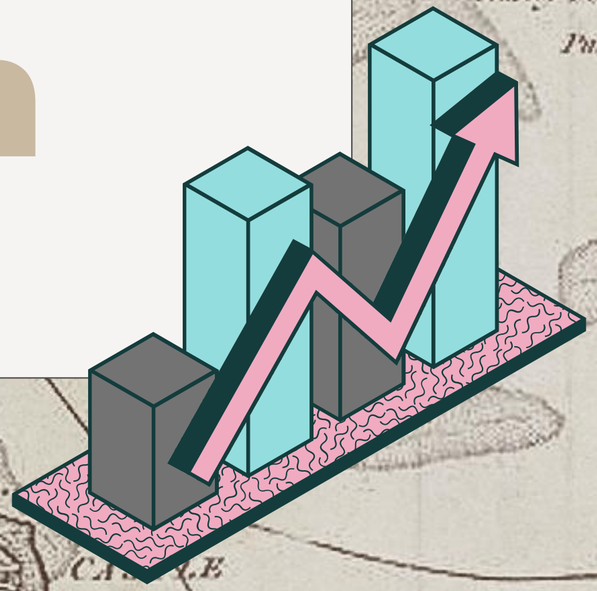
# Laptop Price Prediction

Group Project



# The team

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# Introduction

**Objective:** Develop a laptop price prediction model.

**Method:** Apply statistical inference methods to the analysis.

**Data:** Compile extensive laptop datasets with essential attributes.

**Process:** Analyse exploratory data, prepare, and design features.

**Used regression evaluation and hypothesis testing as part of your statistical methods.**

**Result:** Gain helpful knowledge regarding the connections between laptop costs and features.

**Application:** Offer helpful guidance on pricing strategies for the consumer electronics market.

# Objectives

01

Develop a laptop price prediction model.

02

Acquire understanding of the factors affecting prices.

03

Provide useful guidance regarding how to set prices for laptop.

# Problem Statment

The goal of our project is to create an model that predicts laptop prices for users. When someone wants to buy a laptop, our model should give them an estimated price based on their chosen specifications. However, the challenge lies in the complexity of our dataset, which is noisy and requires careful cleaning and feature engineering.

# Data

| Features | |
|---|---|
| Company | The different manufacturing company names. |
| TypeName | The laptop type such as,<br>(Notebooks, Ultrabook, Gaming laptops etc.) |
| Inches | The screen size of the laptop. |
| ScreenResolution | The screen resolution of the laptop, display quality. |
| Cpu | The processor types with speed. |
| Ram | The RAM capacity of the laptop |
| Memory | The Hard Disk, SSD storage capacity. |
| Gpu | The different GPU configuration. |
| OpSys | The different operating systems. |
| Weight | The weight of the laptop. |
| Price | Price of different laptops in INR. (Target variable of our model) |

## Dataset Overview:

**1303 entries**
**12 columns**

# Methodology:

- **Exploratory Data Analysis:**
- Data cleaning
- Summary Statistics
- Correlation Analysis
- Feature Engineering
- Data Visualization

2.**Statistical Methods Used:**

- Linear
- Support Vector Regressor (SVR)
- Random Forest

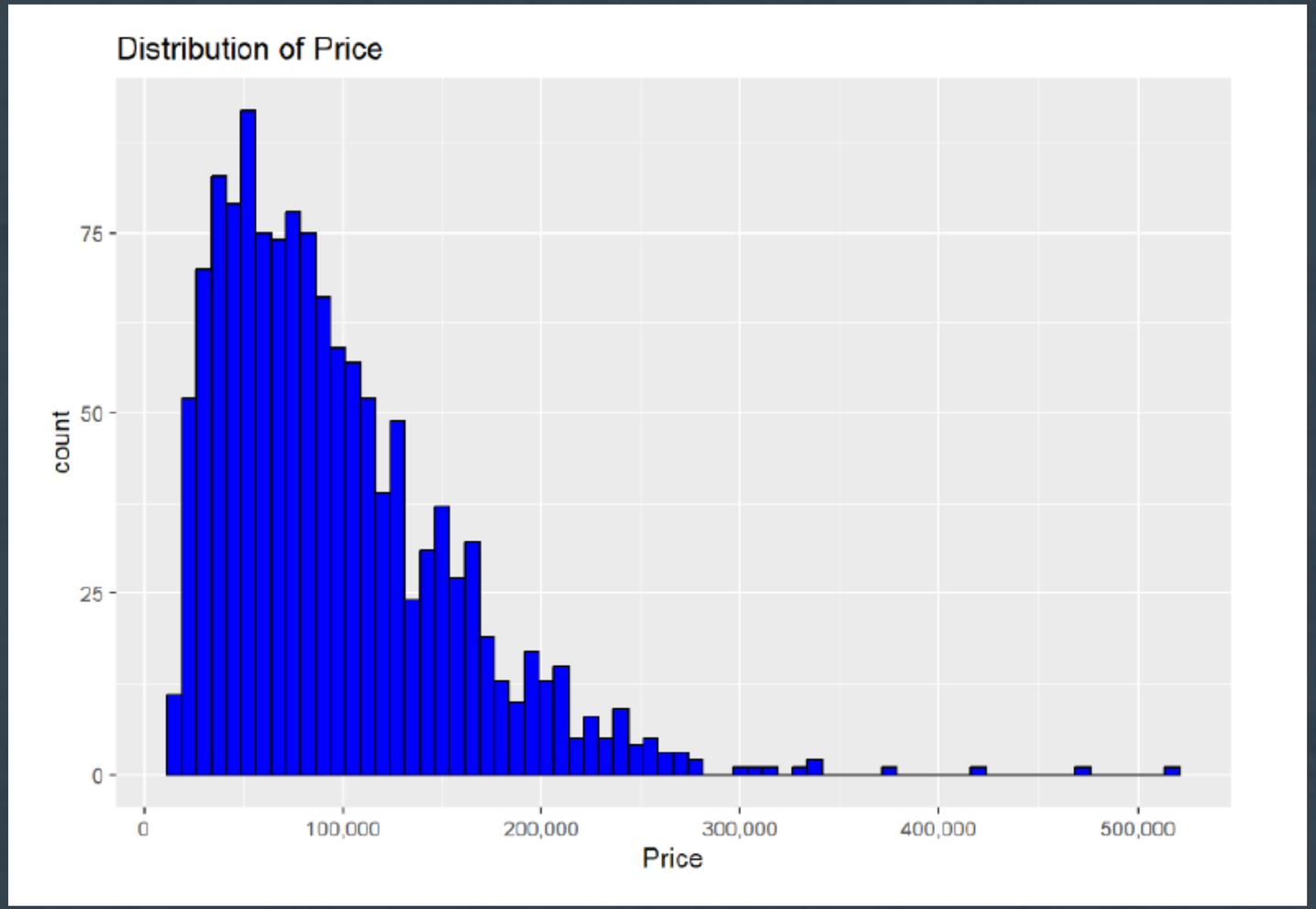
# DATA CLEANING

- Removed unnecessary columns
- Made necessary datatype changes.
- Transformed columns to make suitable for analysis.

| Column | After Data Cleaning |
|---|---|
| RAM | Removed ‘GB’ from the data and made numeric |
| Weight | Removed ‘kg’ form the data and made numeric |
| X | Removed the column |
| Screen Resolution | Derived other columns like Touchscreen, Resolution, ppi, |
| CPU | Transformed the column into CPU brand name |
| Processor | Removed unnecessary metrics from the column. |

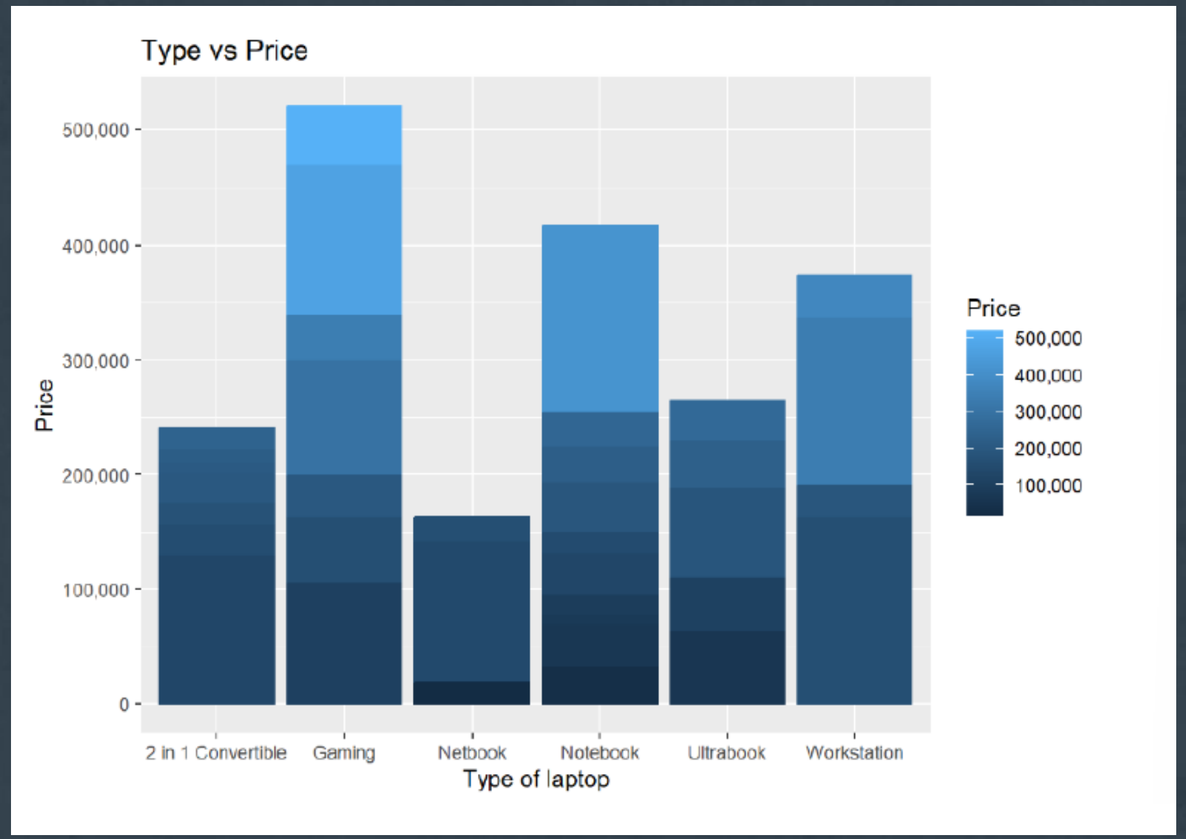
# EXPLORATORY DATA ANALYSIS

- Majority of laptops are priced below Rs. 100,000.
- A notable number of laptops fall into the expensive category, exceeding Rs. 300,000.



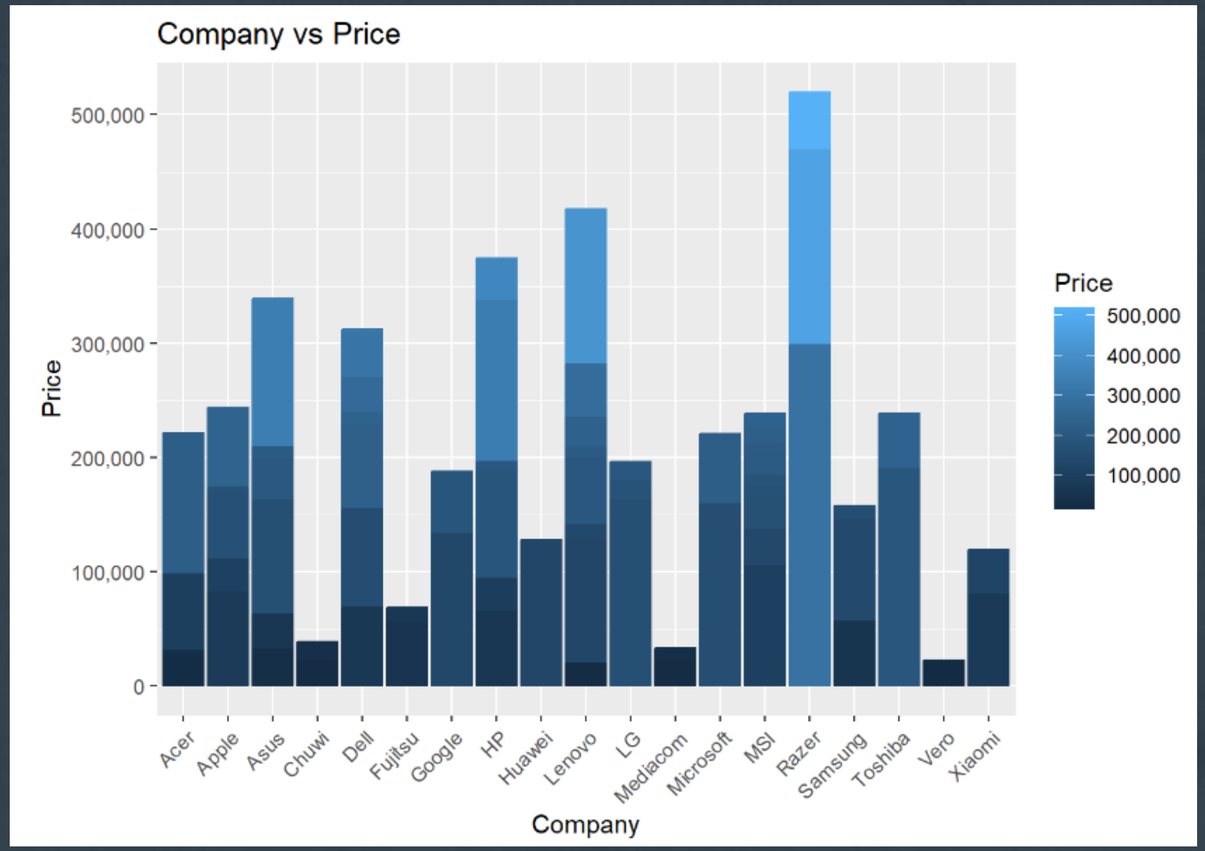
# EXPLORATORY DATA ANALYSIS

- Gaming laptops are consistently the most expensive.
- Netbooks, designed for internet use, tend to be more budget-friendly.
- Price variations align with the intended use and specifications of each laptop type.

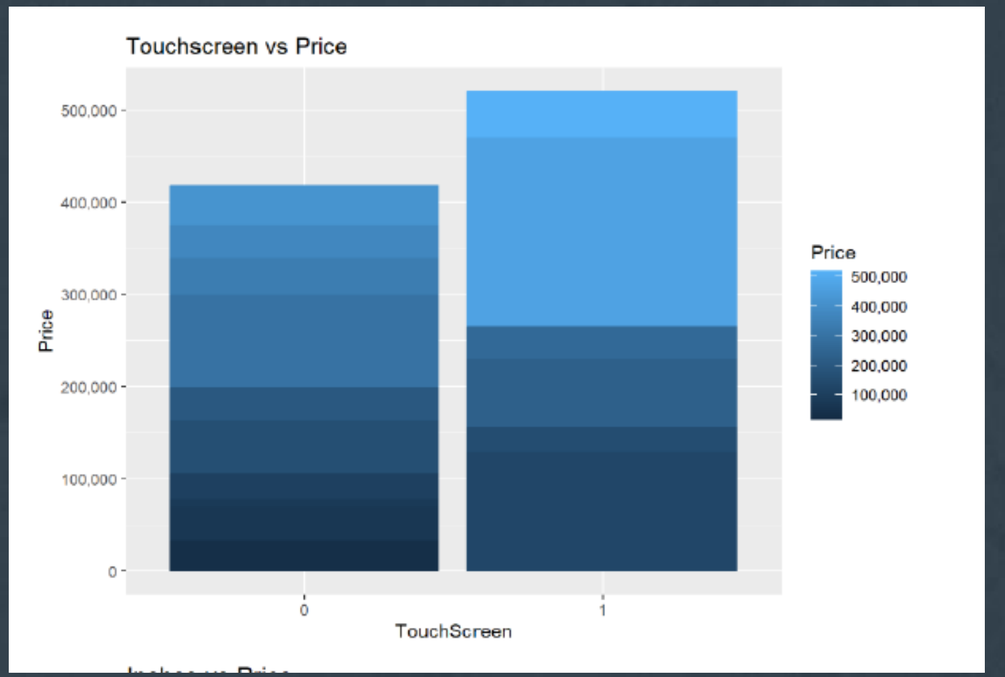


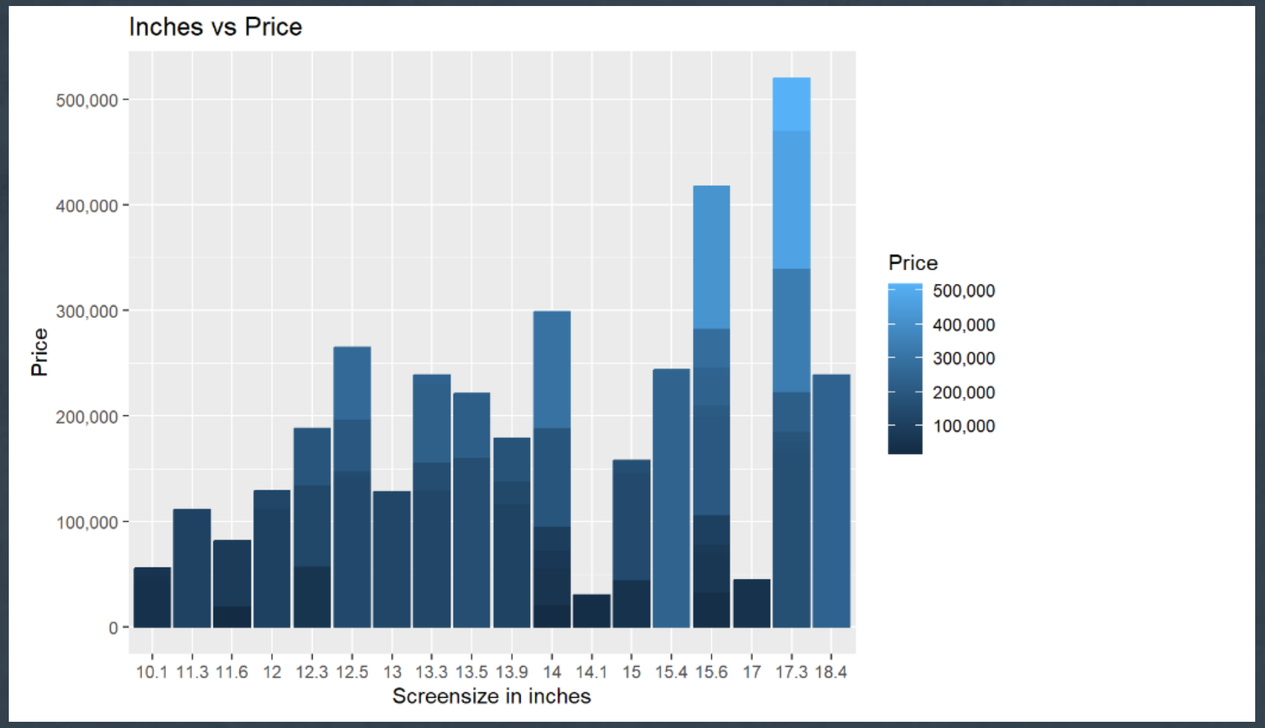
# EXPLORATORY DATA ANALYSIS

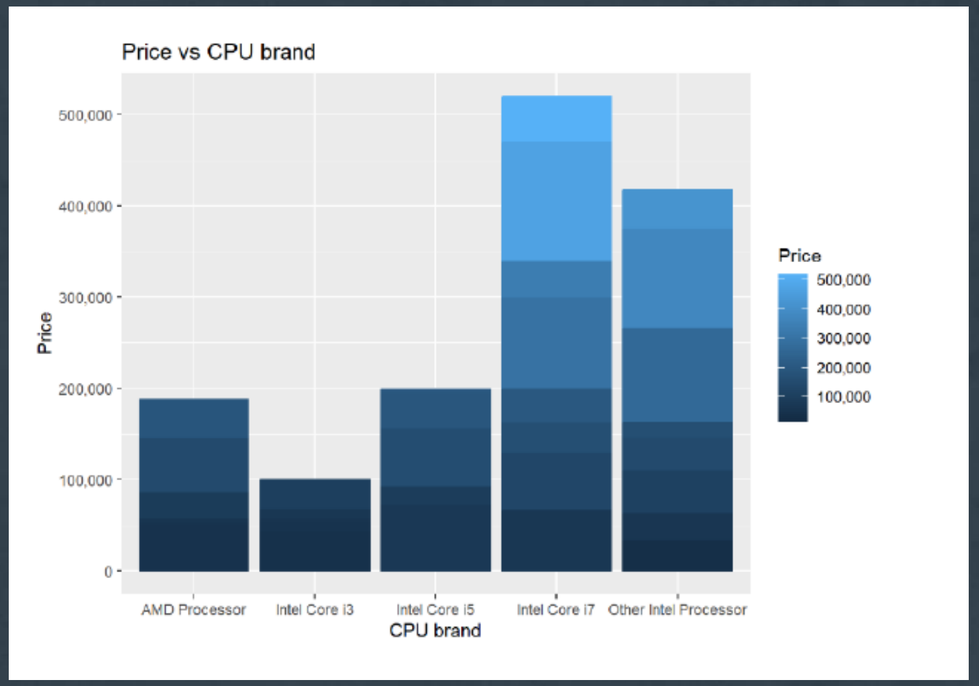
- Numerous companies contribute to the laptop market.
- Brand value and consumer trust can impact laptop prices.
- Bar chart analysis reveals 'Razor' as having the most expensive laptops, attributed to its focus on high-end Gaming Laptops.



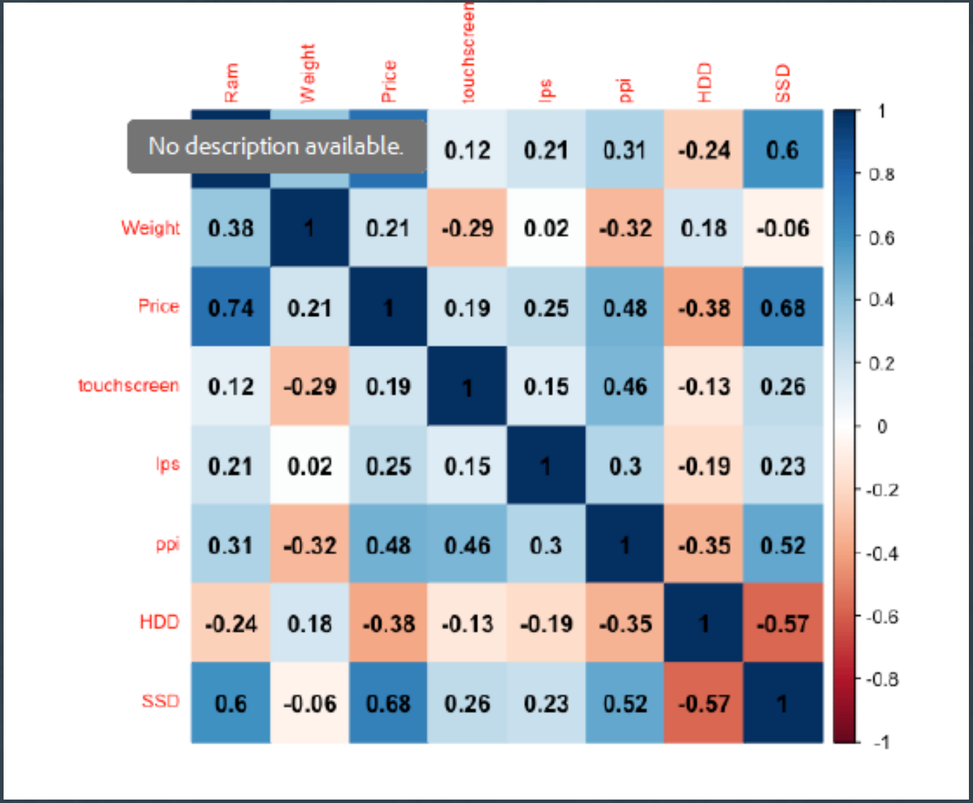
# EXPLORATORY DATA ANALYSIS

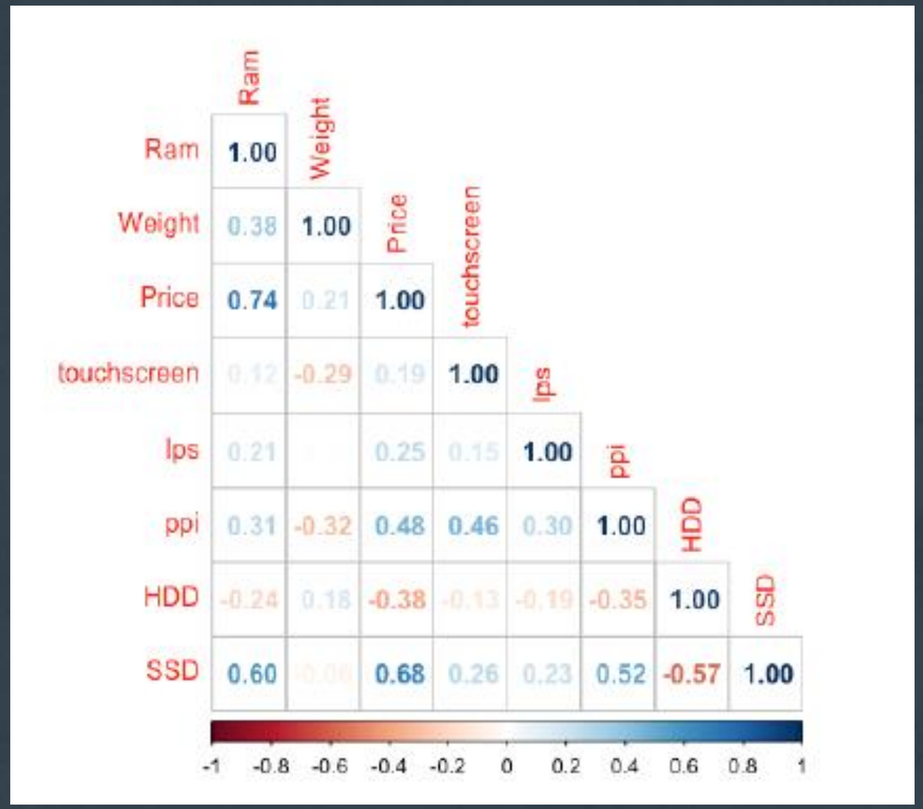


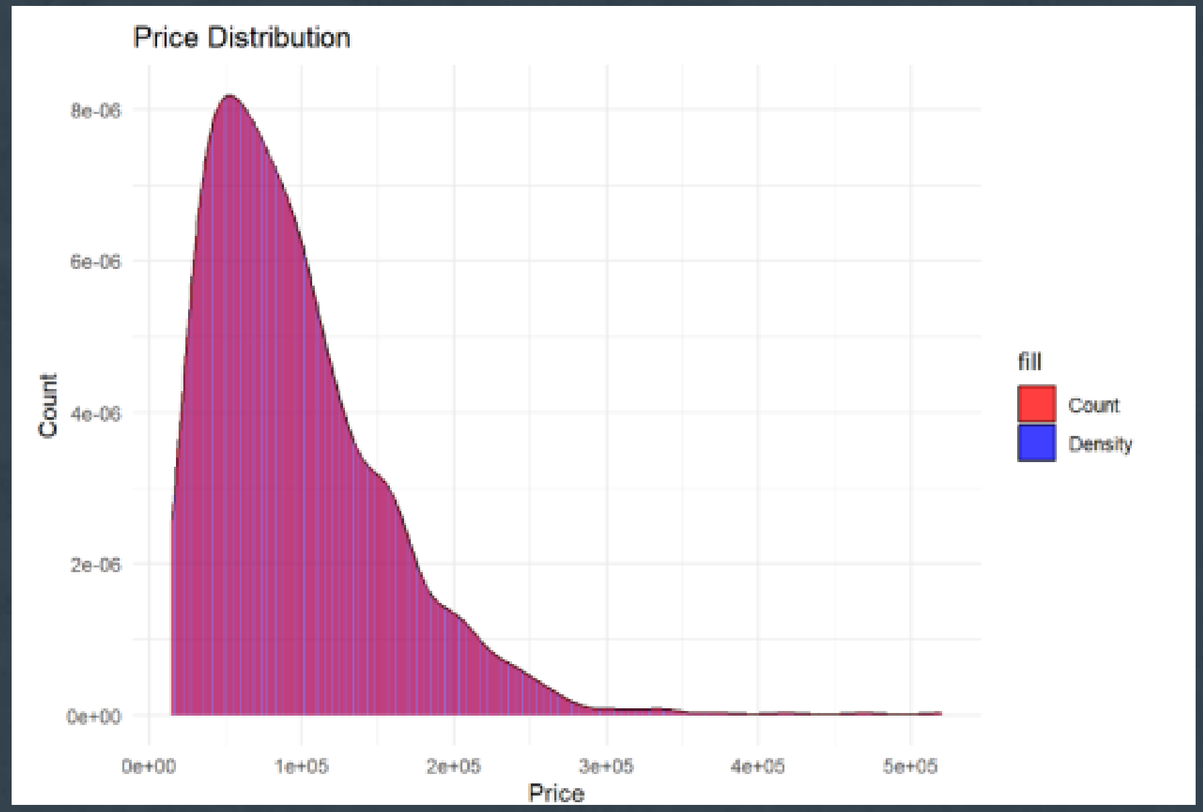
# CORRELATION ANALYSIS



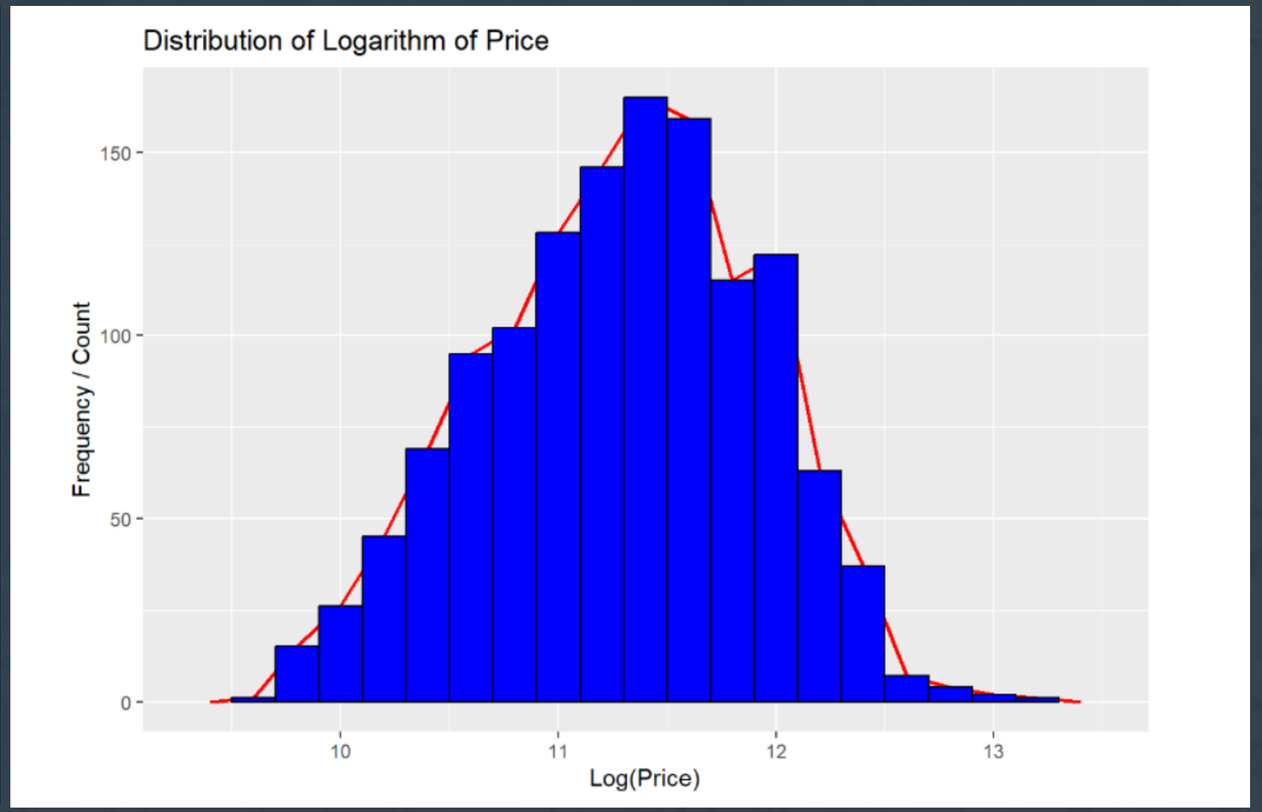



# Feature Engineering : Log Transformation

## Before




## After

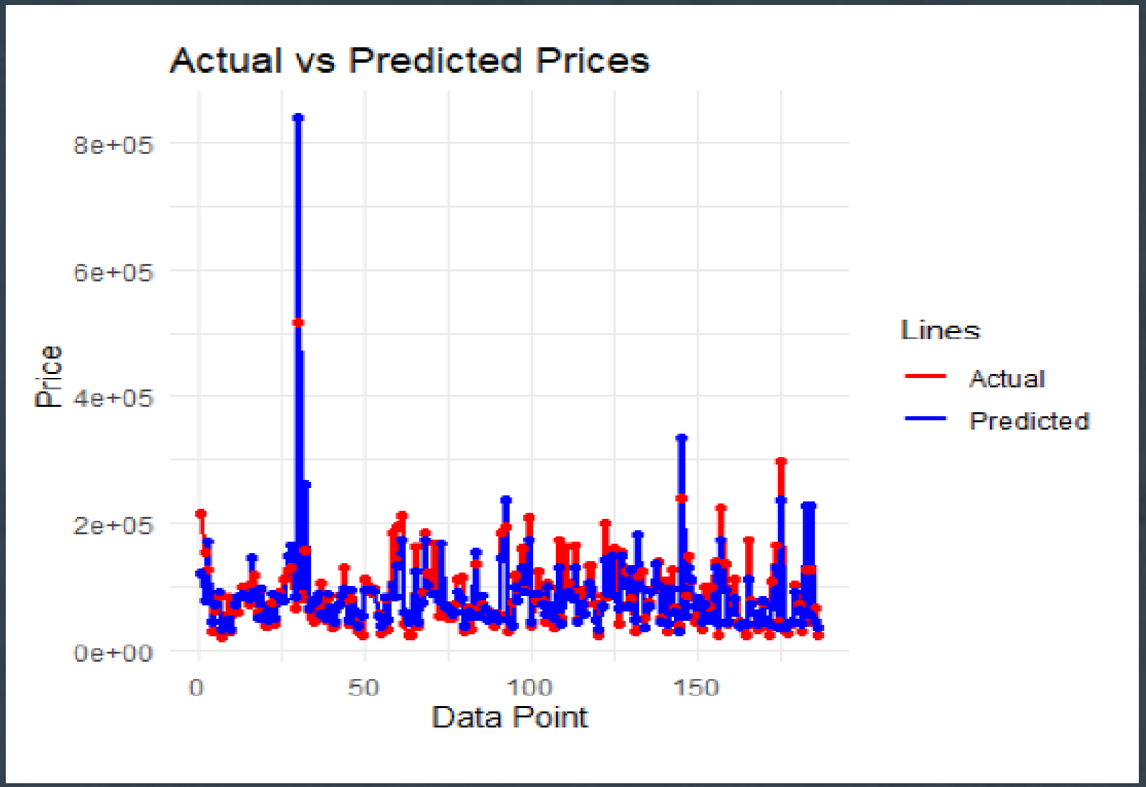


# MODEL PERFORMANCE

## LINEAR REGRESSION

```
Residual standard error: 0.3168 on 1039 degrees of freedom
Multiple R-squared:  0.7027, Adjusted R-squared:  0.6993
F-statistic: 204.7 on 12 and 1039 DF,  p-value: < 2.2e-16
```

| | predicted | True |
|---|---|---|
| 4 | 122327.03 | 216312.54 |
| 5 | 78473.61 | 153753.29 |
| 8 | 172447.70 | 127445.76 |
| 11 | 45891.78 | 29409.71 |
| 16 | 72465.59 | 63509.76 |
| 20 | 92636.32 | 85162.75 |
| 21 | 35188.39 | 21993.98 |
| 24 | 43286.19 | 35688.22 |
| 31 | 47189.73 | 85077.50 |
| 32 | 34368.07 | 31286.02 |
| 50 | 72303.86 | 65453.41 |
| 59 | 84367.65 | 58821.12 |
| 87 | 88353.35 | 101871.36 |
| 88 | 85125.72 | 89425.15 |



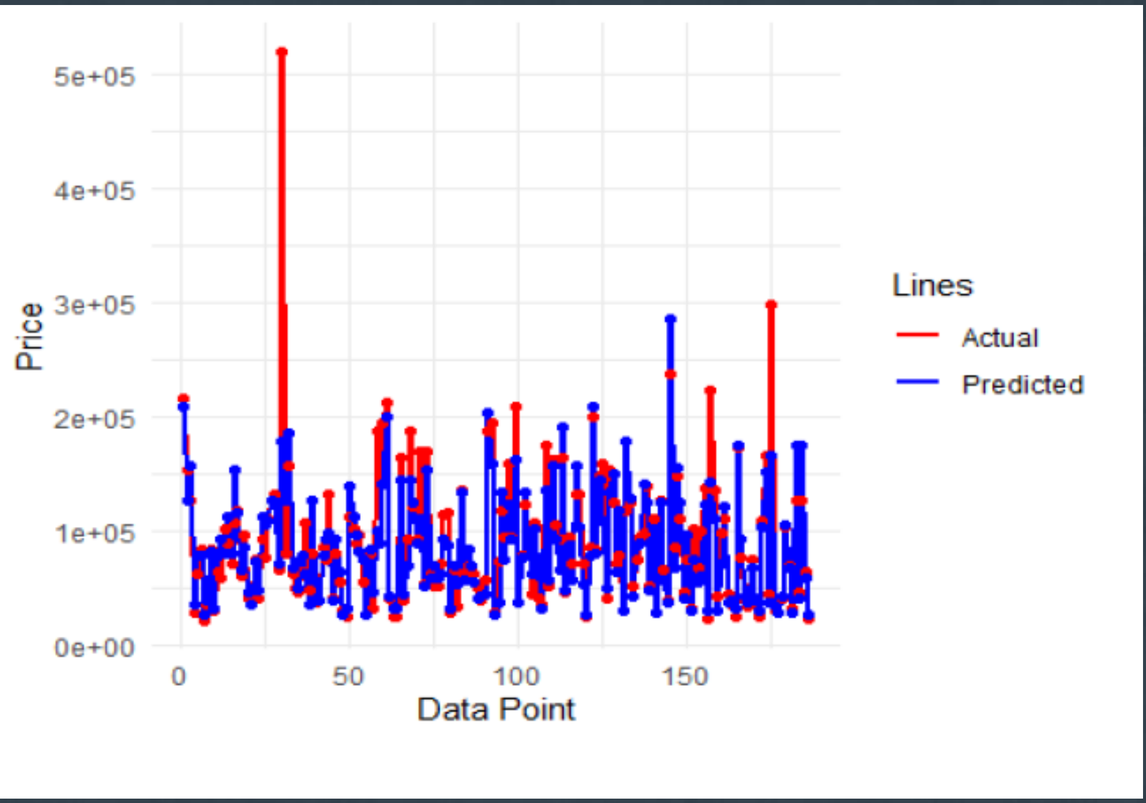
# MODEL PERFORMANCE

# SUPPORT VECTOR REGRESSOR

```
## [1] "R2 score: 0.86142574859494"
```

```
## [1] "MAE: 0.172006651734998"
```

| | predicted | True |
|---|---|---|
| 4 | 209937.19 | 216312.54 |
| 5 | 128139.30 | 153753.29 |
| 8 | 158456.41 | 127445.76 |
| 11 | 35985.46 | 29409.71 |
| 16 | 79593.33 | 63509.76 |
| 20 | 78590.49 | 85162.75 |
| 21 | 28069.53 | 21993.98 |
| 24 | 39803.77 | 35688.22 |
| 31 | 82688.90 | 85077.50 |
| 32 | 33185.27 | 31286.02 |



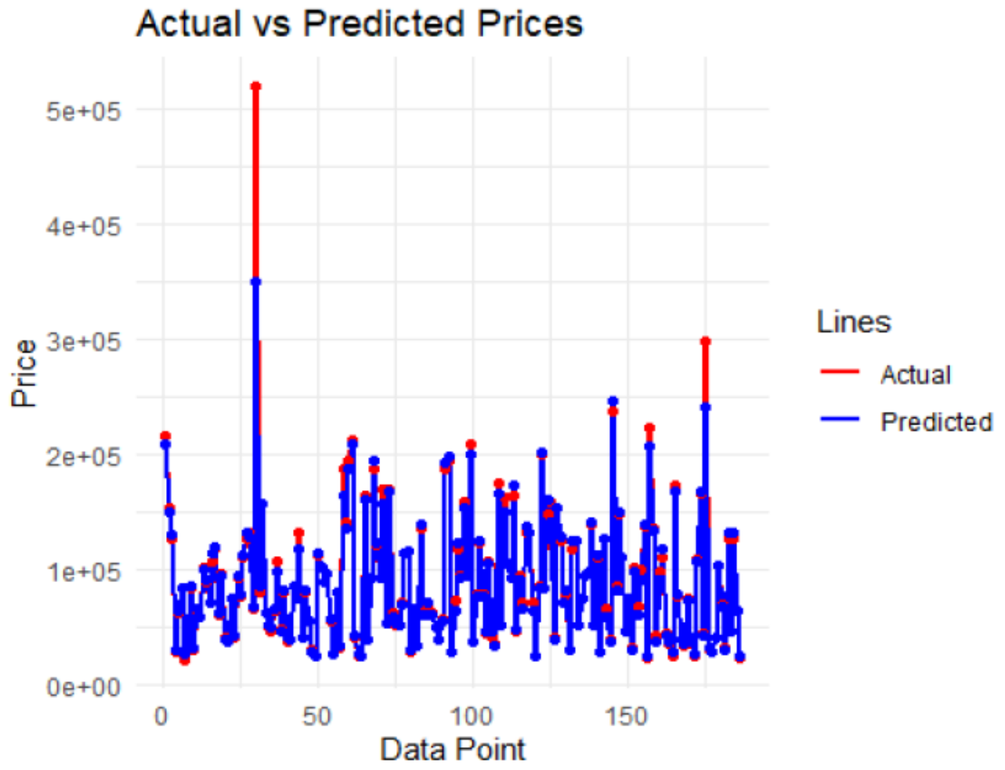
# MODEL PERFORMANCE

# RANDOM FOREST

```
## [1] "R2 score: 0.992549931979812"
```

```
## [1] "MAE Score: 0.0325191100620161"
```

| | Predicted | True |
|---|---|---|
| ## 190 | 85475.23 | 81752.83 |
| ## 193 | 157804.19 | 157282.56 |
| ## 195 | 62837.94 | 63254.02 |
| ## 202 | 52141.16 | 50893.06 |
| ## 206 | 50010.37 | 46801.15 |
| ## 220 | 66479.50 | 65555.71 |
| ## 222 | 98263.32 | 108179.71 |
| ## 230 | 47746.56 | 49017.60 |
| ## 248 | 83094.32 | 80900.35 |
| ## 249 | 41678.73 | 38012.08 |



# MODEL EVALUATION

| Models | R2 Score |
|---|---|
| Linear Regression | 70% |
| Support Vector Regressor | 86% |
| Random Forrest | 99% |

# FUTURE IDEA


Laptop Price Predictor
Brand
Apple
Type
Ultrabook
Ram(in GB)
2
Weight of the Laptop

## Limitations:

- Rapid technological advancements
- Insufficient Data
- High Price Variability
- Lack of Domain Knowledge
- External variables can significantly affect laptop costs

# Conclusion

In conclusion, predicting laptop prices is a difficult effort that requires examining and understanding a wide range of variables, from technical details to market patterns. Despite the difficulties, it's a useful tool for both customers and companies. While corporations can use it for competitive pricing and strategic planning, it can also assist consumers in making educated purchasing decisions.


Thank
You!