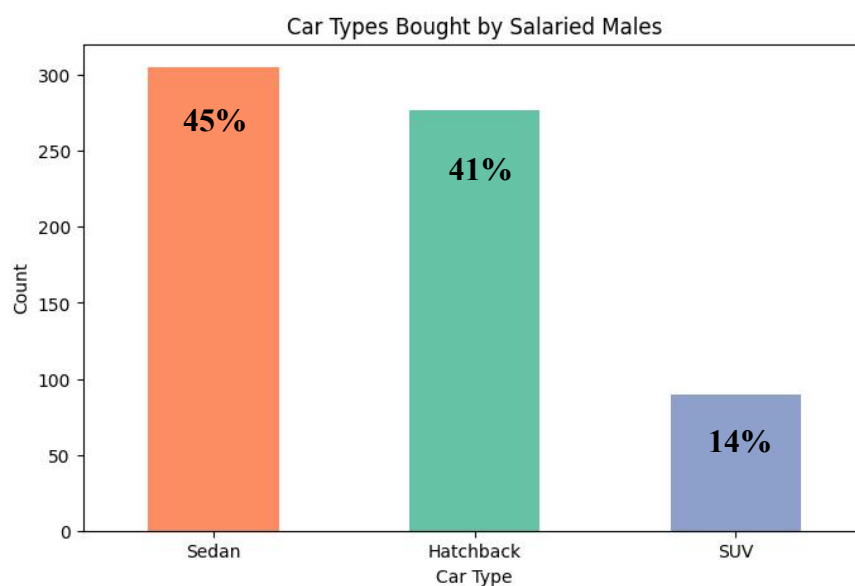
- Salaried male customers mostly prefer sedan over SUV, so statement given by Sheldon cooper's is wrong.

D. How does the the amount spent on purchasing automobiles vary by gender?
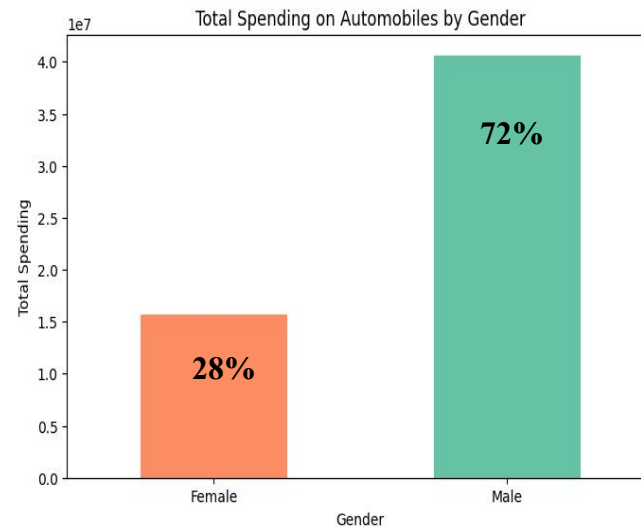
- From given result, male Customer spent 72% more than female customer.

Gender	Price	% of share spent
Male	40585000	72%
Female	15695000	28%

E. How much money was spent on purchasing automobiles by individuals who took a personal loan?
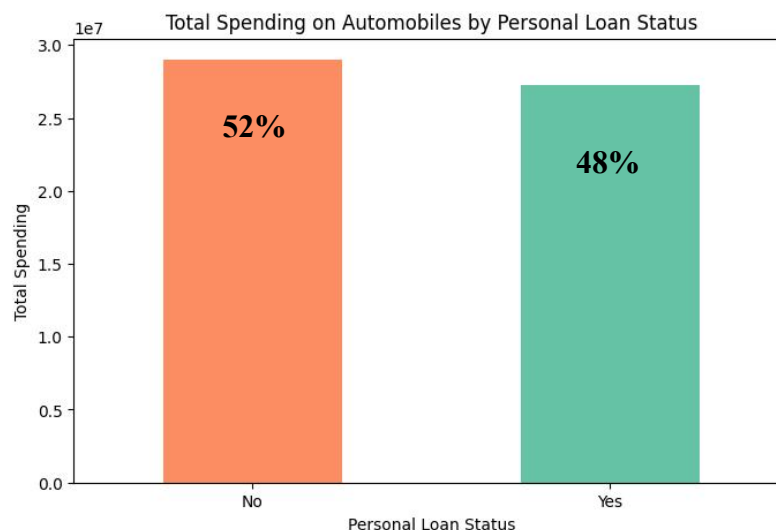
- Customers who do not availed for a personal loan spend slightly more on an average as compared to customers who do not.

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

Average Price of Cars by Partner Working Status
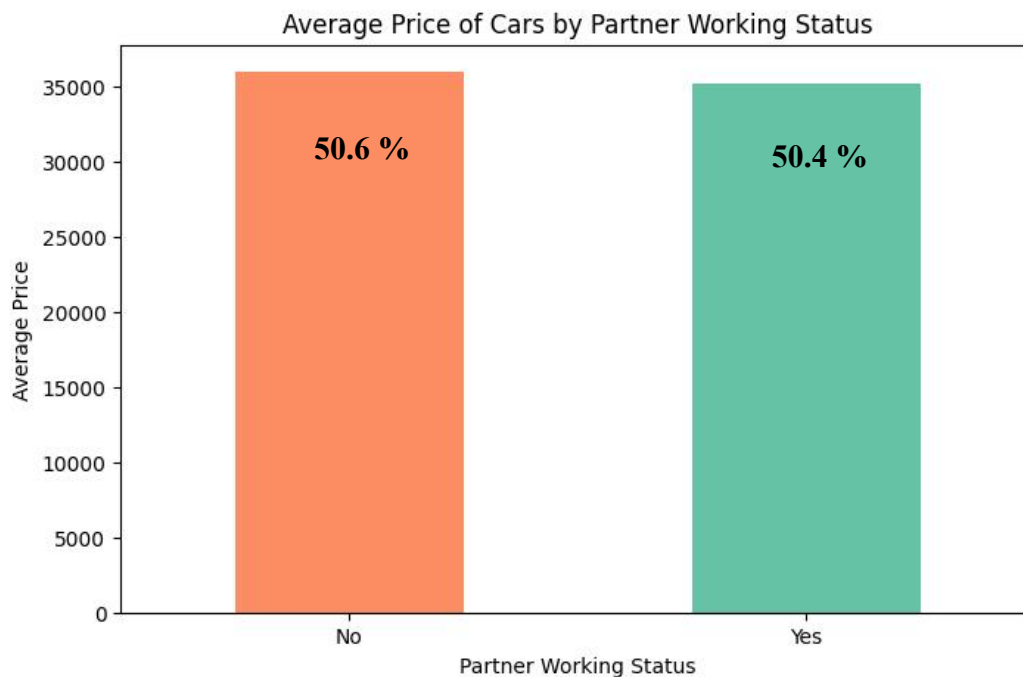
- From above results shown having working partner do not have such impact to buy high price car

6. <u>Business Recommendations and insights</u>:-

1. Customer demographics and their Preferences

a) **Target Younger Customers:**

Since the median age is 29 and so majority of our customers are younger, marketing campaigns should focus on appealing to this demographic. Highlight those features that attract younger buyers, such as technology integration, fuel efficiency, and affordability.

b) **Family-Oriented Marketing:**

Our most customers having 2 or 3 dependents, consider promoting those vehicles that cater to families with their ample space, safety features, and reliability.

c) **Gender-Specific Campaigns:**

Our 78% of customers are male and 22% are female, where male prefer sedan but females tend to prefer SUVs, tailor marketing messages to emphasize the strengths of these vehicles, such as safety, versatility, and status.

d) **Income-Based Segmentation:**

The average salary of customers and their partners indicates a wide income range. Offer flexible financing options and tailor vehicle offerings to different income brackets, such as budget-friendly models for lower-income customers and premium models for higher-income customers.

2. Product Offering and Pricing

a) **Focus on Sedans:**

Since sedans are the most popular choice among customers, continue to stock and promote a variety of sedan models. Consider offering incentives or special deals on sedans to attract more buyers.

b) **Price Sensitivity:**

With car prices being right-skewed and the average price at 35,597, ensure that your product lineup includes vehicles that cater to price-sensitive customers. Offering entry-level models or promoting certified pre-owned vehicles could capture this market.

c) **High-Income Customers:**

For customers with higher total salaries, introduce or highlight premium models and luxury add-ons. Emphasize features like advanced safety, premium interiors, and cutting-edge technology.

3. Loan and Financing Insights

a) **Promote House Loans:**

Since 67% of customers have availed of house loans, offer special financing packages that bundle car purchases with house loans, creating a more comprehensive financial solution for customers.

b) **Analyze Personal Loan Impact:**

Given that personal loans have a slight impact on car purchases, consider promoting alternative financing options that might be more attractive to potential buyers. Offering low-interest car loans or leasing options might increase sales.

4. Sales and Marketing Strategies

a) Leverage High-Education Demographics:

With a significant portion of customers being postgraduates, emphasize the sophistication, reliability, and advanced features of your vehicles in marketing campaigns. Educational content about the latest car technologies or eco-friendly options could resonate well with this group.

b) Customer Loyalty Programs:

Develop loyalty programs targeting salaried professionals, who form a significant part of your customer base. Offer incentives such as discounts on future purchases, free servicing, or upgrades to retain these customers.

c) Optimize Sales by Marital Status:

With 85% of customers being married, focus on family-oriented features and benefits. Highlight safety, space, and comfort in your marketing campaigns to appeal to married customers.

5. Operational and Strategic Recommendations

a) Customer Profiling:

Utilize the data on customer preferences to create detailed profiles. This will allow for more personalized marketing efforts, increasing the likelihood of conversion.

b) Inventory Management:

Adjust your inventory to reflect customer preferences for sedans and hatchbacks, while keeping a limited stock of SUVs. This will help optimize inventory turnover and reduce holding costs.

c) Partner Collaboration:

Collaborate with financial institutions to create joint marketing campaigns that target customers seeking house loans. Bundling offers and cross-promotions could enhance customer acquisition.