Predicting Laptop Price

SmartTech Co.

AGENDA

- Introduction
- Problem Statement
- Solution Approach
- Results
- Business Impact
- Implementation and Next Steps
- Q&A

TOOLS :

INTRODUCTION

- **Project Overview:**

- **Problem Statement:** Developing a robust machine learning model to predict laptop prices accurately.
- **Objective:** Accurate pricing, market positioning, and understanding brand influence on pricing.
- **Importance:** Helps SmartTech Co. remain competitive by pricing their laptops accurately and strategically.

Business Context

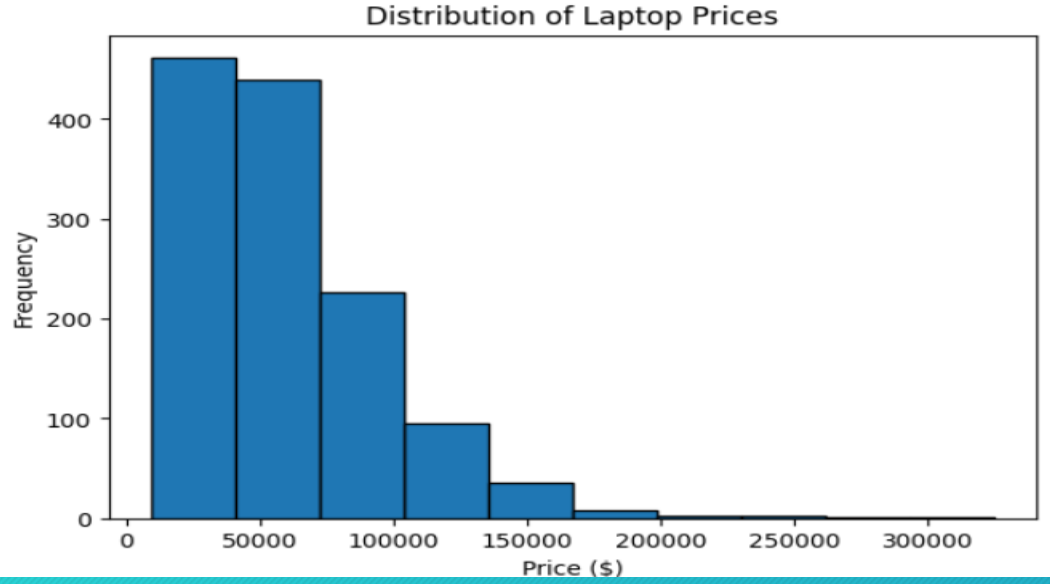
- **Client's Objectives:**
  - Accurate Pricing: Enhance pricing strategy based on features.
  - Market Positioning: Understand feature impact on prices.
  - Brand Influence: Assess how brand reputation affects pricing.

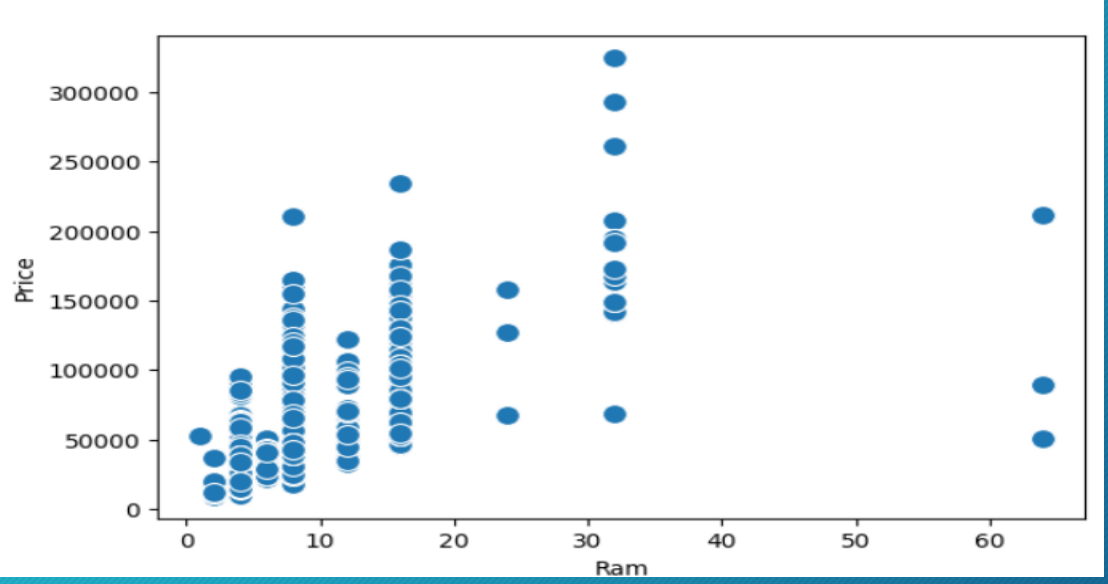
Data Overview :

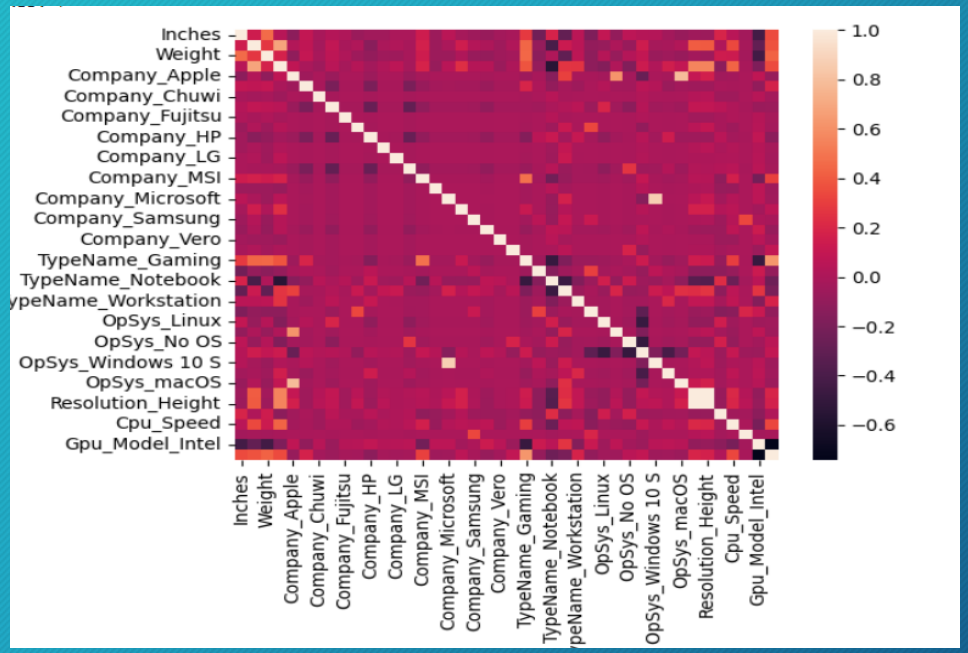
- **Dataset Description:**
- **Data Attributes**
- **Key Features:**
  - **Brand:** Manufacturer (e.g., Dell, HP, Apple)
  - **Processor Type:** Processor details (e.g., Intel i5, AMD Ryzen 7)
  - **RAM:** Memory size in GB
  - **Storage:** Type and capacity (e.g., 256GB SSD)
  - **Screen Size:** Size of the screen in inches
  - **Resolution:** Screen resolution (e.g., 1920x1080)
  - **Graphics:** Type of graphics card (e.g., integrated, dedicated)
  - **Price:** Laptop price in dollars (target variable)

- **Statistics and Summary**
- **Basic Statistics:**
- **Total Records:** 1303 laptops
- **Number of Features:** 8 features
- **Price Range:** $150 - $2400
- **Key Statistics:**
- **Average Price:** $1129
- **Median RAM:** 8GB
- **Most Common Brand:** Dell
- **Unique Values in Categorical Features:**
- **Brands:** 19 unique brands
- **Processor Types:** 20 unique processors
- **Additional Insights:**
- **Most Common Processor:** Intel i5
- **Most Common Storage Type:** SSD

Exploratory Data Analysis :







Data Preprocessing :

Content:

- **Handling Missing Values:** Most of the values are to be missing in entire row so simply drop that rows.
- **Encoding Categorical Variables :**

Company', 'TypeName', 'Inches', 'ScreenResolution', 'Cpu', 'Ram', 'Memory', 'Gpu', 'OpSys', 'Weight

Feature Engineering :

New Features: ['Inches', 'Cpu', 'Ram', 'Memory', 'Gpu', 'Weight', 'Price 'Company_Apple', 'Company_Asus', 'Company_Chuwi', 'Company_Dell' 'Company_Fujitsu', 'Company_Google', 'Company_HP', 'Company_Huawei', 'Company_LG', 'Company_Lenovo', 'Company_MSI', 'Company_Mediacom','Company_Microsoft', 'Company_Razer', 'Company_Samsung' 'Company_Toshiba', 'Company_Vero', 'Company_Xiaomi', 'TypeName_Gaming', 'TypeName_Netbook', 'TypeName_Notebook', 'TypeName_Ultrabook', 'TypeName_Workstation', 'OpSys_Chrome OS', 'OpSys_Linux', 'OpSys_Mac OS X', 'OpSys_No OS', 'OpSys_Windows 10', 'OpSys_Windows 10 S', 'OpSys_Windows 7', 'OpSys_macOS', 'Resolution_Width', 'Resolution_Height', 'Memory_Numeric', 'Cpu_Speed', 'Gpu_Model_ARM', 'Gpu_Model_Intel', 'Gpu_Model_Nvidia']

Among all features most correlation with price:

["Weight","Company_Apple", "Company_Fujitsu", "Company_Google","Company_HP",

"Company_Huawei","Company_Lenovo", "Company_MSI","Company_Mediacom","Company_Microsoft",

"Company_Vero", "TypeName_Netbook", "TypeName_Notebook","TypeName_Ultrabook",

"TypeName_Workstation", "OpSys_Windows 10 S","OpSys_macOS","Resolution_Width", "Resolution_Height","Cpu_Speed","Gpu_Model_ARM","Gpu_Model_Nvidia"]

Model Selection :

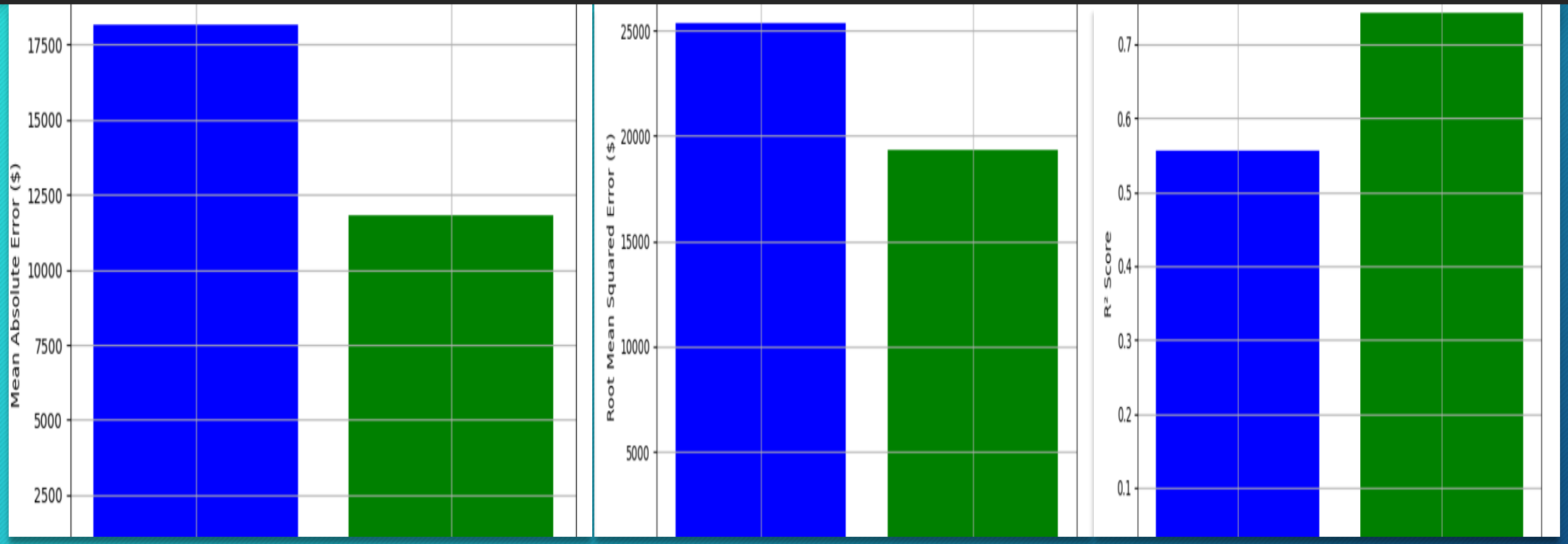
Linear Regression:

- **Mean Absolute Error(MAE):** $18,179.84
- **Root Mean Squared Error (RMSE):** $25,386.51
- **R^2 Score :** 0.556

Random Forest :

- **Mean Absolute Error(MAE):** $11,826.01
- **Root Mean Squared Error (RMSE):** $19,308.77
- **R^2 Score :** 0.743

Visual Representation :



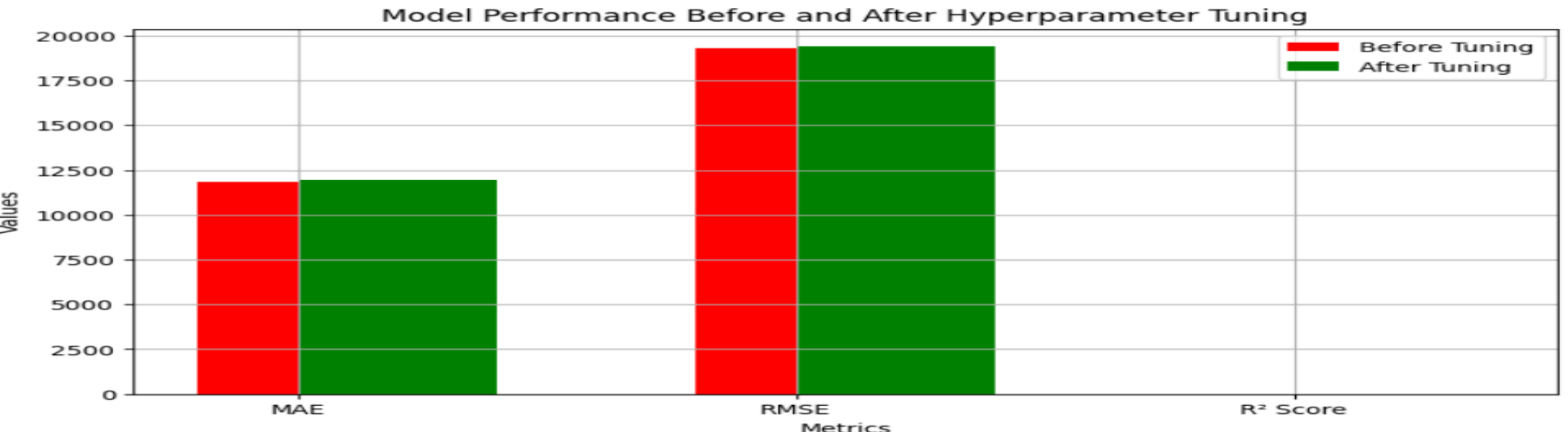
R2 score

- **Best Model:** Random Forest, as it demonstrates superior performance with lower error metrics and a higher R^2 score.
- **Recommendation:** Random Forest model for predicting laptop prices due to its improved accuracy and ability to handle complex data relationships.

Hyper Parameter Tuning :

- **Before Tuning:**
  - MAE: $11,826.01
  - RMSE: $19,308.77
  - R^2 Score: 0.743
- **After Tuning:**
  - MAE: $11,950.68
  - RMSE: $19,403.42
  - R^2 Score: 0.7405

Metric	Before Tuning	After Tuning
MAE	$11,826.01	$11,950.68
RMSE	$19,308.77	$19,403.42
R^2 Score	0.743	0.7405



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colab.research.google.com/drive/1c_Bfqd9XaVCj6mgPOMuztJE7avqztKl_

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```
1  import pandas as pd
2  import numpy as np
3  import seaborn as sns
4  import matplotlib.pyplot as plt
```

```
[ ] 1  df=pd.read_csv("/content/sample_data/laptop.csv")
```

```
[ ] 1  df.shape
```

```
(1304, 13)
```

```
1  df.columns
```

```
Index(['Unnamed: 0.1', 'Unnamed: 0', 'Company', 'TypeName', 'Inches',
       'ScreenResolution', 'Cpu', 'Ram', 'Memory', 'Gpu', 'OpSys', 'Weight',
       'Price'],
      dtype='object')
```

```
[ ] 1  df.head()
```

	Unnamed: 0.1	Unnamed: 0	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
0	0	0.0	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8GB	128GB SSD	Intel Iris Plus Graphics 640	macOS	1.37kg	71378.6832
1	1	1.0	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8GB	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	47895.5232
2	2	2.0	HP	Notebook	15.6	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8GB	256GB SSD	Intel HD Graphics 620	No OS	1.86kg	30636.0000
3	3	3.0	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16GB	512GB SSD	AMD Radeon Pro 455	macOS	1.83kg	135195.3360
4	4	4.0	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8GB	256GB SSD	Intel Iris Plus Graphics 650	macOS	1.37kg	96095.8080