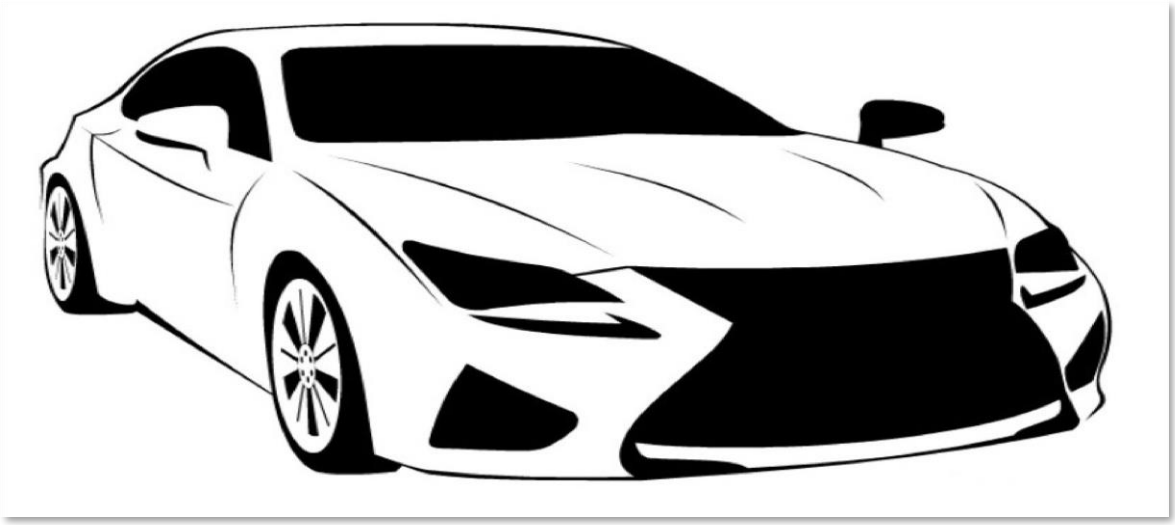
Austo Motor Case Study

by Arindam Saha



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1. Background

- Austo Motor Company is a leading car manufacturer specializing in SUV, Sedan, and Hatchback models.
- In it's 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 analytics professional to improve the existing campaign.

2. Objectives

To analyze the data to get a fair idea about the demand of customers which will help them in enhancing their customer experience.

Our focus will be on:

1. Gender preference for SUVs: Men vs. Women.

2. Likelihood of salaried individuals purchasing sedans.

3. Evidence for Sheldon's claim on salaried males and SUV sales.

4. Gender-based spending on automobiles.

5. Spending by individuals with personal loans.

6. Influence of working partners on high-priced car purchases.

3. Data Information

Variables	Description
Age	The age of the individual in years.
Gender	The gender of the individual, categorized as male or female.
Profession	The occupation or profession of the individual.
Marital_status	The marital status of the individual, such as married &, single
Education	The educational qualification of the individual Graduate and Post Graduate
No_of_Dependents	The number of dependents (e.g., children, elderly parents) that the individual supports financially.
Personal_loan	A binary variable indicating whether the individual has taken a personal loan "Yes" or "No"

House_loan	A binary variable indicating whether the individual has taken a housing loan "Yes" or "No"
Partner_working	A binary variable indicating whether the individual's partner is employed "Yes" or "No"
Salary	The individual's salary or income.
Partner_salary	The salary or income of the individual's partner, if applicable.
Total_salary	The total combined salary of the individual and their partner (if applicable).
Price	The price of a product or service.
Make	The type of automobile

Table 1: Variables and Descriptions

Note: -

- There are in total 1581 observations and 14 variables.
- There are no repeated values, although there are 53 instances where gender information is missing and 106 instances where partner salary data is absent.
- There are two incorrect entries for gender, namely "Femal" and "Femle“
- "Female" has been substituted for the incorrect entries "Femal" and "Femle".
- All null fields in the "Gender" column have been updated to "Male".
- The partner_salary has been adjusted for instances where the partner is not employed, with a salary value of 0 assigned to those entries.
- In 16 instances where the partner is employed but the salary was not provided, we computed the partner's salary by subtracting the individual's salary from the total salary.
- Created Age_group column based on individual’s age.

4. Univariate Analysis

4.1. Individual salary

- There are no outliers detected, and the distribution does not conform to a normal pattern.
- The median individual salary is approximately INR 59,500, with the maximum salary recorded at INR 93,300.

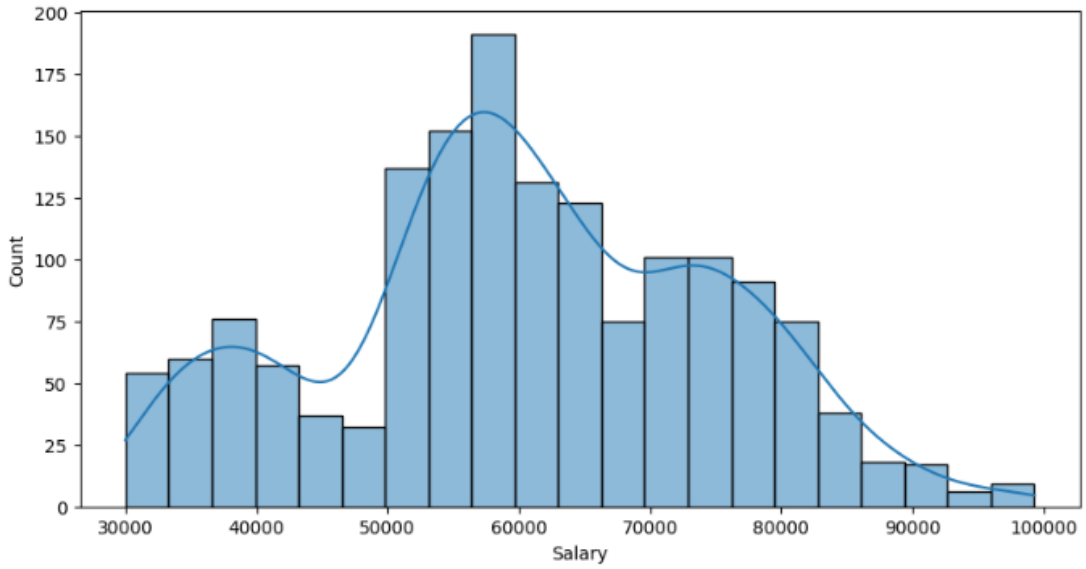

Figure 1: Histogram of individual salary

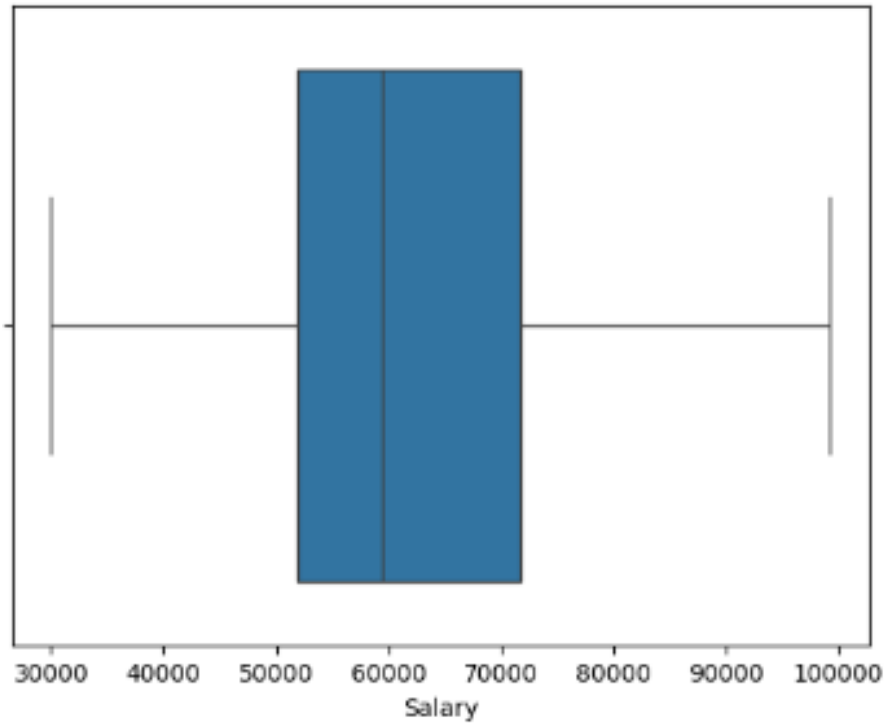

Figure 2: Boxplot of individual salary

4.2. Partner's salary

- It appears that the total salary is influenced by both partner salary and individual salary, necessitating further analysis.
- Moreover, the distribution exhibits a right-skewed pattern, indicating asymmetry towards higher salary values.

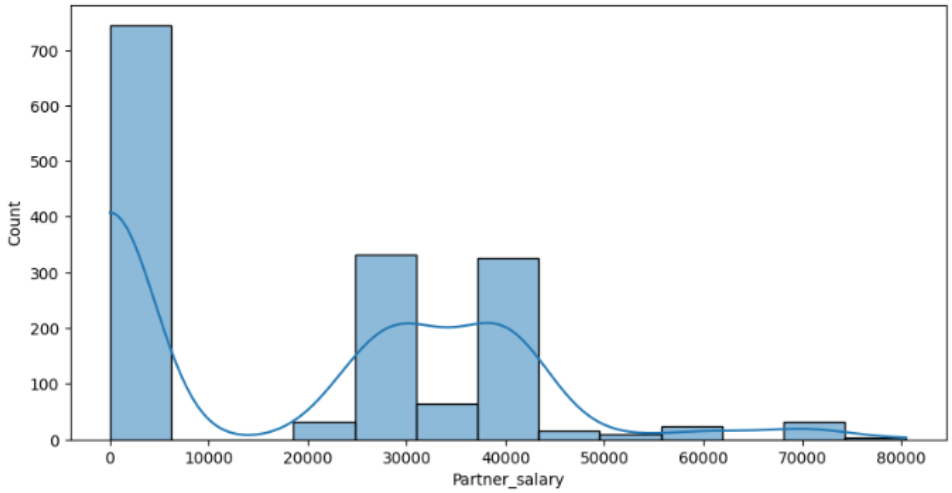

Figure 3: Histogram of Partner_salary

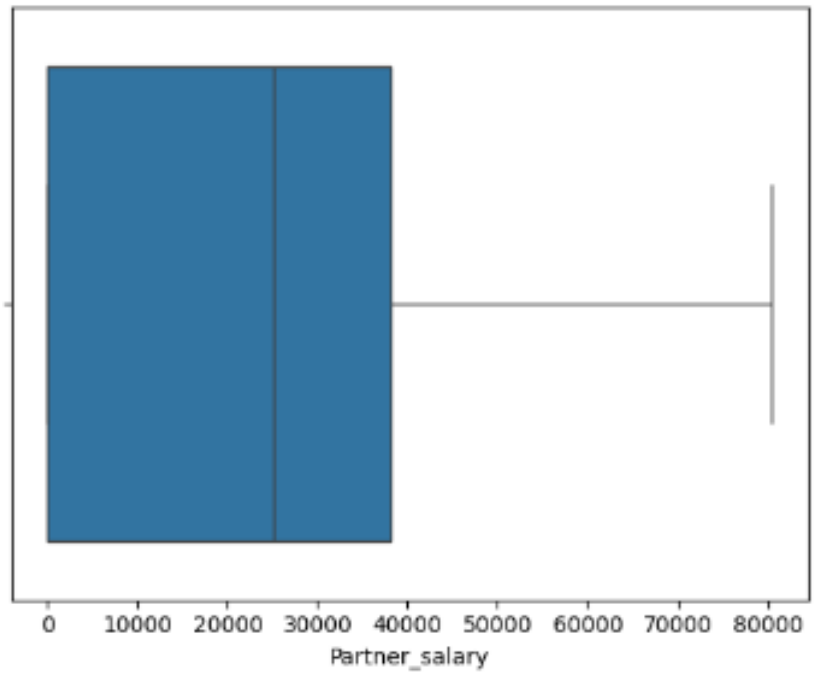

Figure 4: Boxplot of Partner_salary

4.3. Total Salary

27 outliers observed in the Total_salary of more than INR 145000 due to high individual and partner salary.

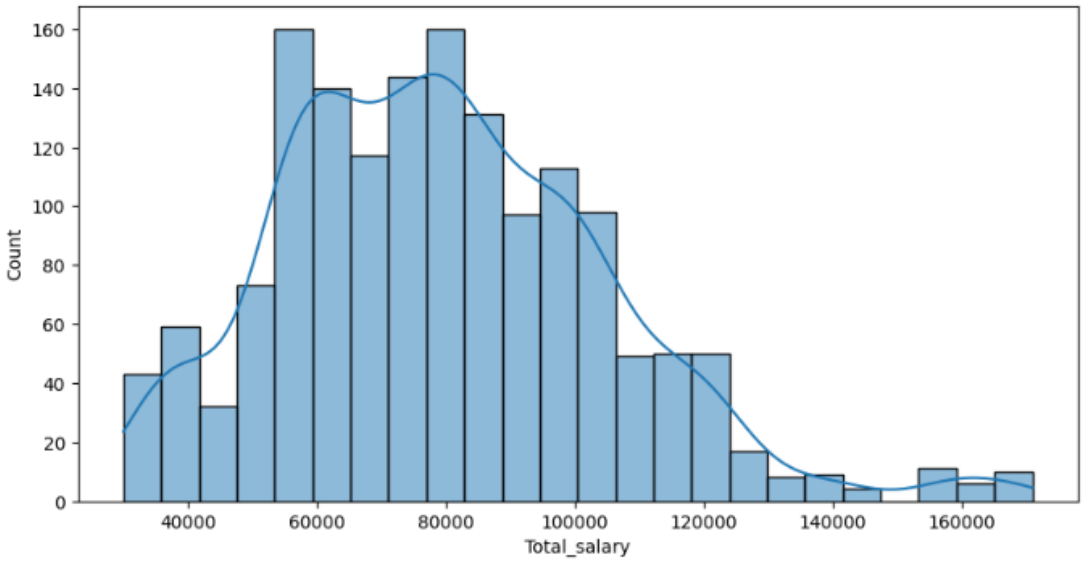

Figure 5: Histogram of Total_salary

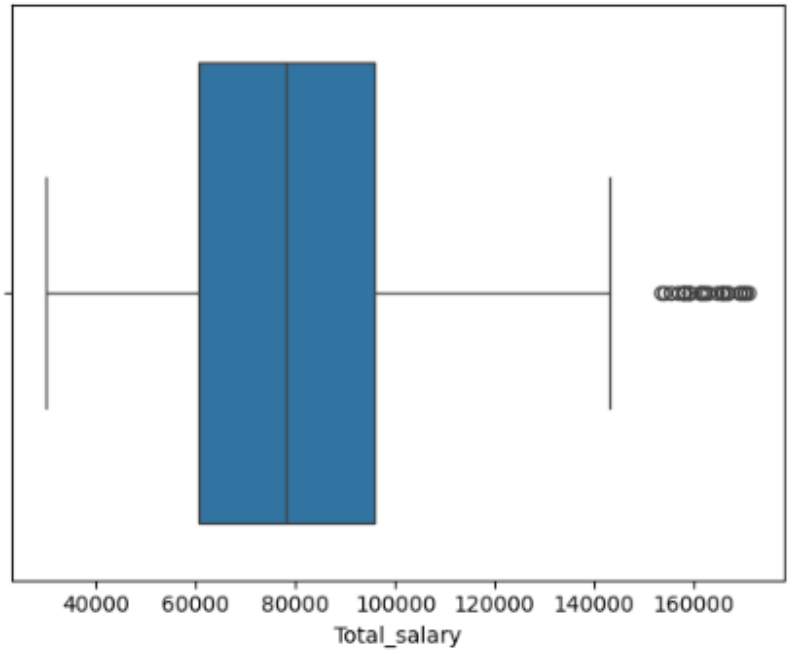

Figure 6: Boxplot of Total_Salary

5. Bivariate Analysis

5.1. Correlation Matrix

- We can observe positive correlations between Price and Age, Partner salary and Total salary, as well as individual salary and total salary.
- However, partner's salary appears to have a stronger influence on the total salary.
- Additionally, there seems to be an inverse relationship between the number of dependents and age. If age increases dependencies decreases.

- Higher age group people tend to buy costly cars.

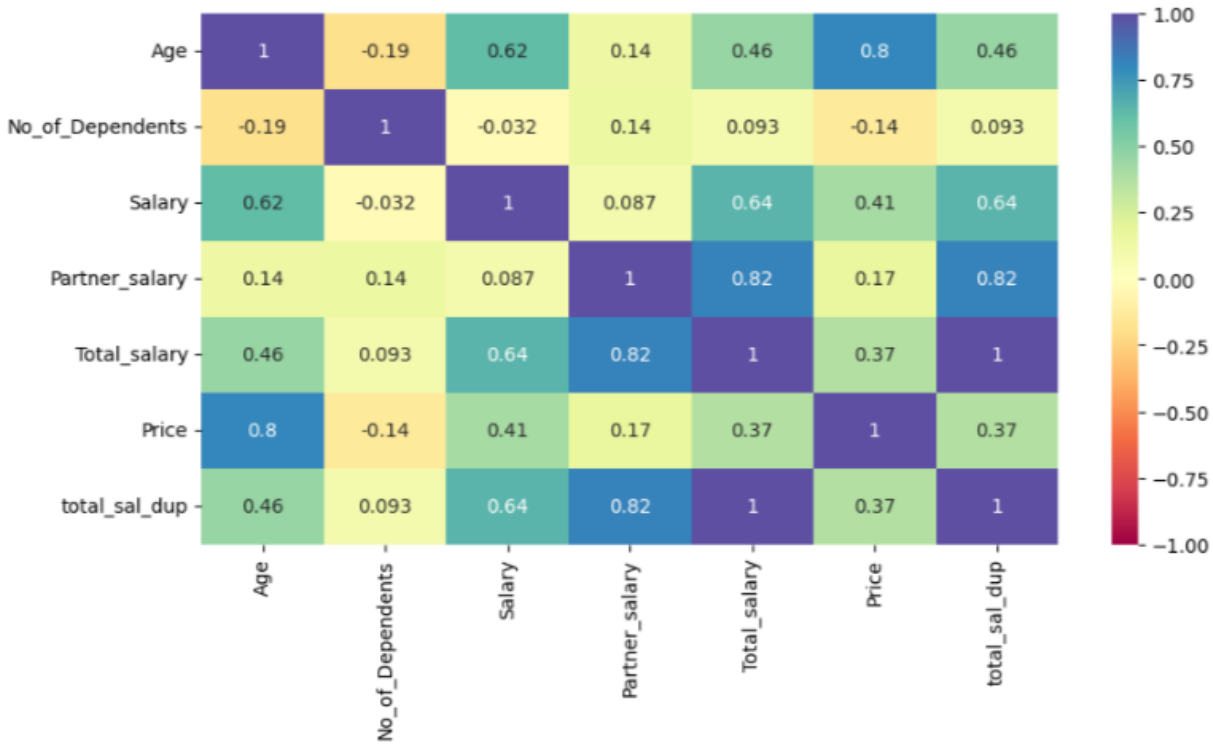

Figure 7: Correlation Matrix of the df

5.2. EDA on Car preference

5.2.1. Car preference depending upon gender

Male individuals generally exhibit a higher preference for hatchback cars, followed by sedans, while female individuals tend to favour SUVs, followed by sedans.

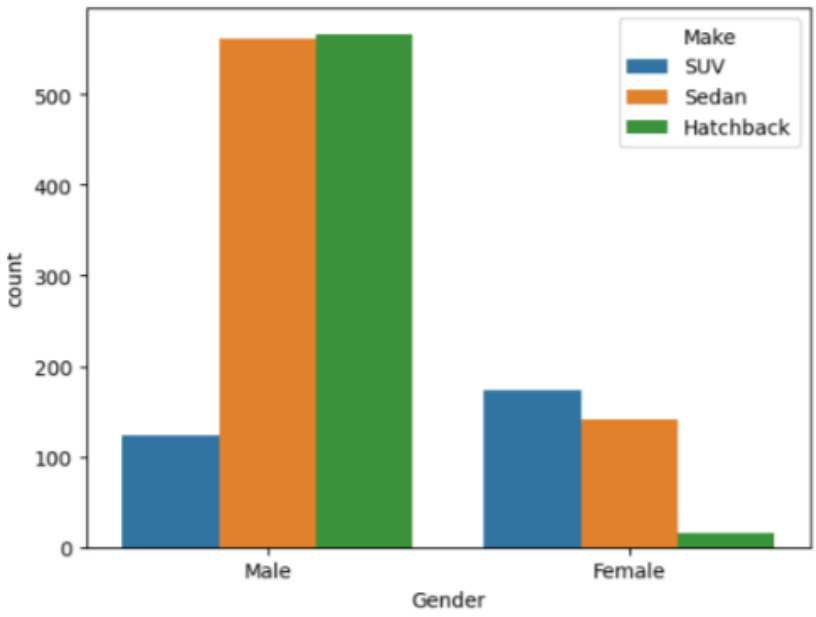

Figure 8: Make VS Gender

5.2.2. Car preference depending upon profession

- Likelihood of a salaried individual buying a Sedan: 44.19 %
- Likelihood of a business man buying a Sedan: 44.67 %

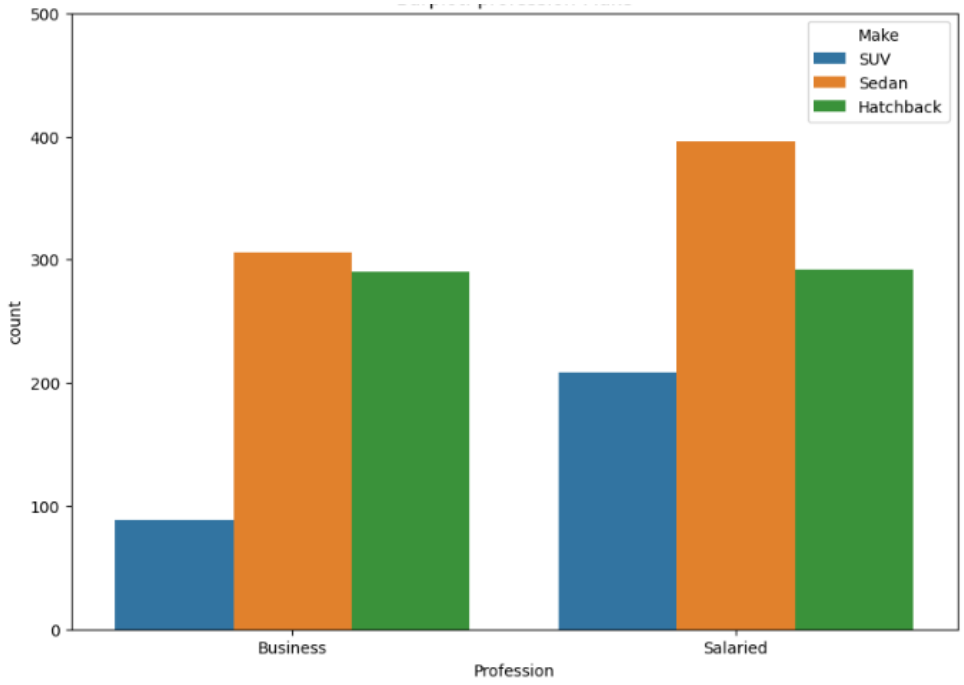

Figure 9: Preference on Make by profession

5.2.3. Car preference with respect to gender and profession

Male individuals who are salaried tend to show a higher interest in purchasing Sedan cars rather than SUVs.

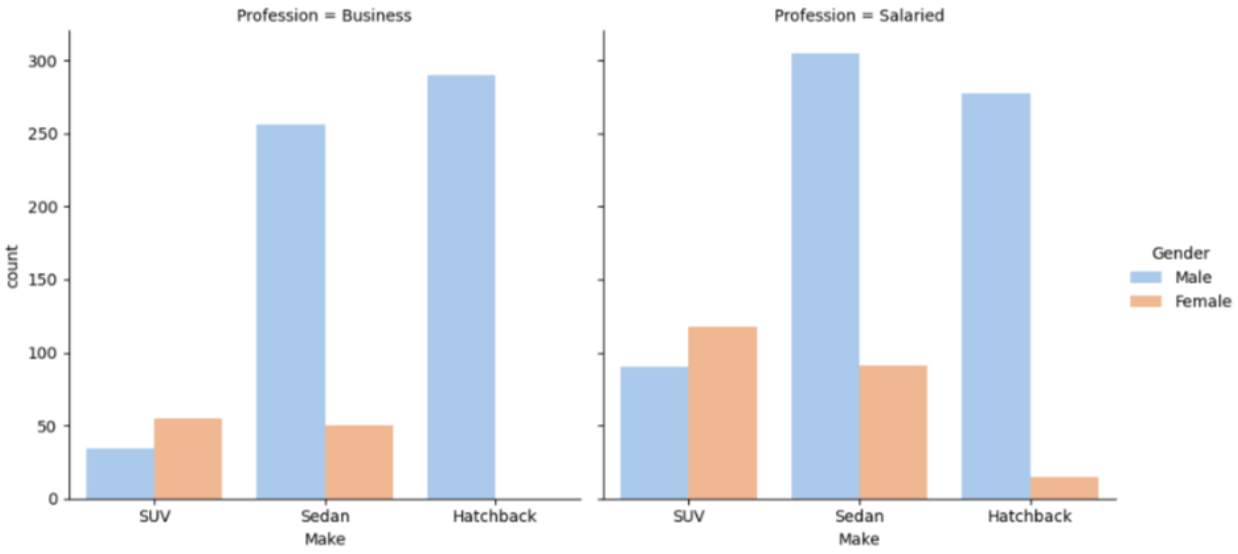

Figure 10: Preference of Make by gender and profession

5.3. EDA on Purchasing

5.3.1. Purchasing pattern based on gender

- Females tend to have a higher potential for purchasing automobiles or exhibit a tendency to spend more on them compared to males.
- Approximately 75% of male purchases are within 37,000 INR, while for females, more than 75% of purchases start at 38,000 INR and above.
- Additionally, outliers have been observed in male purchasing expenditures.

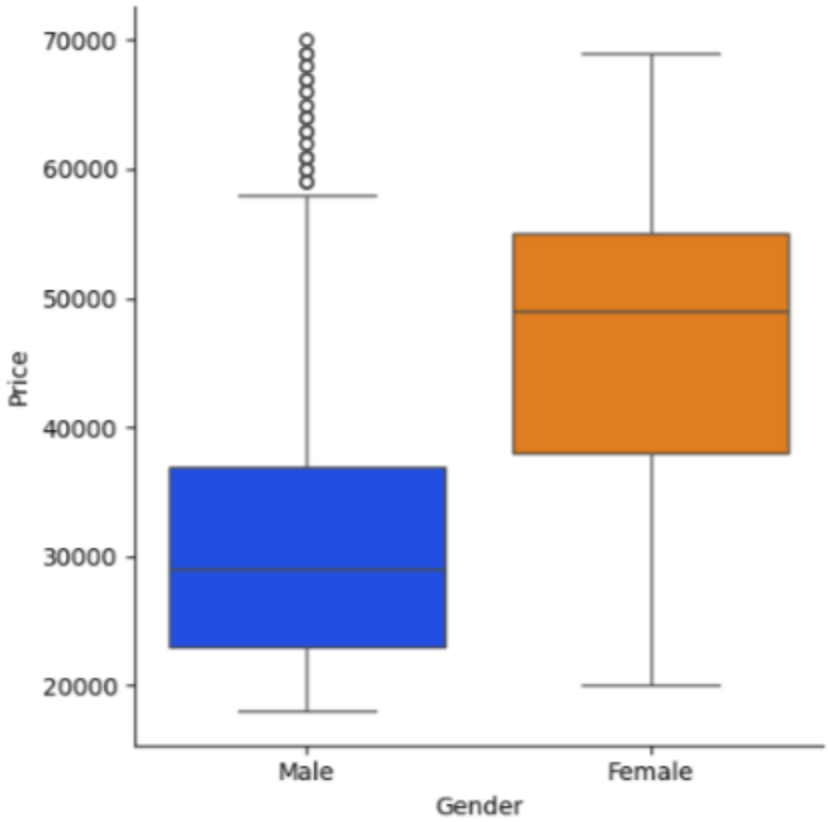

Figure 11: Boxplot Gender VS Price

5.3.2. Spending pattern for male with respect to make

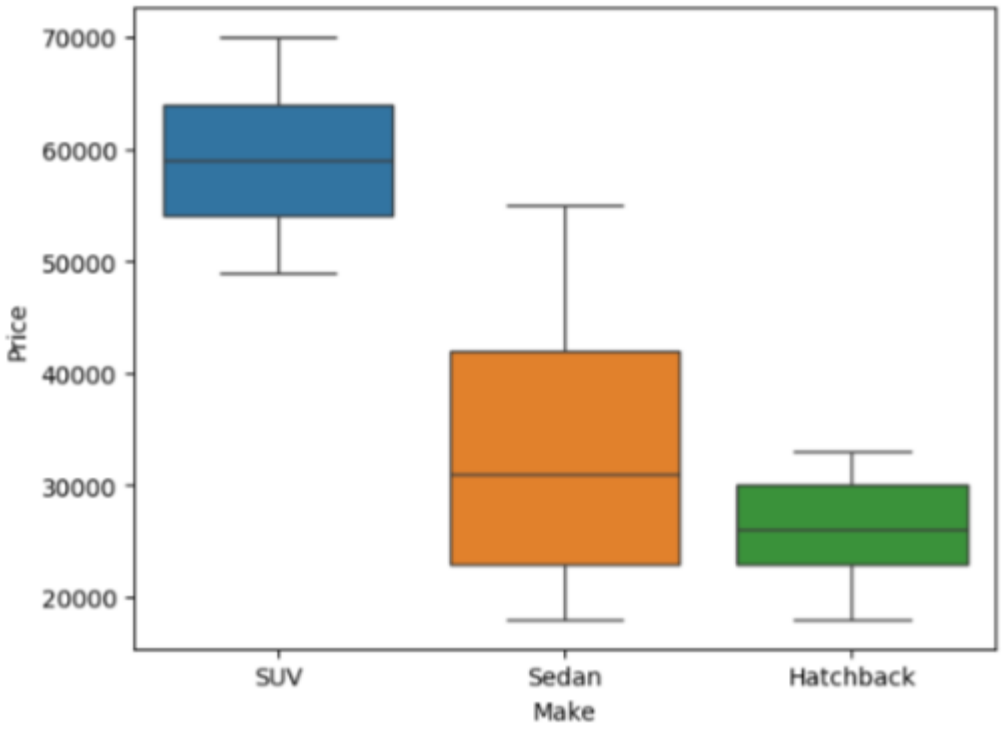

Figure 12: Male Spend on make

5.3.3. Average pricing on make

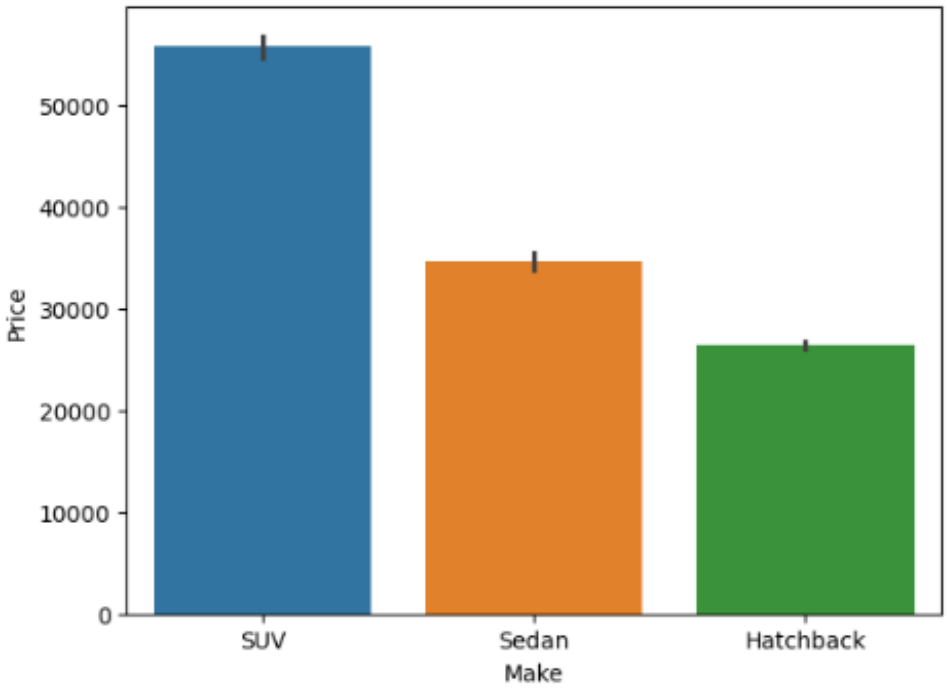

Figure 13: AVG Price on Make

5.3.4. Spending pattern for female with respect to make

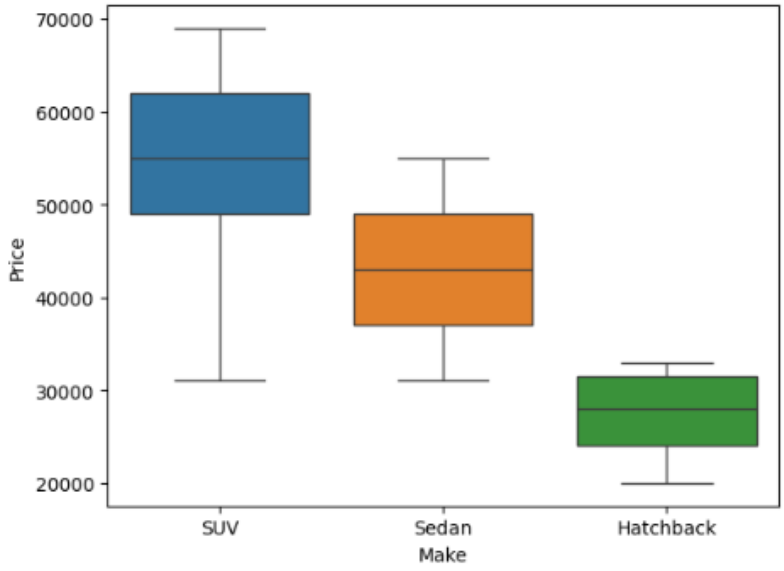

Figure 14: Female Spend on make

- It's clear that SUV and Sedan cars has more price structure.
- Male buyers demonstrate a preference for Hatchback cars, but they also purchase Sedans at a similar rate. Notably, they tend to opt for lower-priced sedan models, with a mean price of INR 33,639. Outliers for Male purchasing is due to costly SUV cars purchase at vary low rate.
- In contrast, female buyers show a higher inclination towards purchasing SUVs, which typically have higher prices. They also show interest in higher-priced Sedan models, with mean prices of INR 53,479 for SUVs and INR 42,773 for sedans.

5.3.5 Influence of age on car preference and purchasing pattern

- As the age increases individual try to more prefer buying higher segment of cars.
- Significant observations can be found in age group of 40 – 50 buying SUV followed by Sedans and age group of 50 – 60 buying only SUV cars instead of Sedan and Hatchback.

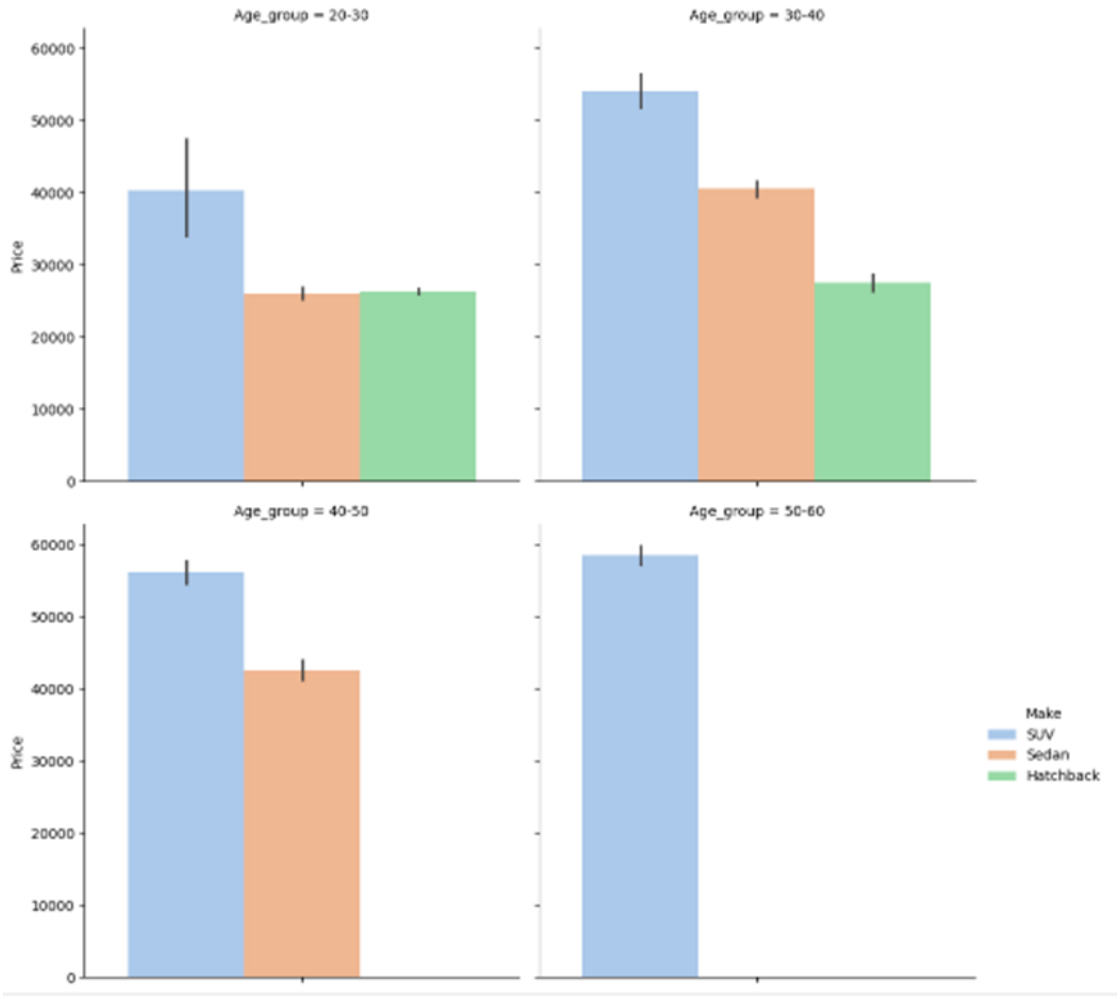

Figure 15: Age group vs car make

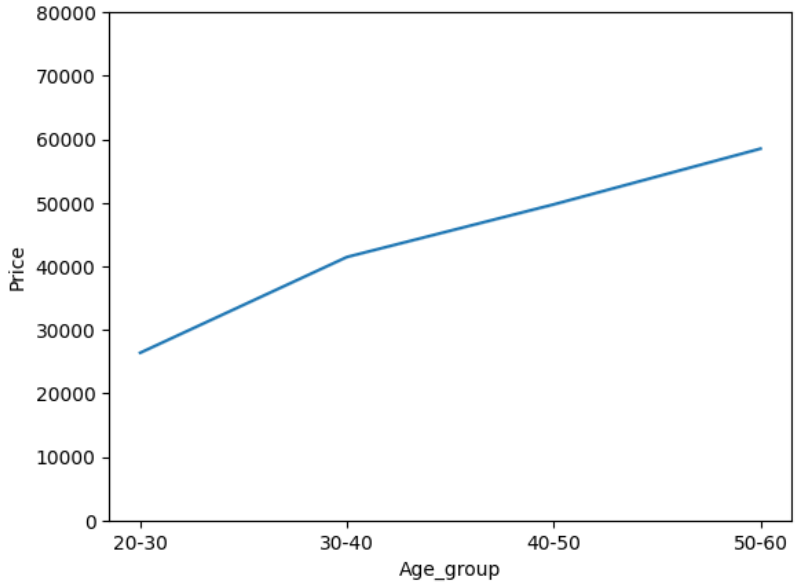

Figure 16: linechat Age group vs car price

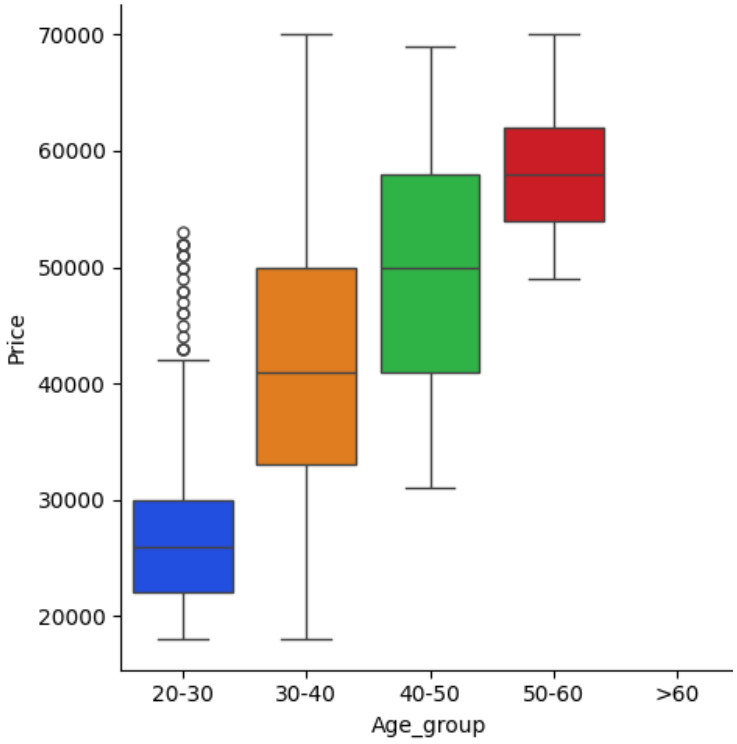

Figure 17: Boxplot Age group vs car Price

- We already came to know that as individuals grow older, they tend to have fewer dependencies.
- Now, we can also observe the uphill trend i.e. as the individual grow old they tend to allocate more spending towards higher-priced vehicles.

5.3.5. Influence of loans on purchasing pattern

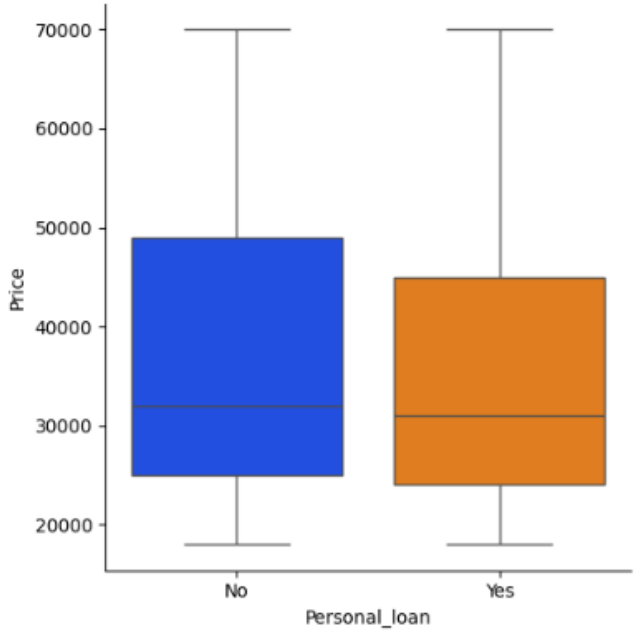

Figure 18: Boxplot personal loan vs car price

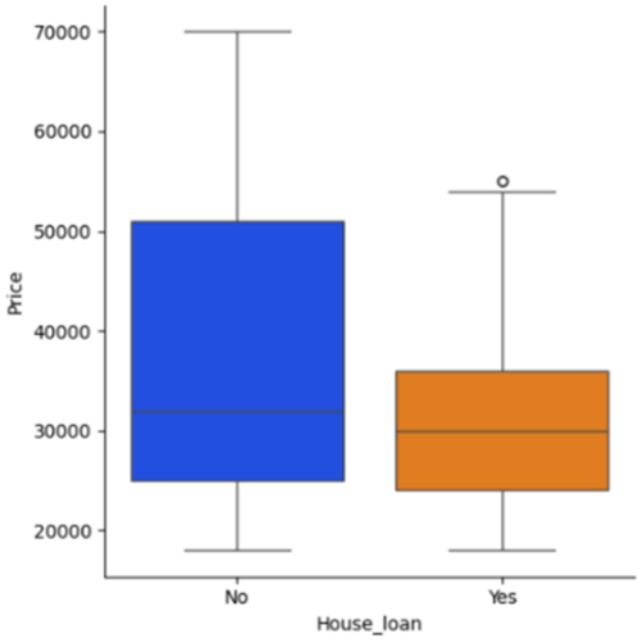

Figure 19: boxplot house loan vs price

- For individuals who have taken a personal loan, about 75% of their purchases fall below INR 45,000, with a median purchase amount ranging between INR 31,000 and INR 32,000.
- Interestingly, there doesn't seem to be a significant difference in purchasing limits between those who have taken a personal loan and those who haven't.
- Nevertheless, there exists a significant correlation between having a house loan and one's purchasing behavior. Individuals with house loans tend to opt for cars with lower prices. Approximately 75% of individuals with house loans have bought cars priced at INR 36,000, with a mean purchase value of INR 313,777.609, considerably lower compared to those without loans.

5.3.6. Influence of working partner on purchasing pattern

There isn't a noticeable distinction to highlight. It appears that whether the partner is employed or not, the buying tendencies appear to be similar.

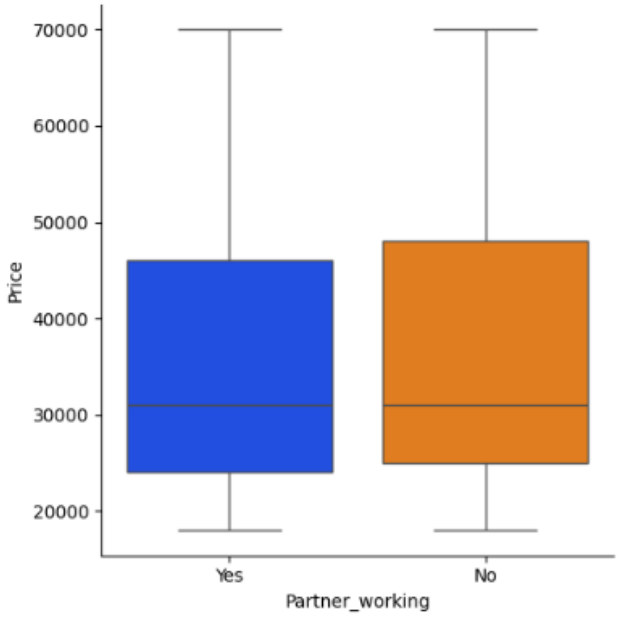

Figure 20: boxplot partner working vs car price

6. Q & A:

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

- No, woman tend to prefer more SUVs in compare to men.

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

- Likelihood of a salaried individual buying a Sedan: 44.19 %

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?

- This claim is false. Male individuals who are salaried tend to show a higher interest in purchasing sedan cars rather than SUVs.

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

Male buyers demonstrate a preference for hatchback cars, but they also purchase sedans at a similar rate. Notably, they tend to opt for lower-priced sedan models, with a mean price of INR 32550.80.

In contrast, female buyers show a higher inclination towards purchasing SUVs, which typically have higher prices. They also show interest in higher-priced sedan models, with mean prices of INR 53,479 for SUVs and INR 42,773 for sedans.

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

- Mean INR 34457.071 and max INR 70000 was spend on purchasing automobiles by individuals who took personal loans.

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

- There isn't a noticeable distinction to highlight. It appears that whether the partner is employed or not, the buying tendencies appear to be similar.

7. Conclusions

1. Men showed a preference for Hatchback cars followed by Sedans, women tend to prefer SUVs followed by Sedans.
2. Among salaried individuals, around 44.19% have opted for Sedan cars. Similarly, approximately 44.67% of business owners have chosen Sedan cars.
3. Females tend to spend more on purchasing automobiles compared to males.
4. Observed the uphill trend i.e. as the individual grow older, they tend to allocate more spending towards higher-priced vehicles.
5. For those with personal loans, around 75% of purchases are under INR 45,000, with a median purchase of INR 31,000 to INR 32,000. Surprisingly, the purchasing limits show little variation between personal loan holders and non-holders. Indeed, having a house loan can negatively influence purchasing limits. Individuals with house loans tend to allocate less spending towards higher-priced cars.
6. There isn't a significant observable difference in purchasing tendencies based on whether the partner is working or not.
7. Further analysis can be done to check the features of car that attracts Female buyers mostly to purchase SUVs.

8. Business Recommendations

1. Develop targeted marketing campaigns tailored to the preferences of different customer segments. Since men prefer Hatchback cars and Sedans, while women prefer SUVs and Sedans, create separate campaigns that highlight the features and benefits of each type of vehicle to appeal to these specific demographics.
2. Adjust the product portfolio to align with customer preferences. Given that Sedans are popular among both salaried individuals and business owners, consider expanding the Sedan lineup or introducing new models to capitalize on this demand.
3. Implement gender-based pricing and promotion strategies to attract female buyers who tend to spend more on automobiles. Offer special promotions or discounts targeted specifically towards female customers to encourage purchases.
4. Leverage the observed trend of increased spending on higher-priced vehicles as individuals grow older. Develop marketing campaigns that target older demographics and emphasize the luxury features and benefits of higher-priced vehicles.
5. Consider the impact of personal loans and house loans on purchasing limits. Develop financing options or promotional offers tailored to individuals with loans to encourage them to invest in higher-priced cars despite financial constraints.
6. While there isn't a significant difference in purchasing tendencies based on whether the partner is working or not, further analysis can be conducted to understand any subtle influences. This insight can inform marketing strategies aimed at couples or families.

7. Conduct further analysis to identify the specific features of SUVs that attract female buyers the most. Use these insights to highlight these features in marketing campaigns and product descriptions targeted towards female customers.