A

PROJECT REPPORT

ON

Laptop Price Predictor Using LR And RF

Submitted in partial fulfilment of the requirements

of the degree of

Bachelor of Engineering

In

Information Technology

by

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University of Mumbai

2021-22

CERTIFICATE

This is to certify that the project entitled **"Laptop Price Predictor Using LR And RF"** is a bonafide work of **Alok Salian (51), Aashish Sharma (54), Vinay Thakur (58), Vivek Tiwari (59)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **"Bachelor of Engineering"** in **"Information Technology"**.

Name and sign
Supervisor/Guide

Name and sign
Co Supervisor/Guide

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Project Report Approval for T.E.

This project report entitled ***Laptop Price Predictor Using LR And RF*** **by** ***Mr.Alok Salian,Mr.Aashish Sharma, Mr.Vinay Thakur, Mr.Vivek Tiwari*** is approved for the degree of Bachelor of Engineering in **Information Technology.**

Examiners

1.----------

2.----------

Date:

Place:

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

_____

(Signature)

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Alok Salian (51)

Aashish Sharma (54)

Vinay Thakur (58)

` Vivek Tiwari (59)

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ABSTRACT

Laptop Is A Device Which Is Growing Its Popularity At An Immense Rate,From Young Teenagers To Office Going Workers Everyone Needs An Laptop In The World Where Technology Is Increasing At A Very Fast Rate.People May Need Laptops For Different Usages Such As Some Might Need Them For Light Work Such As Simple Office Presentations And Documentations And Some Might Need Laptops For A Lot Of Heavy Usage Such As Gaming,Content Creation Or May Be Graphic Designing Which Requires A Laptop To Be Very High End.Now In This Case Where Everyone Wants A Laptop For Different Purposes It Is Very Important To Know What Type Of Laptop Is Available At What Point Of Price.Some Laptops Maybe Expensive Just Because Of Their Brand Name And Some May Be Very Cheap Having Not So Good Specifications.Now From Customer's Point Of View A Customer Can Not Ask The Prices And Specifications Of Each And Every Laptop That Is Available In The Market.And It May Happen That The Laptop Which User Is Looking For Is Not Available Or Has Not Been Manufactured Yet Even Once.So To Avoid Such Problems We Have Developed An Laptop Price Predictor Using ML Algorithms.The Main Aim Of Our Project Is To Allow The User To Enter The Specification That He/She Is Looking In The Laptop That They Want To Buy And We Will Predict The Price Of The Laptop With That Same Specifications Using The Laptop Specification Vs Price Data Set Available Over The Internet.The User Would Also Be Able To Visualize The Prices Of Laptops And Laptops Of Different Brands Using Different Graphs That Has Been Provided On Our Web App.Our Project Aims To Help The User So That They Can Get To Know What Type Of Laptop Is Supporting Their Budget And What Would Be The Price Of The Laptop That The User Is Aspiring To Buy.Our Project Is In The Form Of A Web App So The Users Can Easily Use Our Web App And Access This Tool Even If They Have A Low End Device.

1. INTRODUCTION

In The World Full Of Technology,People Use Laptops And Computers For Different Purposes Such As Gaming,Content Creation,Programming,Or Some Casual Work.People May Or May Not Have Clear Idea Or Knowledge When It Comes To The Specifications And Prices Of Laptops Due To Which They May Sometimes Buy Laptops Which Doesn't Support Their Requirements Or They May Sometimes Pay More Money For The Laptop Which Comes With The Exactly Same Specifications But Different Brand.So We Need To Create Awareness Among The Customers And We Need To Increase The Knowledge About Laptops And Their Specifications Among Them So That They Don't Face These Issues.Keeping This As The Main Intention Of Our Project, We Are In A Fast-Growing Society Where Science And Technology Sees A Rapid Growth And Time Has Become The Most Valuable Thing.We Are Living In The World Where Artificial Intelligence And Machine Learning Is Growing At A Very Fast Pace.So With All The Power At Our Fingertips This Is What We Have Come Up With.We Have Created A Machine Learning Model Using Different Machine Learning Algorithms And Data Mining Tasks Which Helps Us To Predict The Price Of The Laptop Based On The Specifications Entered By The User.The Machine Learning Model Has Been Trained Using The 85% Of The Data Set Which We Are Using In This Project.The Data Set Can Be Downloaded For Free From The Kaggle Website Which Provides A lot Of Free Datasets.The Data Set Was First Cleaned Using Different Techniques In Which We Checked Whether Our Dataset Contains Any Irregularities Or Null Values Which Needs To Be Removed.Once The Data Set Was Cleaned We Started To Build The Model To Build The Model We Have Used Two Different ML Algoirithms And We Have Built Two Different Models Just To Compare The Prediction Of Each One Of Them.The First Model Has Been Created Using The **Linear Regression Algorithm** (Linear Regression is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. It is mostly used for finding out the relationship between variables and forecasting) And The Other One Was Built Using The **Random Forest Algorithm**(Random

forest is a Supervised Machine Learning Algorithm that is used widely in Classification and Regression problems. It builds decision trees on different samples and takes their majority vote for classification and average in case of regression).Once Both The Models Were Generated We Used The Streamlit Library Available In Python To Convert Our Project Into An Web App.The **Streamlit** Library Is An External Python Library Which Is Used To Build Web Apps Without Putting So Much Of Efforts.In Our Web App We Have Also Included Different Kinds Of Graphs That Helps The User To Visualize The Results And Make The Best Decision.The Final Web App Was Deployed On An Open Source Hosting Web Site So That It Can Be Accessed From Anywhere,By Anyone Who Has The Access To The URL.

2. LITERATURE SURVEY

Year Of Paper	Title of paper	Methodology of paper	Advantages	Limitation
2019	Machine learning and its applications: A Review	Machine Learning	It Reduces Man Work,It Can Solve Complex Problems Easily In Very Less Time	Machines Need To Be Properly Trained To Properly Perform Some Tasks
2016	A Review of Data Mining Literature	Data Mining	It Provides Us The Valuable Information Which Can Be Used To Make Conclusions And Decisions	Data Mining Can Lead To Misuse Of Information
2018	Linear Regression Analysis Study	Linear Regression algorithm in ML	Simple To Implement And Understand	Overfitting Is An Important Issue
2012	Analysis of a Random Forests Model	Random Forest algorithm in ML	High Accuracy , Less Chances Of Overfitting Issue	High Complexity , Longer Training Time
2018	Analyzing online price by using machine learning techniques	Building Model Which Can Make Predictions Using ML	Using This Users Can Plan Their Budgets Properly	Data Set Must Be Large Enough To Properly Train The Model
2022	Laptop Price Prediction using Machine Learning	Laptop Price Prediction Using ML	It Can Help The User To Buy The Best Laptop In Their Budget	Data Set Needs To Be Updated Frequently

3. PROPOSED WORK

3.1 Requirement Analysis:

3.1.1 Scope:

The Laptop Price Predictor Can Predict The Prices Of Laptops Based On The Specifications And The Brand Selected.The Specifications Include Ram,Graphic Card,Processor,Screen Size,Display Type,Screen Resolution,Weight Of The Laptop And Many More Such Important Factors.The User Selects The Specification And Clicks On The Predict Button Provided On Our Website,Which Then Shows The Price And Also Few Graphs Related To Its Predictions And Some Static Graphics Related To Data Set Provided To It.The User May Use These Graphs And The Prediction Provided To Make Their Decisions.

3.1.2 Feasibility Study:

The feasibility study is a major factor which contributes to the analysis and development of the system. The decision of the system analyst whether to design a system or not depends on its feasibility study. Feasibility study is undertaken whenever a possibility of probability of improving the existing system or designing new system. Feasibility study helps to meet user requirements.

3.1.3 Hardware & Software Requirement:

A. Hardware Requirements

- System: Laptop With Minimum I3 Processor

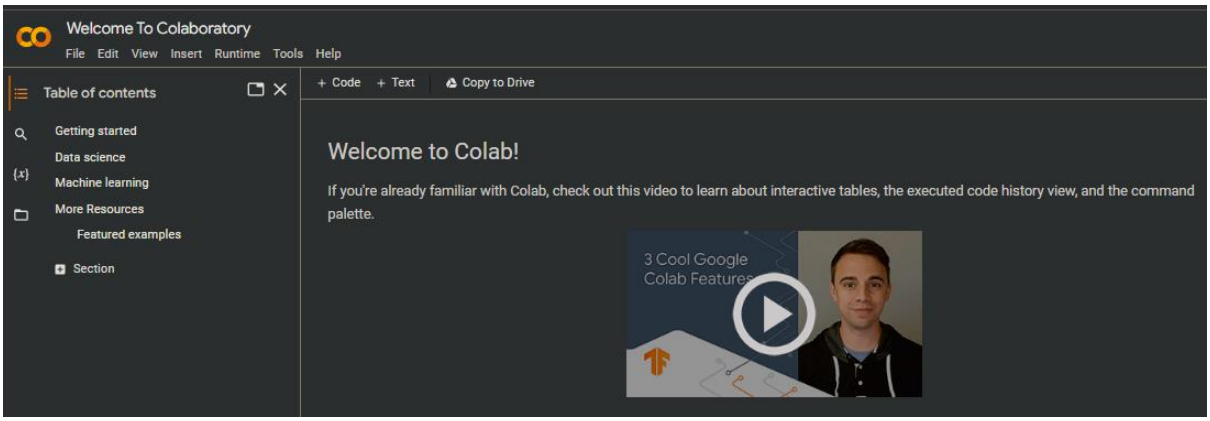
B. Software Requirements

- Visual Studio Code
- Google Colab / Jupyter Notebook
- Python 3 (With Numpy And Pandas)
- Stremlit
- Any Browser Supporting Javascript

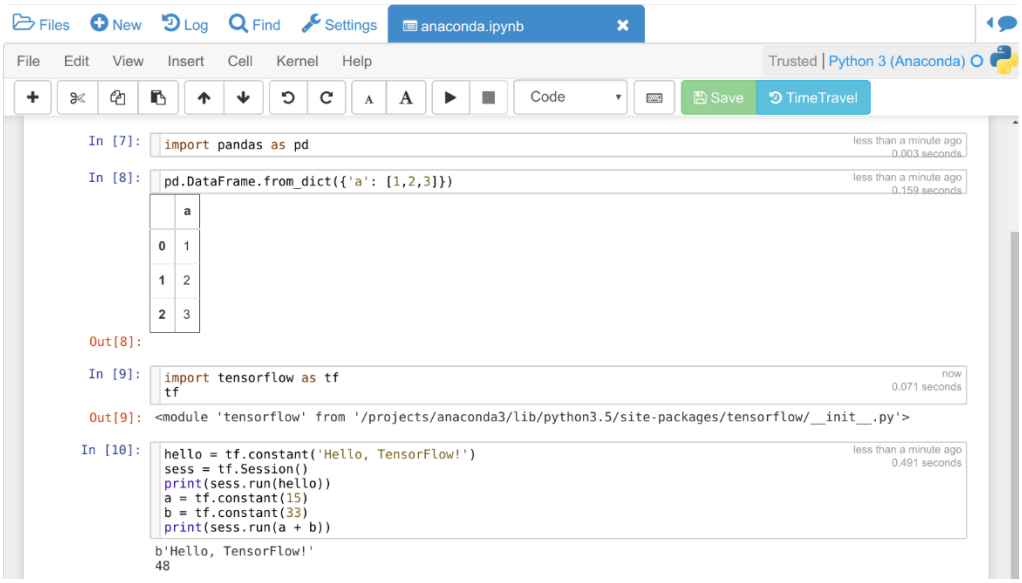
Software components:

1. **<u>Visual Studio Code</u>** – Visual Studio Code, also commonly referred to as VS Code, is a source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git.

2. **<u>Google Colab</u>** – Colaboratory, or “Colab” for short, is a product from Google Research. Colab allows anybody to write and execute arbitrary python code through the browser, and is especially well suited to machine learning, data analysis and education.



3. **<u>Jupyter Notebook</u>** – Project Jupyter is a project and community whose goal is to "develop open-source software, open-standards, and services for interactive computing across dozens of programming languages". It was spun off from IPython in 2014 by Fernando Pérez and Brian Granger.



4. **Python 3** – What is Python 3? Python 3 is a newer version of the Python programming language which was released in December 2008. This version was mainly released to fix problems that exist in Python 2. The nature of these changes is such that Python 3 was incompatible with Python 2. It is backward incompatible.

    - NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays.
    - pandas is a software library written for the Python programming language for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series. It is free software released under the three-clause BSD license.

5. **Streamlit** – Streamlit is an open source app framework in Python language. It helps us create web apps for data science and machine learning in a short time. It is compatible with major Python libraries such as scikit-learn, Keras, PyTorch, SymPy(latex), NumPy, pandas, Matplotlib etc.

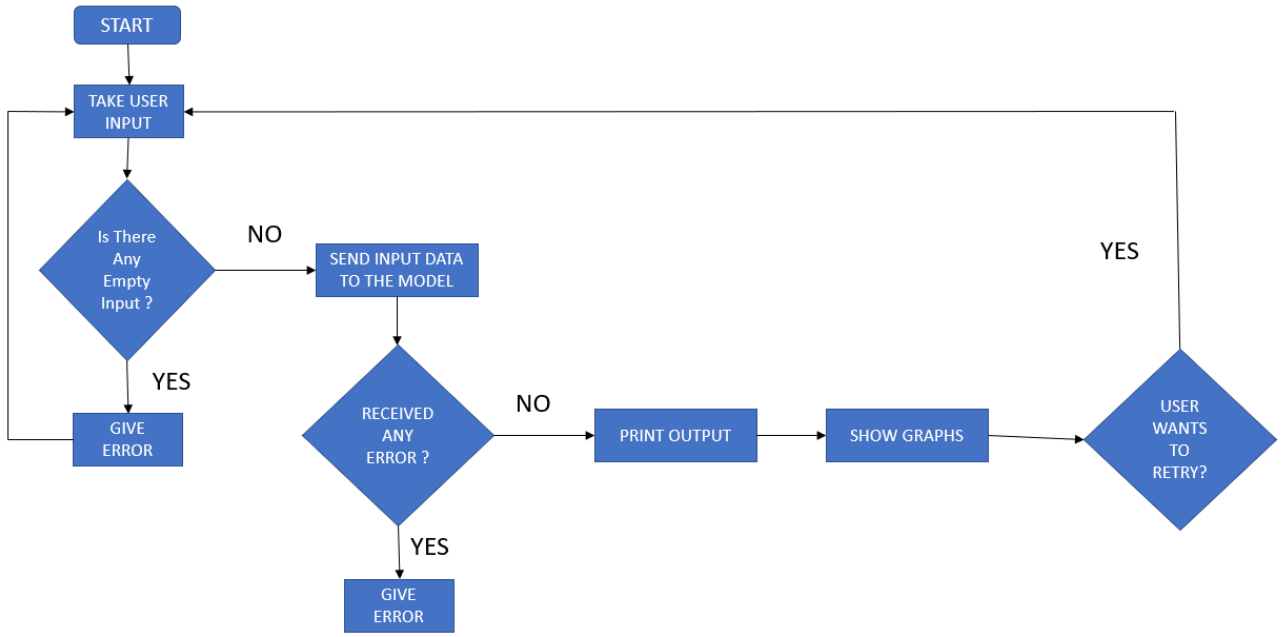
6. **Browser (With JS)** – A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web. This includes Web pages, videos and images.

3.2 PROBLEM STATEMENT

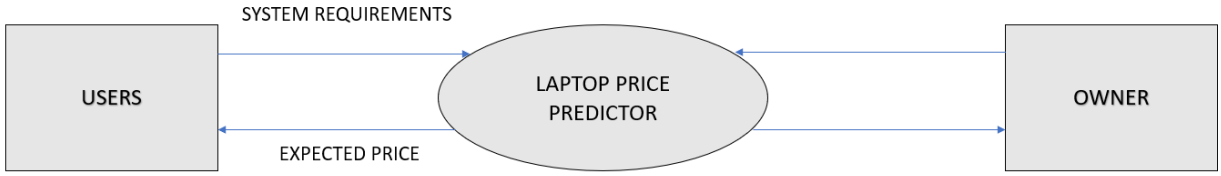
To Design A Web App Which Consists Of Different Input Fields Asking About The Specification Of Laptop Which Needs To Be Filled By The User.The Web App Must Include An Button After Clicking On Which The Price Of The Laptop Must Be Displayed Using The Laptop Price Predictor Model Which Is To Be Made Using The Linear Regression And Random Forest Algorithms.The Web App Must Also Include Some Static And Dynamic Graphs Which Can Help The User To Interpret The Results Predicted By Your ML Model And Can Help The Users The Understand The Prices Of Laptops Easily.

3.3 PROJECT DESIGN

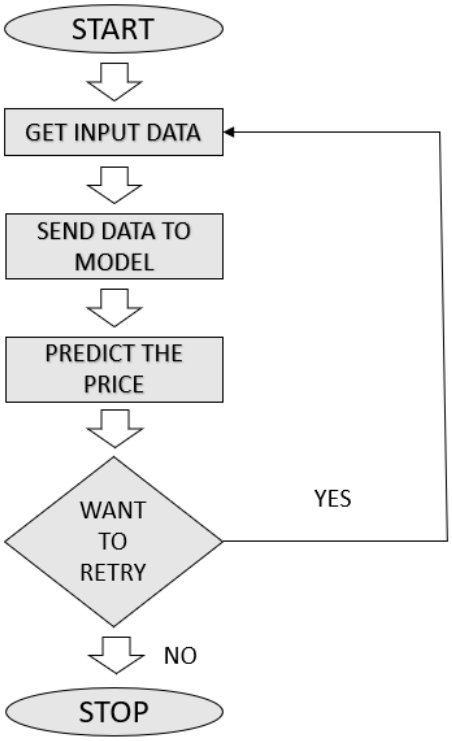
Proposed Algorithm and System Flow Chart



DFD Level 0



DFD Level 1



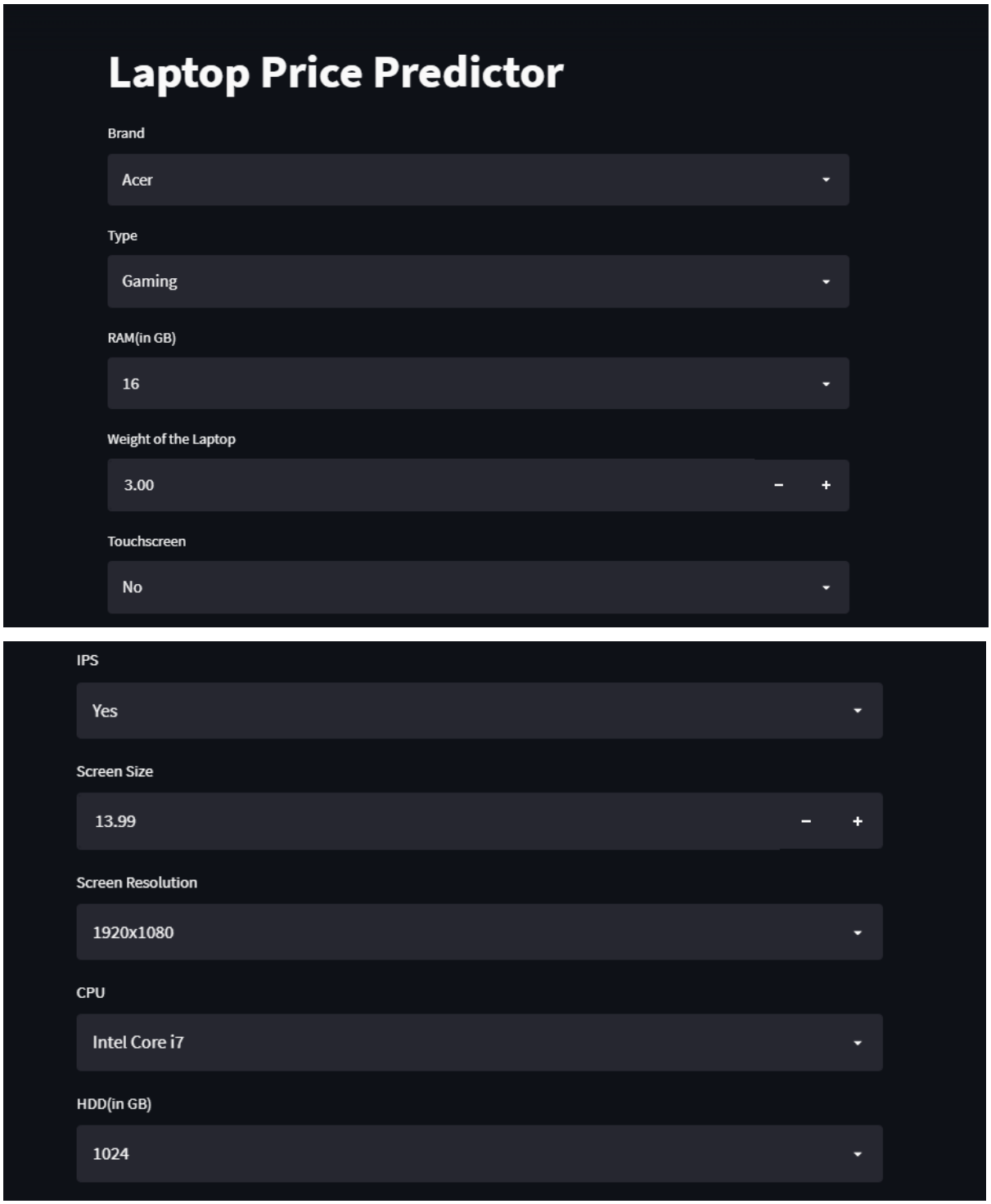
3.4 METHODOLOGY

This Method Is Proposed To Help The Customers/Users In Helping Them To Make Decisions Regarding Laptop Specification And Their Prices. In This Method The Model Helps The User To Visualize The Prices Of Laptops Based On The Specifications That They Have Selected. In Some Cases The Specifications Selected Can May Be Inapropriate In Which The User Will Be Notified On The Web App Itself About The Same.
The Process Of Learning Begins With Observations Or Data, Such As Examples, Direct Experience, Or Instruction, In Order To Look For Patterns In Data And Make Better Decisions In The Future Based On The Examples That We Provide. The Primary Aim Is To Allow The Computers To Learn Automatically Without Human Intervention Or Assistance And Adjust Actions Accordingly.We Have Used The Linear Regression And The Random Forest Algorithm To Build The Model. **Linear Regression** is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. **Random forest** is a Supervised Machine Learning Algorithm that is used widely in Classification and Regression problems. It builds decision trees on different samples and takes their majority vote for classification and average in case of regression.The **85%** Of The Dataset Was Used To **Train** The Model And The Remaining **15%** Of The Dataset Was Used To **Test** The Models And Check Whether The Output It Is Providing Is Correct Or Not.The Users Can Enter Their Demands Through The Web App And Can Click On The "**Predict**" Button,Which Directly Sends The Input Data To The Model And Tells Them To Predict The Price Of The Laptop Based On The Input Provided.According To The **R2** Scores Of Both The Models It Was Found That The Model Built Using Random Forest Algorithm Is More Accurate Than The Other Model.The Web App Provides Some Graphs Which Can Help The Users To Interpret The Results And Understand Them More Easily.

Key Capabilities:

- Predicts The Price Of Laptop Based On The Specification Selected By The User.
- Helps The User To Visualize The Results By Providing Static And Dynamic Graphs.
- Provides Prices Of Laptops With Similar Configurations.

Output & Screenshots



SSD(in GB)

256

GPU

Nvidia

OS

Windows

Predict Price

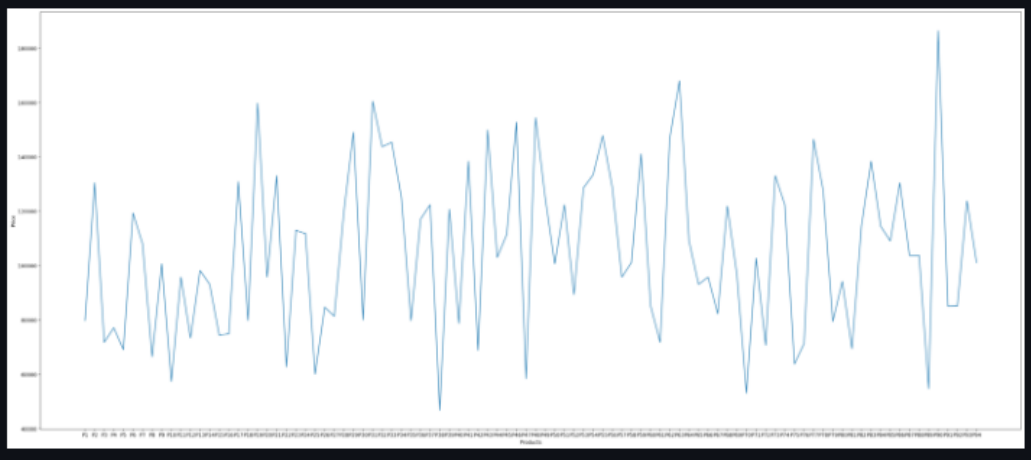
Using Linear Regression

The predicted price of this configuration is 85232

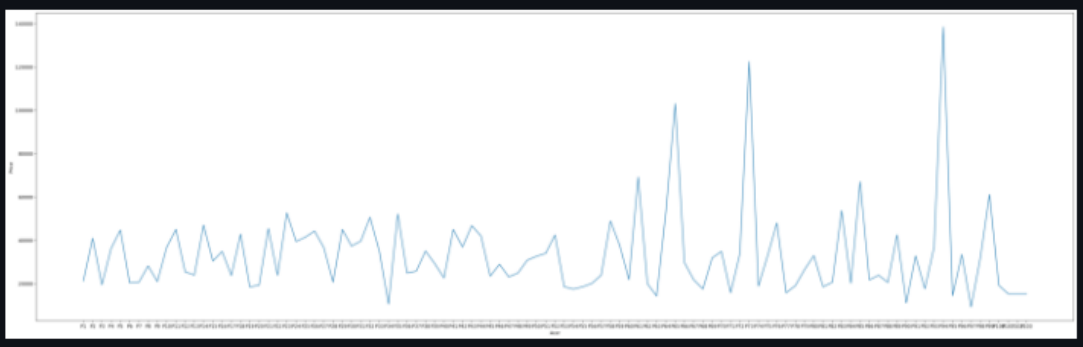
Using Random Forest

The predicted price of this configuration is 108083

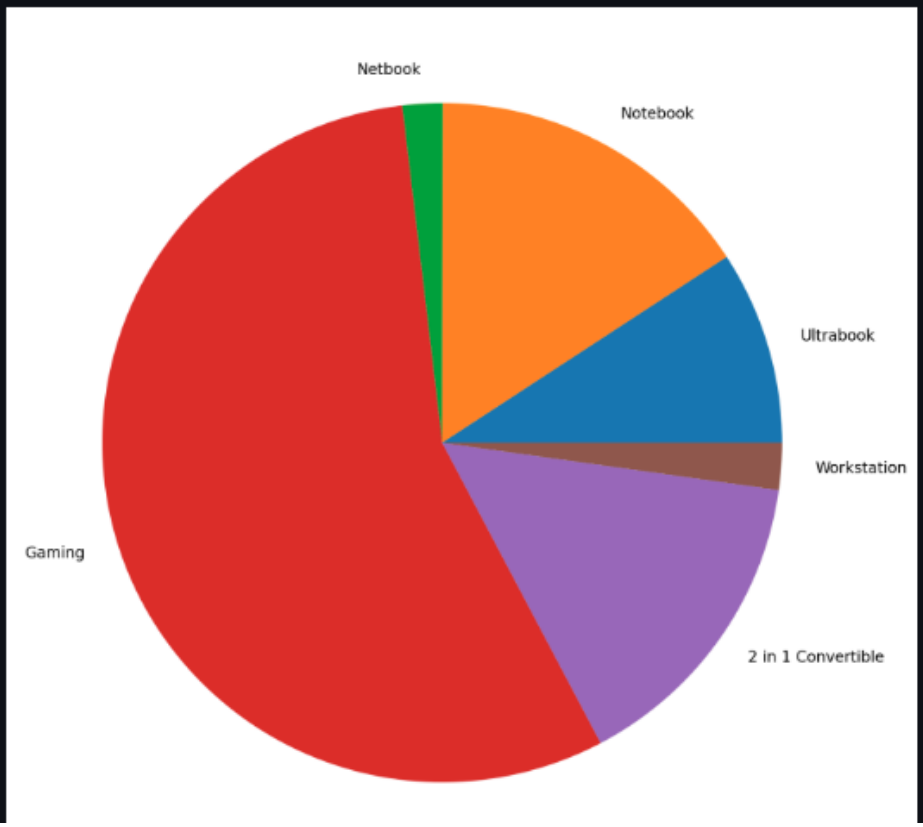
Laptops of Similar Configurations Vs Prices - Line Plot

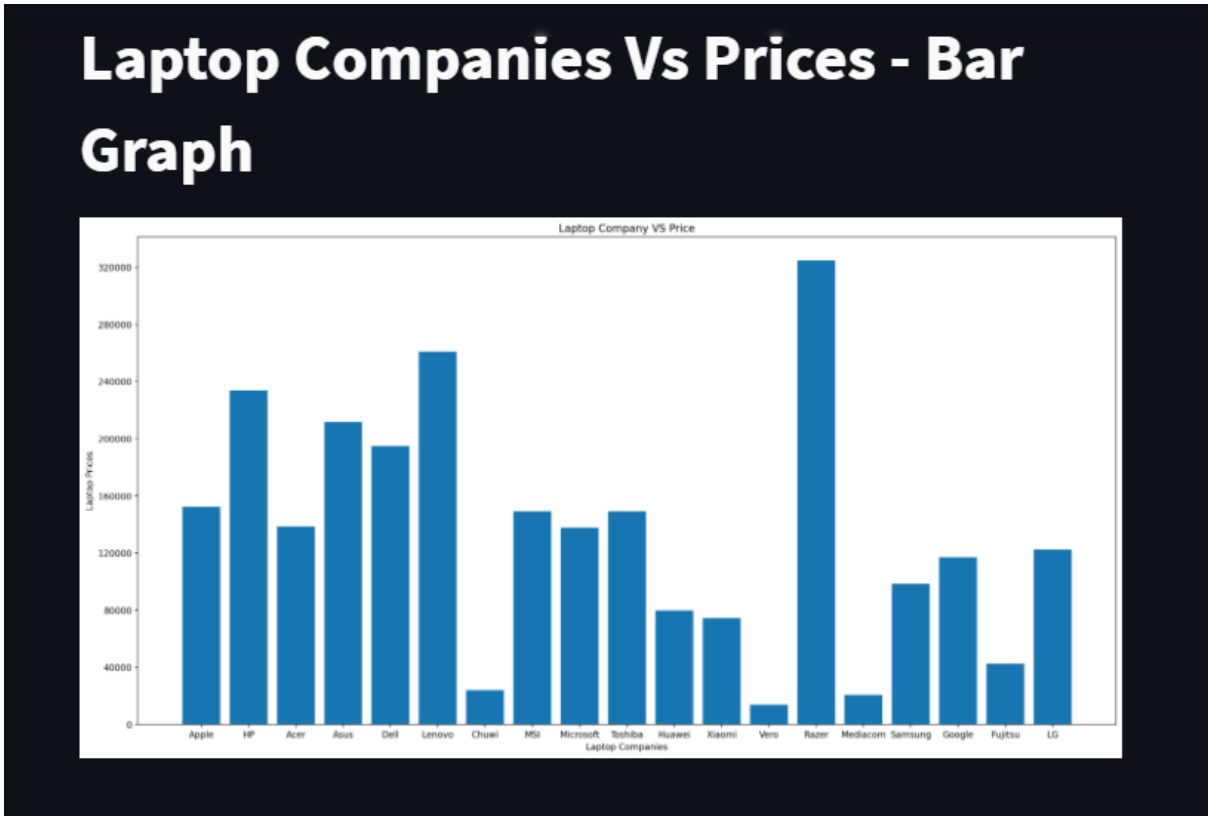


Laptops of Selected Company Vs Prices - Line Plot



Type Of Laptops Vs Quantity - Pie Chart





4.CONCLUSION

The Proposed Module Ensures That The User Get The Accurate Results Of The Price Of The Laptop With Specifications Selected By The User. It Helps The User To Make The Decisions And Improve Their Knowledge In The Field Of Laptops And Their Specifications.The Users Also Get To See The Prices Of Laptop With Similar Configuration Which Helps Them To Get A Clear Idea About The Laptop Market And By Using This Model The Users Can Check Before Buying Any Laptop And They Can Plan Their Budget Accordingly.

5. FUTURE SCOPE

1. We Can Keep Updating The Prices Of Laptops According To Market Changes Which Will Help The User To Get The Accurate Prices Based On The Market Prices At That Point Of Time.
2. The Model Can Be Used In Different Laptop Shops Using Which The Shopkeepers Can Allow The User To Enter Their Aspired Specifications And Based On That They Will Get The Prices Of Laptops.
3. The Model Can Help The Users To Make Better Decision In Future Also.
4. The Model Can Be Used By Anyone For Their Personal Use In Future Also.

6.REFERENCES

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