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LAPTOP PRICE PREDICTION USING MACHINE LEARNING

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ABSTRACT

This paper uses supervised machine learning to offer a system for predicting laptop prices. The machine learning prediction approach used in the study, multiple linear regression, provided 81% prediction accuracy. There are numerous independent variables when using multiple linear regression. only one dependent variable, whose actual and predicted values are contrasted to determine the accuracy of the findings. This study suggests a system in which the price is a predicted dependent variable that is derived from elements such as the laptop's model, RAM, ROM (HDD/SSD), GPU, CPU, IPS Display, and Touch Screen.

Keywords: Multiple Linear Regression, Laptop Price, Regression Model, Machine Learning.

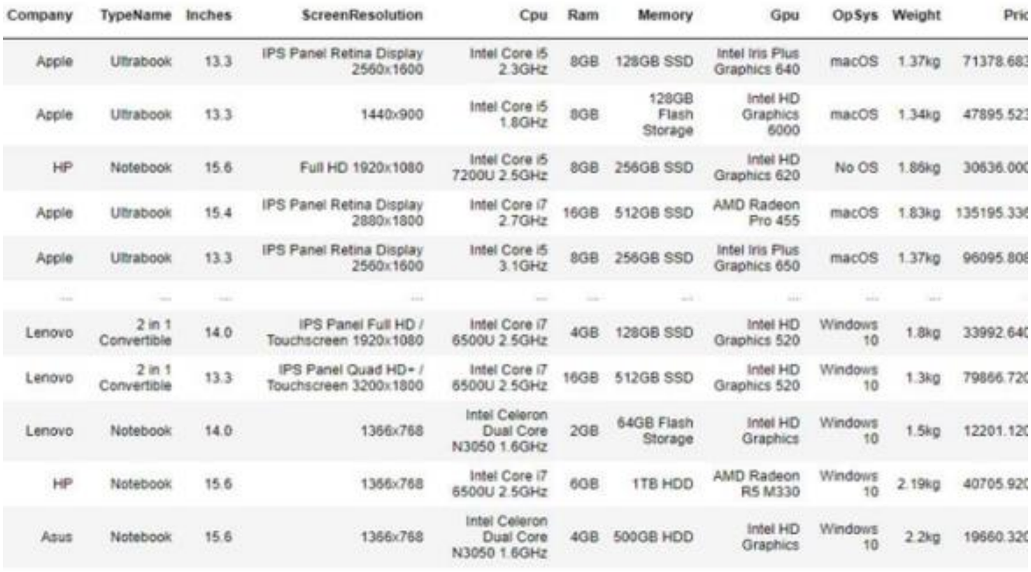
I. INTRODUCTION

Predicting laptop prices is a crucial and significant endeavor, particularly when the laptop is being shipped directly from the factory to electronic markets or stores. There is no longer the craze for laptops that we witnessed in 2020 to facilitate distant work and learning. After the nationwide shutdown, demand for laptops in India skyrocketed, and in the June quarter of 2021, 4.1 million units were shipped, which was a five-year record. Because the price of a laptop typically depends on a variety of unique features and elements, an accurate price forecast requires specialist expertise. The most important ones are usually things like brand and model, RAM, ROM, GPU, CPU, etc. We used a variety of methodologies and techniques in this study to increase the accuracy of our used laptop price prediction.

II. METHODOLOGY

Of course, sample data is required to support the implementation of machine learning utilising the Decision Tree algorithm. The information about different laptops and their costs based on their configuration is shown in the table below.

Sample information was collected from Kaggle.com.



Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Pric
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	71378.683
Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8GB	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	47895.523
HP	Notebook	15.6	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8GB	256GB SSD	Intel HD Graphics 620	No OS	1.86kg	30636.000
Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16GB	512GB SSD	AMD Radeon Pro 455	macOS	1.83kg	135195.336
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	96095.808
...	...	...	...	...	...	...	...	...	...	
Lenovo	2 in 1 Convertible	14.0	IPS Panel Full HD / Touchscreen 1920x1080	Intel Core i7 6500U 2.5GHz	4GB	128GB SSD	Intel HD Graphics 520	Windows 10	1.8kg	33992.640
Lenovo	2 in 1 Convertible	13.3	IPS Panel Quad HD+ / Touchscreen 3200x1800	Intel Core i7 6500U 2.5GHz	16GB	512GB SSD	Intel HD Graphics 520	Windows 10	1.3kg	79866.720
Lenovo	Notebook	14.0	1366x768	Intel Celeron Dual Core N3050 1.6GHz	2GB	64GB Flash Storage	Intel HD Graphics	Windows 10	1.5kg	12201.120
HP	Notebook	15.6	1366x768	Intel Core i7 6500U 2.5GHz	6GB	1TB HDD	AMD Radeon R5 M330	Windows 10	2.19kg	40705.920
Asus	Notebook	15.6	1366x768	Intel Celeron Dual Core N3050 1.6GHz	4GB	500GB HDD	Intel HD Graphics	Windows 10	2.2kg	19660.320

The C4.5 algorithm (used as a Decision Tree Classifier that can be used to generate a decision based on a sample dataset) begins by choosing the highest gain attribute as the tree's root, then creating branches for each value, dividing the cases into branches, and repeating the process for each branch until all the cases in it belong to the same class.

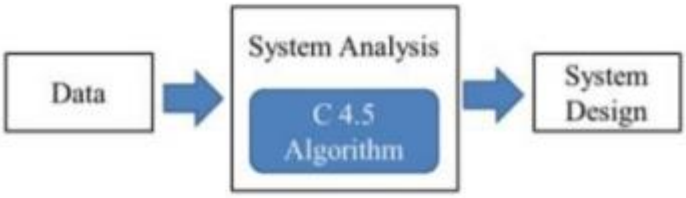


Figure: Flow of design and analysis

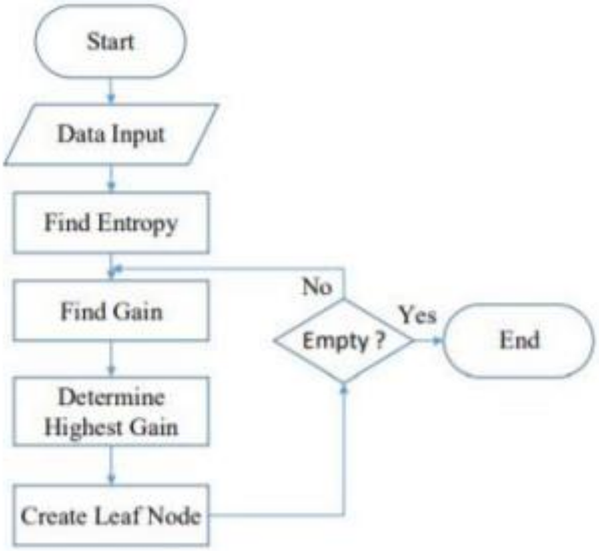


Figure: C 4.5 algorithms flowchart

Entropy and Gain were employed in calculations for each variable to ensure reliable findings. Entropy gauges the degree of randomness in a set of data. The classification process will be impacted by the high Entropy value.

The equation used to calculate Entropy and Gain, as follows:

$$Entropi\ (S) = \sum_{j=1}^{k} - p_j \log_2 p_j$$

S: Case set

k: Number of S partition

Pj: Probability obtained from the total (Yes / No) divided by the total case

$$\text{Gain (S,A)} = \text{Entrophy (s)} - \sum_{i=1}^{n} - \frac{|si|}{|s|} * \text{Entrophy (si)}$$

S: Case set

A: Attribute

n: Number of A attribute partition

|Si|: Number of cases on the i partition

|S|: Number of S partition

EXPLANATORY DATA ANALYSIS (EDA)

We can now compute tables and draw graphs to show how each characteristic relates to the variability of laptop pricing using our feature-engineered dataset. The bar plot technique, which we imported from Matplotlib, allows us to test and validate our original theories or hypotheses about how certain characteristics may affect laptop prices. Below is an example of how to plot a bar plot for the feature TypeName (type of laptop)

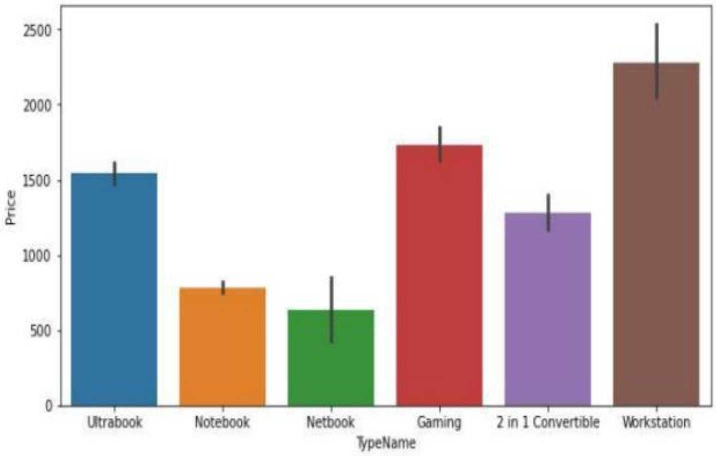
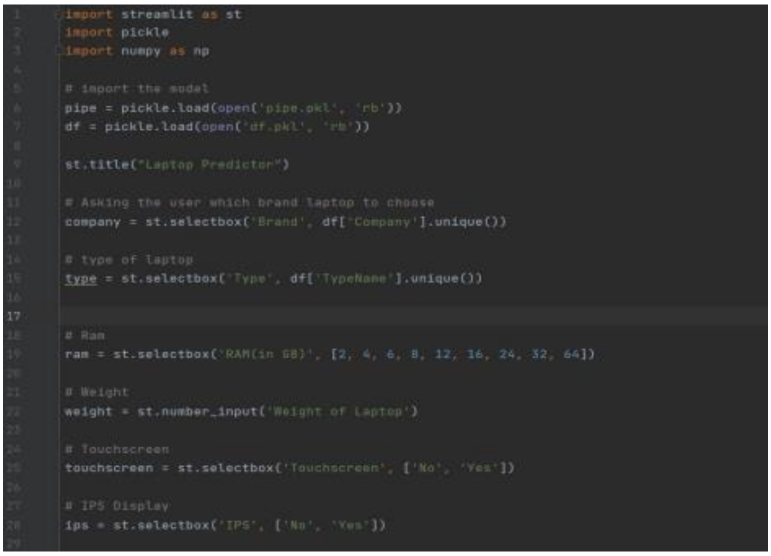


Figure: Data Visualization using bar plot

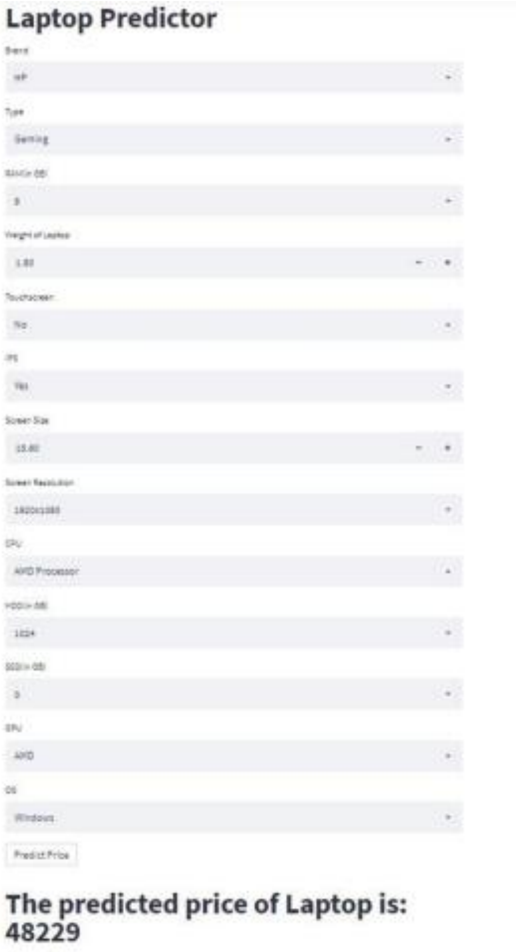
III. RESULTS AND DISCUSSION

This WebApp UI was created using the Streamlit framework. Custom web apps for machine learning and data science may be easily created and shared using the open-source Python package Streamlit. Results with backend code are displayed in the figures below.



```
import streamlit as st
import pickle
import numpy as np

# import the model
pipe = pickle.load(open('pipe.pkl', 'rb'))
df = pickle.load(open('df.pkl', 'rb'))

st.title("Laptop Predictor")

# Asking the user which brand laptop to choose
company = st.selectbox('Brand', df['Company'].unique())

# type of laptop
type = st.selectbox('Type', df['TypeName'].unique())


# Ram
ram = st.selectbox('RAM(in GB)', [2, 4, 6, 8, 12, 16, 24, 32, 64])

# Weight
weight = st.number_input('Weight of Laptop')

# Touchscreen
touchscreen = st.selectbox('Touchscreen', ['No', 'Yes'])

# IPS Display
ips = st.selectbox('IPS', ['No', 'Yes'])
```

Figure: Integrating ML model with Web Application



Laptop Predictor

Brand
HP

Type
Gaming

RAM(in GB)
8

Weight of Laptop
1.80

Touchscreen
No

IPS
Yes

Screen Size
15.60

Screen Resolution
1920x1080

CPU
AMD Processor

HDD(in GB)
1024

SSD(in GB)
0

GPU
AMD

OS
Windows

The predicted price of Laptop is: 48229

IV. CONCLUSION

It is simple for students to predict anything through the use of machine learning and the Decision Tree algorithm, especially when choosing the laptop specs that are most desirable for them in order to suit their needs and take into account their purchasing power. Because the laptop specs from the outcomes of the machine learning application have offered the most desirable specifications with their costs of laptops, students no longer need to search through numerous sources to discover the laptop specifications that they need to satisfy their needs.

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V. REFERENCES

[1] Sorrower MS. A literature survey on algorithms for multi-label learning. Oregon State University, Corvallis. 2010 Dec;18.

[2] Pandey M, Sharma VK. A decision tree algorithm pertaining to the student performance analysis and prediction. International Journal of Computer Applications. 2013 Jan 1;61(13).

[3] Priyama A, Abhijeeta RG, Ratheeb A, Srivastava S. Comparative analysis of decision tree classification algorithms. International Journal of Current Engineering and Technology. 2013 Jun;3(2):334-7

[4] Ho, T. K. (1995, August). Random decision forests. In Document analysis and recognition, 1995., proceedings of the third international conference on (Vol. 1, pp. 278-282).

[5] Weka 3 - Data Mining with Open-Source Machine Learning Software in Java. (n.d.), Retrieved from:

https://www.cs.waikato.ac.nz/ml/weka/. [August 04, 2018].

[6] Noor, K., & Jan, S. (2017). Vehicle Price Prediction System using Machine Learning Techniques. International Journal of Computer Applications, 167(9), 27-31.

[7] Pudaruth, S. (2014). Predicting the price of used cars using machine learning techniques. Int. J. Inf. Comput. Technol, 4(7), 753-764.

[8] Listiani, M. (2009). Support vector regression analysis for price prediction in a car leasing application (Doctoral dissertation, Master thesis, TU Hamburg-Harburg).

[9] Utku A, Hacer (Uke) Karacan, Yildiz O, Akcayol MA. Implementation of a New Recommendation System Based on Decision Tree Using Implicit Relevance Feedback. JSW. 2015 Dec.