



# LAPTOP PRICE PREDICTION USING MACHINE LEARNING

**Prof .B.Prajna<sup>1</sup>, A .Lekha Sri , A.Sahiti , A .Bhagyasri Teja ,A.Arzoo**

Department of CSE, AUCEW, Visakhapatnam

**ABSTRACT:** This paper presents a laptop price prediction system by using the supervised machine learning technique. The research uses multiple linear regression as the machine learning prediction method which offered 81% prediction precision. Using multiple linear regression, there are multiple independent variables but one and only one dependent variable whose actual and predicted values are compared to find precision of results. This paper proposes a system where price is dependent variable which is predicted, and this price is derived from factors like Laptop's model, RAM, ROM (HDD/SSD), GPU, CPU, IPS Display, and Touch Screen. Keywords— Multiple Linear regression, Laptop Price, Regression model, Machine Learning, Random forest , Random forest, SVM.

## I.INTRODUCTION:

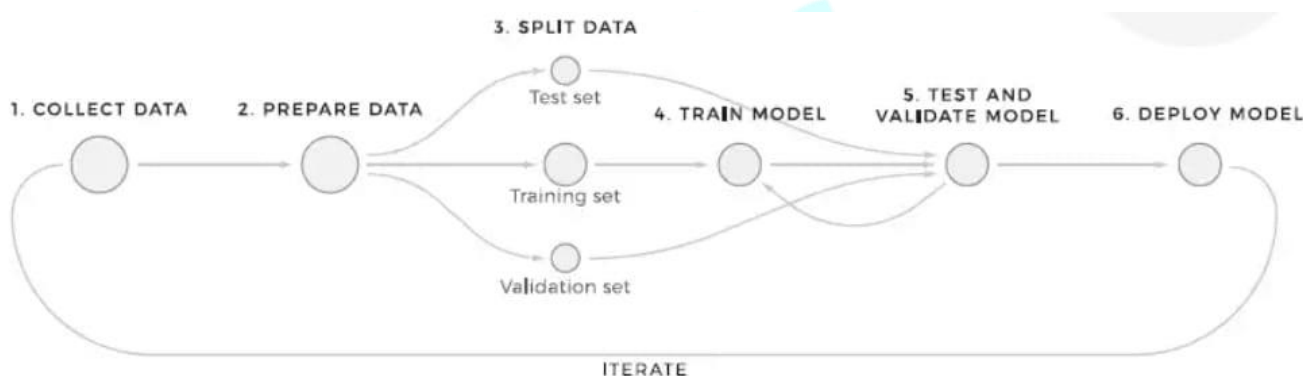
Laptop price prediction especially when the laptop is coming direct from the factory to Electronic Market/ Stores, is both a critical and important task. The mad rush that we saw in 2020 for laptops to support remote work and learning is no longer there. In India, demand of Laptops soared after the Nationwide lockdown, leading to 4.1-Million-unit shipments in the June quarter of 2021, the highest in the five years. Accurate Laptop price prediction involves expert knowledge, because price usually depends on many distinctive features and factors. Typically, most significant ones are brand and model, RAM, ROM, GPU, CPU, etc. In this paper, we applied different methods and techniques in order to achieve higher precision of the used laptop price prediction.

We will make a project for Laptop price prediction. The problem statement is that if any user wants to buy a laptop then our application should be compatible to provide a tentative price of laptop according to the user configurations. Although it looks like a simple project or just developing a model, the dataset we have is noisy and needs lots of feature engineering, and

preprocessing that will drive your interest in developing this project.

FLOW OF LOGIC:

1. collecting the data and select required data.
2. prepare, preprocess, and transform this data.
3. Once this stage is completed, the model is trained using training data and start building predictive models.
4. A model that forecasts prices with the highest accuracy rate will be chosen to power a system or an application.



## II. MODULE:

Use of computers and laptops has been on a rise for the past few decades. Previous studies indicate that uses of laptop have positive impact on learning and it creates a positive attitude towards the task, more autonomy on work and larger variety of strategies that can be used . A decline in prices of computer was observed as about 11% per year . Laptop computers can provide powerful tools for elementary classrooms, especially if they are combined with authentic instruction. There is a difference in the desktops and laptops, quality-adjusted prices has fallen at a slightly lower value than mobile models (24%) than for desktops (32%), It shows that taking quality changes into account has a huge impact on the time patter of price indexes for PCs Parameters in hedonic price equations for desktop PC models differ from those for mobile PCs . While the annual inflation rate for overall investment has been 3.66 percent for the period 1958 to 1992, computer prices have declined by 19.13 percent per year! Similarly, overall investment grew at 3.82 percent, while investment in computers increased at an astounding 44.34 percent .

**Laptops may not only help the professionals but can also be used as powerful tools for elementary classrooms, when it is combined with authentic instruction . International**

comparability of methods used to convert the value added of the office and computing machinery sector (OCM) into constant prices for nine OECD countries was also analyzed . I concluded that the variation which exist in the price indexes is largely de to differences in the method

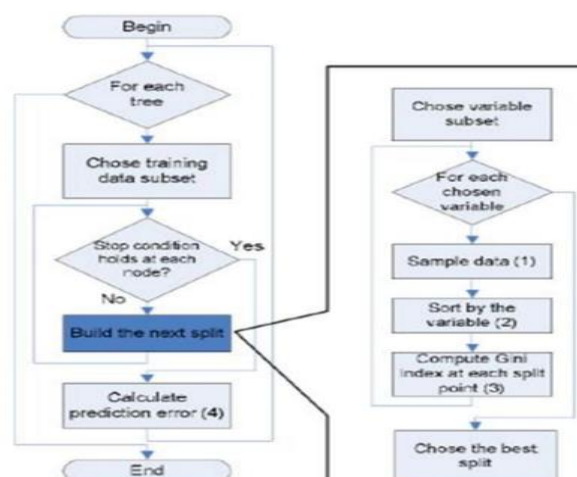
### III. REVIEW OF LITERATURE:

Predicting price of laptops has been studied extensively in various researches. Listian discussed, in her paper written for Master thesis, that regression model that was built using decision tree & Random Forest Regressor can predict the price of a laptop that has been leased with better precision than multivariate regression or some simple multiple regression. This is on the grounds that Random forest Algorithm is better in dealing with datasets with more dimensions and it is less prone to overfitting and underfitting. The weakness of this research is that a change of simple regression with more advanced Random forest Algorithm regression was not shown in basic indicators like mean, variance or standard deviation.

### IV. ALGORITHM:

The working process can be explained in the below steps

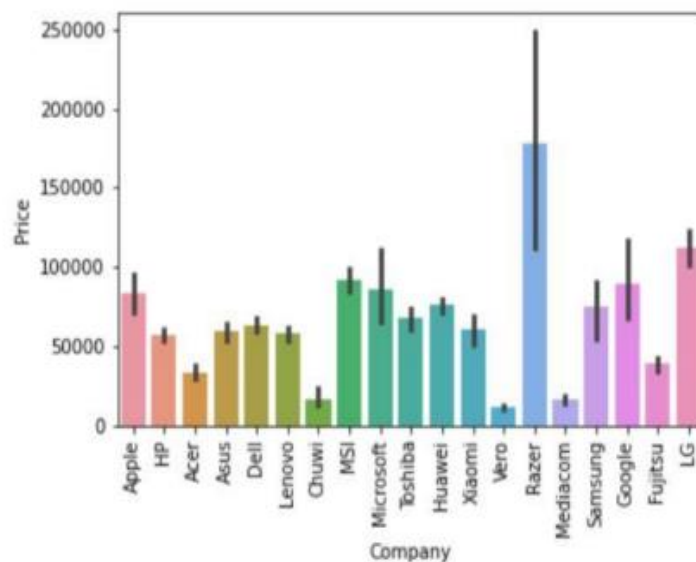
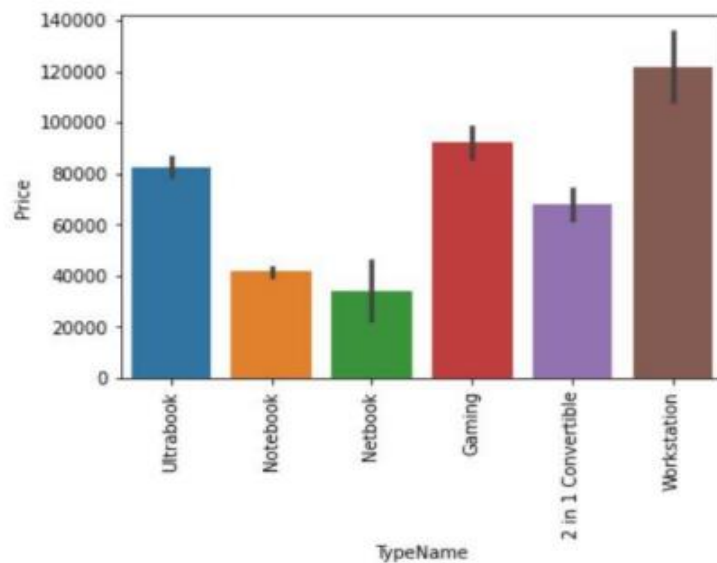
1. Select random K datapoints from the training data set.
2. Build the decision trees associated with the selected data points(subsets)
3. Choose the number N for decision trees that you want to build
4. Repeat Step 1 & 2 .
5. For new data points , find the predictions of each decision tree, and assign the new data points to the category that wins the majority votes.

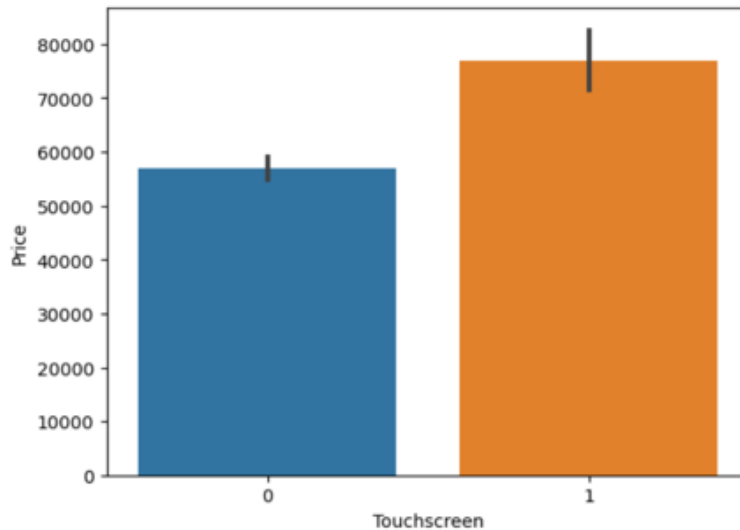


## V. PROCESS INVOLVED:

### EXPLANATORY DATA ANALYSIS (EDA):

Using our feature-engineered dataset, we can now plot graphs and compute tables to visualize how each feature relates to the variability of laptop prices. By using the bar plot method imported from Matplotlib, we can test and verify our hypothesis or initial opinions on how some features will affect the pricing of laptops. Here's an illustration of plotting a bar plot for the feature TypeName (type of laptop)





## VI. RESULT:

Streamlit library is used to build this WebApp UI. Streamlit is an (open-source Pythonlibrary) that makes it easy to create and share, custom web apps for machine learning and data science. Result with backend code is shown in following figures.

```

%%writefile streamlit_app.py
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 Price Predictor")

# brand
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 the Laptop')

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

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

# screen size
screen_size = st.number_input('Screen Size')

# resolution
resolution = st.selectbox('Screen Resolution',['1920x1080','1366x768','1600x900','3840x2160','3200x1800','2880x1800','2560x1600','2560x1440','2304x1440'])

#cpu
cpu = st.selectbox('CPU',df['Cpu brand'].unique())

```



Screen Resolution  
1920x1080

CPU  
Intel Core i5

HDD(in GB)  
0

SSD(in GB)  
128

GPU  
Intel

OS  
Mac

Predict Price

**The predicted price of this configuration is 62756**

## VII. PROBLEM DEFINITION:

We will make a project for Laptop price prediction. The problem statement is that if any user wants to buy a laptop then our application should be compatible to provide a tentative price of laptop according to the user configurations. Although it looks like a simple project or just developing a model, the dataset we have is noisy and needs lots of feature engineering, and preprocessing that will drive your interest in developing this project.

## IX. TECHNOLOGIES:

### 1. Python

Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. Python uses dynamic typing and a combination of reference counting and a cycle-detecting garbage collector for memory management. It uses dynamic name resolution (late binding), which binds method and variable names during program execution.

### 2. Machine Learning

Machine learning (ML) is a field of inquiry devoted to understanding and building methods that "learn" – that is, methods that leverage data to improve performance on some set of tasks. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so. Machine learning algorithms are used in a wide variety of

applications, such as in medicine, email filtering, speech recognition, agriculture, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks.

### 3.Streamlit:

Streamlit is an open-source web framework written in Python. It is the fastest way to create data apps and it is widely used by data science practitioners to deploy machine learning models. To work with this it is not important to have any knowledge of frontend languages

### 4.SKlearn:

- Scikit-learn is mainly coded in Python and heavily utilizes the NumPy library for highly efficient array and linear algebra computations.
- Some fundamental algorithms are also built in Cython to enhance the efficiency of this library. Support vector
- machines, logistic regression, and linear SVMs are performed using wrappers coded in Cython for LIBSVM and LIBLINEAR, respectively. Expanding these routines with Python might not be viable in such circumstances. Scikit-learn works nicely with numerous other Python packages, including SciPy, Pandas data frames, NumPy for array vectorization, Matplotlib, seaborn and plotly for plotting graphs, and many more.

## X. TESTING

### 1. The Test Standard:

Regarding laptop price prediction, we will test the input format, invalid input verification, and return code etc. Besides, laptop price prediction uses various ML algorithms. The result will be affected by the input parameters provided for various fields. Although the model is built and trained perfectly, 100% accuracy is currently not guaranteed.

### 2. TEST PROCESS:

Firstly, we need to train certain amount of data and draw conclusions from them by observing the correlation between various fields present in the dataset and the price factor. Further different algorithms are used in this process and the one with least Mean Absolute Error is

chosen as the best algorithm to derive conclusions. Depending on those conclusions we try to predict the price for the unknown data. The accuracy rate depends upon the efficiency of the algorithm and the quality of the training dataset.

## XI. ACKNOWLEDGEMENT

It is a great pleasure to have the opportunity to extend our heartfelt gratitude to everyone who helped us throughout the course of this project. We are profoundly grateful to our supervisor Prof. B. Prajna, Head of department for CS&SE of AUCEW for her expert guidance, continuous encouragement and ever willingness to spare time from her otherwise busy schedule for the project's progress reviews. Her continuous inspiration has made us complete this project and achieve its target.

## XII. REQUIREMENTS SPECIFICATION:

### A. Software Requirements :

- a) Jupyter Notebook
- b) Google Colab

Following are the software requirement necessary of the project:

- a) Python programming language (version 3.7 or 3.8)
- b) SKlearn
- c) Streamlit
- d) Linux OS or Windows or MAC

### B. Hardware Requirements :

Following are the hardware requirement that is most important for the project:

- a) Fluently working Laptops
- b) RAM minimum 4Gb

### Hardware Interfaces

1. Processor : Intel CORE i3 processor with minimum 2.9 GHz speed.
2. RAM : Minimum 4 GB.
3. Hard Disk : Minimum 500 GB

### Software Interfaces

1. Microsoft Word 2003
2. Operating System : Windows 10 or above.



### XIII. APPLICATIONS:

**1.Price Prediction:**Laptop price prediction is helpful to predict the prices of laptops with desired configurations.This helps individuals to get a better picture of the price that must be spent in order to purchase a laptop with desired configuration.

**2.Price Comparison:**It also helps us to compare the current market price with our predicted price, which is useful to get clarity on the price margin.

**3.Other Applications:**This project, if applied to different datasets, it is useful in predicting the prices of other commodities as well Example-Television price prediction,Moblie phone price predictions



## XIV.OUTPUT:

**Laptop Price Predictor**

Brand: Apple

Type: Ultrabook

RAM(in GB): 8

Weight of the Laptop: 1.35

Touchscreen: No

IPS: Yes

Screen Size: 13.29

Screen Resolution: 1920x1080

Screen Resolution: 1920x1080

CPU: Intel Core i5

HDD(in GB): 0

SSD(in GB): 128

GPU: Intel

OS: Mac

**Predict Price**

**The predicted price of this configuration is 62756**

## XV.CONCLUSION:

Predicting something through the application of machine learning using the Random forest algorithm makes it easy for students, especially in determining the choice of laptop specifications that are most desirable for students to meet student needs and in accordance with the purchasing power of students. Students no longer need to look for various sources to find laptop

specifications that are needed by students in meeting the needs of students, because the laptop specifications from the results of the machine learning application have provided the most desirable specifications with their prices of laptops.

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