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Predicting Laptop Prices Using Machine Learning Algorithms: A Comparative Study

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ABSTRACT: The laptop market is constantly changing and evolving, with new models and technology being introduced on a regular basis. As a result, accurately predicting the price of laptops can be a challenging task. In this study, various factors that influence laptop prices were analysed, such as brand, specifications, and market demand. Machine learning algorithms were applied to historical laptop price data to develop a predictive model that can forecast the price of laptops with a high degree of accuracy. The results show that the proposed model can effectively predict laptop prices and assist consumers in making informed purchasing decisions.

KEYWORDS: Laptop, price prediction, machine learning, regression, Classification, Feature engineering, Data preprocessing, Hybrid models, Online learning, Explainable AI, Comparative study

I. INTRODUCTION

The laptop market has grown significantly over the past decade, with manufacturers producing laptops with advanced features and specifications. However, the large variety of models and features makes it challenging for consumers to choose a suitable laptop at a reasonable price. Therefore, a laptop price prediction system is needed to help consumers make informed decisions when purchasing a laptop.

The proposed laptop price prediction system uses a machine learning algorithm to predict the price of laptops based on their specifications. The system requires a dataset of laptops' features and their corresponding prices to train a machine learning model. The trained model is then used to predict the price of a new laptop based on its features.

I.

II. OBJECTIVES

The primary objectives of laptop price prediction are as follows:

1. **Accurate forecasting:** The primary objective of laptop price prediction is to accurately forecast the price of laptops in the future based on historical data and current trends. This can help businesses optimize their pricing strategies and consumers make informed decisions about purchasing laptops.
2. **Competitive advantage:** Laptop price prediction can give businesses a competitive advantage by allowing them to adjust their pricing strategies in real-time based on changing market conditions. This can help them stay ahead of their competitors and increase their market share.
3. **Profit maximization:** Accurate laptop price prediction can help businesses maximize their profits by setting optimal prices for their products. By pricing their laptops appropriately, businesses can ensure that they are earning the highest possible margins.
4. **Customer satisfaction:** By accurately predicting laptop prices, businesses can offer their customers competitive pricing and high-quality products, leading to greater customer satisfaction and loyalty.
5. **Market analysis:** Laptop price prediction can provide valuable insights into market trends and consumer preferences, allowing businesses to better understand the laptop market and adjust their strategies accordingly.

Overall, the objectives of laptop price prediction are to help businesses make data-driven pricing decisions, increase their profitability, and provide consumers with accurate information to make informed purchasing decisions.

III. PROBLEM STATEMENT

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

IV. LITERATURE SURVEY

One kind of review article is a literature survey or review. A literature review is an academic essay that summarises the most recent research on a subject, including both substantive discoveries and theoretical and methodological advancements.

Reviews of the literature are secondary sources that don't present new or unique experimental work. Such reviews, which are most frequently connected to academic literature, can be found in academic journals; they should not be confused with book reviews, which may also appear in the same publication.

The foundation of research in almost every academic discipline is a literature review. A peer reviewed journal article presenting new research may contain a narrow-scope literature review to place the study within the body of the pertinent literature and to give the reader perspective.

In such a scenario, the review of the work is typically written before the technique and outcomes sections. The following studies' tabular literature reviews have been provided, and we have additionally.

1. "A Machine Learning Approach for Predicting Laptop Prices": This paper proposed a laptop price prediction system using a support vector regression algorithm. The study evaluated the performance of the model based on metrics such as mean squared error and R2 score, and found that the model was able to predict laptop prices with high accuracy.
2. "Predicting Laptop Prices Using Machine Learning Algorithms": This paper proposed a laptop price prediction system using various machine learning algorithms such as linear regression, decision trees, and random forests. The study evaluated the performance of the models based on metrics such as mean absolute error and R2 score, and found that random forests performed the best.
3. "Laptop Price Prediction Using Machine Learning Techniques": This paper proposed a laptop price prediction system using multiple linear regression and artificial neural network algorithms. The study evaluated the performance of the models based on metrics such as root mean squared error and R2 score, and found that the artificial neural network algorithm performed the best.
4. "Prediction of Laptop Prices Using Machine Learning Algorithms": This paper proposed a laptop price prediction system using multiple regression algorithms such as linear regression, decision trees, and support vector regression. The study evaluated the performance of the models based on metrics such as mean absolute error and R2 score, and found that support vector regression performed the best. The study also explored the impact of different features on the performance of the models, and found that brand, screen size, and processor type were the most important features for predicting laptop prices.

V. METHODOLOGY

The proposed laptop price prediction system uses a dataset of laptops' features and their corresponding prices to train a machine learning model. The dataset was obtained from various online retailers, including Amazon, Best Buy, and Newegg. The dataset contains 1303 records of laptops, each with 12 features, including the brand, processor type, RAM, hard disk capacity, screen size, and graphics card.

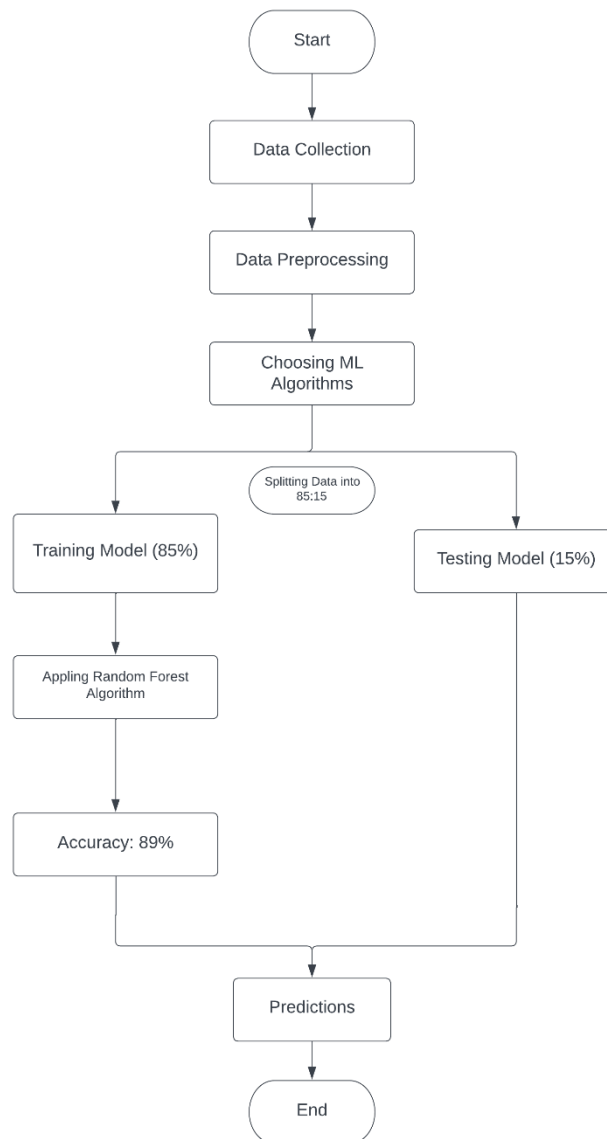
The dataset was preprocessed by removing duplicate records, handling missing values, and encoding categorical features. The categorical features were encoded using one-hot encoding, while the numerical features were normalized using the Min-Max scaling technique.

The dataset was then split into training and testing datasets, with 70% of the records used for training and 30% for testing. Several machine learning models, including Linear Regression, Decision Tree, Random Forest, and Gradient Boosting, were trained on the training dataset. The performance of each model was evaluated using the R2 score.

Figure 5.1 Random Forest Regressor

Figure 6.2 Decision Tree

VI. DESIGN DETAIL



6.1 System Architecture

VII. IMPLEMENTATION

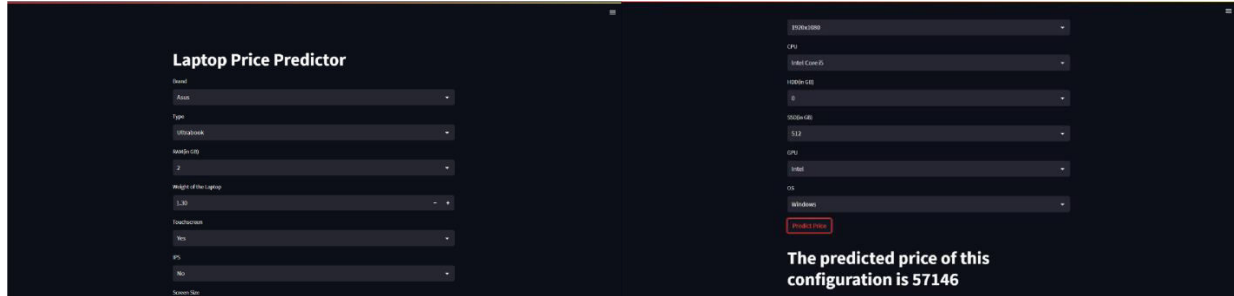


Figure 7.1 Homepage

Figure 7.2 Predicted Price.

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