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Mobile Price Prediction using Machine Learning Methods

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Abstract—

People rely on their smartphones more and more every day. Thanks to technology improvements, people use telephones in many parts of their lives, from personal to work. Beyond only making phone calls, it has other uses as well. It lets you access the internet and view your email even while you're not at your computer. Among the most important things to think about when purchasing a mobile phone are its features. The overarching goal of this study is to determine the optimal method for using machine learning to make retail price estimates for cellphones according to their specific specifications. People who use their phones often pay more attention when choosing features. The price-performance ratio is a key metric for mobile phone shoppers. In terms of performance, phone features are important. This study's overarching goal is to foretell whether certain feature sets of mobile phones are pricey or not. Making educated purchase choices by optimizing features while limiting prices is made easier with the help of this study, which may be used in numerous marketing and commercial scenarios. Topics—Predicting Phone Prices, Machine Learning, Support Vector Machine Method, Decision Tree.

I. INTRODUCTION

Increased social media communication and changes in work and payment processes have contributed to the growth of the mobile phone market. People pick their phones based on a variety of factors, considering this trend will likely continue. Factors like as battery life, color selections, RAM capacity, and Wi-Fi capabilities influence users' preferences for items that provide excellent value. Value for money is the user's first consideration when making a purchase [1]. With 83.3% of the population possessing a mobile phone and 91% of the population owning a landline, mobile phones are quickly becoming a vital tool for many people. current cellphones [2]. There are more than 170 different mobile phone brands sold in the US and throughout the world [3]. At the moment, a wide-ranging engineering subject is artificial intelligence (AI), which allows robots to answer intelligently to questions. Appropriate AI methods and solutions are included by machine learning, which includes supervised and unsupervised learning, classification, and regression. You may use MATLAB, Python, cygwin, or WEKA for your machine learning projects. There are other kinds of predictors that may be used, including decision trees and Naïve Bayes. Selecting the best features while decreasing the dataset size is possible using a variety of feature selection algorithms. We can reduce the computational complexity of the problem by doing this. Since this is an optimization problem, several various approaches are fine-tuned to decrease the data's dimensionality. In the past, a lot of studies looked at customer behavior and how factors like mobile phone features and prices impact their inclination to buy using economic theories and phenomena. One consideration is the intense rivalry among mobile phone makers to release new and improved models. Market uncertainty and the forecaster's subjective factors impact analysis and prediction processes, which may lead to unstable and erroneous forecast outputs. Rapid advancements in computing have led to widespread use of machine learning techniques in fields as diverse as AI, image processing, and natural language processing [4]. At the moment, mobile gadgets are among the most sought-after commodities. Every every day, new and improved smartphone models with a plethora of new features hit the market. There are a lot of mobile gadgets. Traded daily. The goal of this case study is to find the best product by forecasting the price class of mobile phones. Certain real costs of goods including cars, motorcycles, generators, motors, food, and medication may be determined using the same method. In the past, a lot of studies looked at customer behavior and how factors like mobile phone features and prices impact their inclination to buy using economic theories and phenomena. A number of factors, including manufacturer rivalry, impact the evolution of mobile phone technology [5]. Market unpredictability and the forecaster's subjective factors influence analysis and prediction processes, leading to unstable and erroneous forecast outcomes. As a result of machine learning's widespread use in fields like AI, natural language processing, and image processing, computer technology is rapidly progressing. A variety of methods and classifiers, such as Decision trees, Naïve Bayes, and others, are used in machine learning. The field of machine learning includes many algorithms for selecting features. To find the best characteristics for reducing the dataset,

choose one of these. There may be less effort required to resolve the problem if this is implemented. It is also possible to use optimization methods to lower the dataset's dimensionality. There is a near-universal agreement that mobile phones are indispensable in the modern world. One can hardly fathom a world without this device. Mobile devices are always being updated with new features and versions because of how popular they are. A prospective customer may insert their desired features into the model to get an idea of how much a mobile phone would cost. Very little text is there. With the same parameters for an independent variable, it is possible to create a model for estimating goods prices using the same methods as a model for prediction. Many factors, including the CPU, go into determining a mobile phone's price. In today's fast-paced world, a phone's battery life is essential. You should think about things like the mobile device's thickness and size in addition to things like storage, camera quality, and video quality. In today's technological world, an internet browser is an essential component. The price of a mobile phone is influenced by many of the mentioned qualities. We will classify the phone as either very cheap, inexpensive, expensive, or very costly based on the aforementioned characteristics. The mobile pricing is the primary focus of our analysis when it comes to mobile price prediction. When buying a mobile phone in the modern day, specs like CPU speed and battery life are crucial. A mobile device's size and weight are important factors to think about [6][7]. The quality of the video recording capabilities, the amount of internal storage, and the resolution of the camera should all be considered. When setting a price for a mobile phone, these are the main considerations. To ascertain if the portable device would be very inexpensive or expensive, we have made use of a few of the listed features.

II. LITERATURE REVIEW

Shonda Kuiper and colleagues [8] also conducted research in this field. To provide an educated forecast as to what 2005 GM vehicle prices would be, the authors used a multivariate regression model. The data originated from the website www.pakwheels.com. In order to identify the most useful and relevant variables to include into the model, this study is focused on creating efficient variable selection algorithms. By shedding light on the necessary prerequisites for doing research and directing them toward suitable methodologies, his work aids students and academics across disciplines. According to Asim et al. [9], the purpose of this study is to predict if a certain kind of mobile device would be considered affordable or expensive. The real dataset is sourced from the internet. There are a number of feature selection methods that may be used to locate and eliminate unnecessary or duplicate features with little computational expense. Using many classifiers together yields the best results in terms of accuracy. We compare the results according to the maximum accuracy and the minimum amount of criteria that were picked. We use the best feature selection approach and classifier to analyze the dataset and provide results. Anyone in charge of marketing or a corporation looking to find the best product may use this information. The study by Noor et al. on page 10 In order to create a system for estimating car prices, this research use supervised machine learning. The prediction made by machine learning. The study's 98% prediction accuracy was the result of using multiple linear regression. Multiple linear regression is a statistical method that uses a number of independent variables to make predictions about a dependent variable. The findings are then compared to the actual values to see how accurate the predictions were. The price is a forecastable dependent variable in this study's proposed technique. Factors that affect the price of a car include its model, manufacturer, city, version, color, mileage, alloy wheels, and power steering, among others. The dataset used in this work will prove to be priceless for further research using other prediction methodologies. In addition, different approaches have been used by K Noor et al. [11] to predict car prices. The findings were most accurate when the experts used multivariate linear regression. Considerations such as the vehicle's model, maker, city, version, color, mileage, alloy wheels, and power steering all contribute to its estimated price. For example, this article demonstrates one approach. A mobile phone, as indicated by Kumuda et al. [12], is the most regularly purchased device. There are a plethora of new mobile phone models introduced every year, each with its own unique set of specs, designs, and functions. Launching and selling a mobile device successfully requires knowing its actual price and where it stands in the market. Longevity in the market depends on conformity to standards and desired designs as much as it does on financial stability. It is common practice for customers to check whether the item can be purchased at the anticipated price. Pricing strategies and comprehensive market/competitor analyses must be in place before a mobile device launch can take place. Gathering a dataset from the current market to discover critical selection features and guarantee accurate data comparison simplifies and enhances accuracy. When it comes to features and price, this product is unrivaled. Finding out whether a mobile phone with certain characteristics would be cost-effective or pricey is the primary purpose given by Renuka et al. [13]. The actual dataset is assembled by means of internet resources. In order to locate and eliminate unnecessary or unimportant components with little computational cost, many selection features approaches are used. Various classifiers are used to get utmost precision. We compare the results according to the maximum accuracy and the

minimum amount of criteria that were picked. To draw inferences from the dataset, the best feature selection approach and classifier will be used for analysis. Any industry or marketing group may use this research to find the best product in terms of price and characteristics. The goal of the model developed by Kıran et al. [14] was to identify the machine and use its properties to forecast mobile phone costs. Using a 20% test data sample, a learning system was evaluated for its ability to reliably predict prices. With a result of 95% accuracy, Linear Discriminant Analysis is the most accurate prediction method.

III. PROPOSED METHODOLOGY

A. Dataset

The dataset that was made public on Kaggle was used for this investigation. The collection has 11,500 rows and 178 columns. Examine the starting prices of different brand-name mobile phones sold in Europe from 2018 to 2021. Details about each gadget are provided via the eight features. Among the many brand-specific details are the following: price, model, storage, RAM, screen size, camera megapixels, battery capacity, and mAh.

Part B: Extracting features

You may use the following procedures to extract features for mobile price prediction using Support Vector Machine (SVM) and Decision Tree approaches: feature selection, data normalization, feature conversion, feature scaling, feature extraction techniques, feature selection, number of features to use, and finally, model training. By identifying and removing irrelevant information, we can improve prediction models and make them more efficient and accurate.

Section C: Classification Methods

In order to remain competitive with competing manufacturers, businesses will find this estimating approach useful for mobile pricing forecasting. It helps customers who are budgeting to get a mobile device with the best features at the best price. We accomplished the project's goal with astounding accuracy by gathering data from several sources, analyzing it for trends, and then using machine learning algorithms for classification and forecasting.

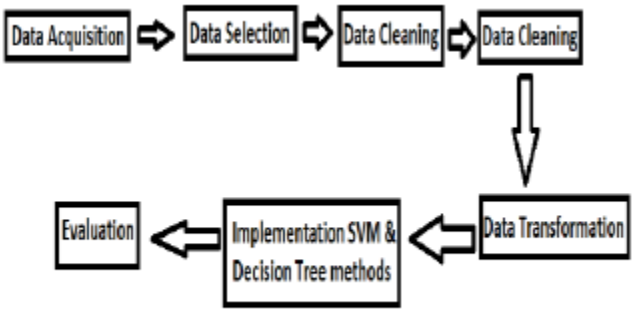

Fig. 1. ClassificationSystem Architecture

Fig. 1 Shows that Basic ClassificationSystem Architecture for Mobile Price Detection.

1) SVM Algorithm

When the training data can be used to divide in a linear but rough fashion, this sorting tool is called a linear support vector machine (SVM). You should use kernel methods when your data isn't easily separated into linear categories. Improving nonlinear SVM flexibility by range optimization [15]. Two sets of data are created and then laid down on a surface. The boundary line has other names as well. Points from the two adjacent classes Support vectors describe the lines. The purpose of a Support Vector Machine is to locate the hyperplane that maximizes the distance between any two data points [16–18].

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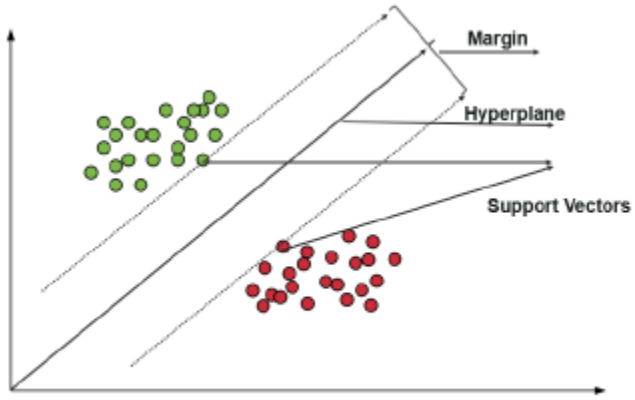

Fig. 2. SVM Model

Fig. 2 Shows that architecture of SVM Model.

2) Decision Tree Algorithm

The goal and independent factors are used to determine the decision and leaf nodes in the decision tree approach. A decision tree is a common way to describe a categorization approach that uses a structure's resemblance to a tree. Prior to running the classification technique, the data set's pieces are converted and grouped into a hierarchical tree. The methods used by algorithms to determine a node, root, and branching criteria might differ.

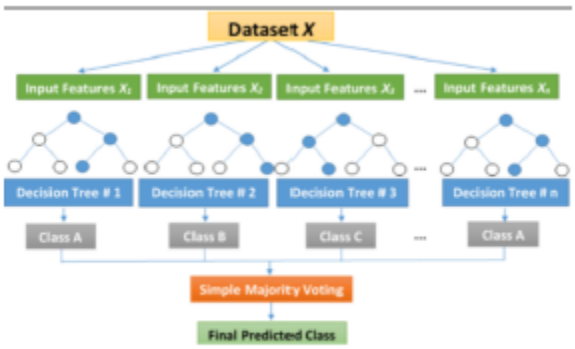

Fig. 3. .Proposed Decision Tree Architecture

Fig. 3 It shows that the proposed model of the Decision Tree design works.

IV. RESULTS AND DISCUSION

The following measures were used for performance evaluation: f1 score, recall, precision, and accuracy. If we compare our method to regional systems that utilize these markers to identify heart disease, we will find that they are quite similar. The following justifications are associated with these measures:

$$Accuracy = \frac{TP+TN}{Total\ Samples} \qquad (1)$$

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$$Recall(Sensitivity) = \frac{TP}{TP+FN} \quad (2)$$

$$Precision(Specificity) = \frac{TP}{TP+FP} \quad (3)$$

$$F1_{Score} = 2 * \frac{Precision*Recall}{Precision+Recall} \quad (4)$$

Here,

TP is True Positive
TN is True Negative
FN is False Negative

FP is False Positive

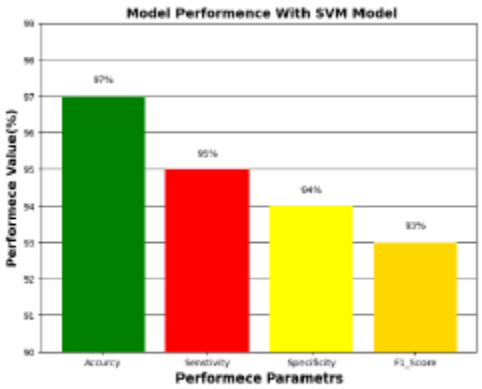

Fig. 4. Performance of SVM Model

Fig. 4 Illustrate the performance evaluation of the SVM model.

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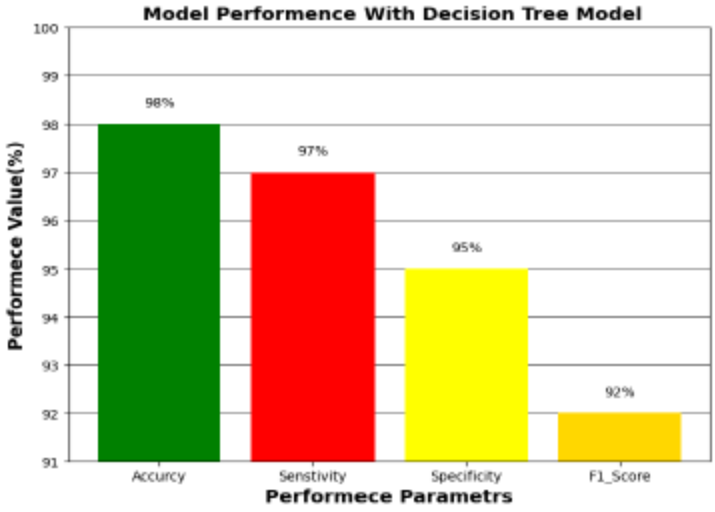

Fig. 5. Performance of Proposed Decision Tree Model

Fig. 5 Illustrate the performance evaluation of the Proposed Decision Tree model.

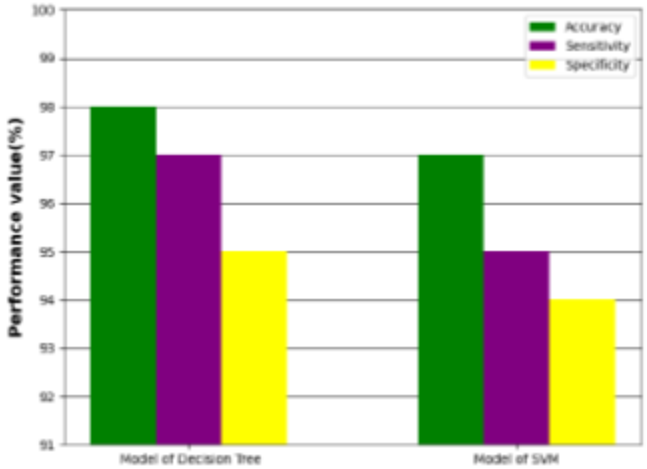

Fig. 6. Comparison of Decision Tree vs SVM

Fig. 6 Compare the performance of Decision Tree and SVM models.

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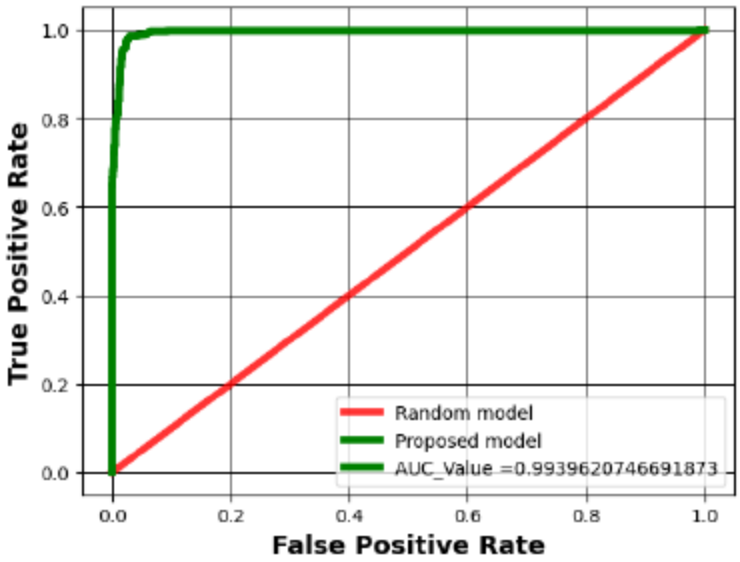

Fig. 7. ROC_AUC curve for proposed SVM

Fig. 7 Denotes the ROC_AUC value for the suggested Decision Tree. The AUC value is 0.993.

V. CONCLUSION

The purpose of this research is to examine the feasibility of using machine learning to predict future phone pricing. As a result, a dataset with different properties is processed using two separate algorithms. The accuracy score is used to evaluate the results. Because decision trees provide better results than support vector machines (SVMs), this research concludes that they are superior. AUC = 0.993 is the result of this approach. Anyone involved in the production, sale, or consumption of food, automobiles, housing, etc., may benefit from the study's approach and modeling algorithm by applying it to these and related industries.

REFERENCES

1. M. Chen, “Mobile Phone Price Prediction with Feature Reduction”, Highlights in Science, Engineering and Technology, vol. 34, pp. 155–162, Feb. 2023.
2. Jinsi Jose, Vinesh Raj, SweanaVakkayilSeaban, Deepa V. Jose, "Machine Learning Algorithms for Prediction of Mobile Phone Prices", International Conference on Innovative Computing and Communications, vol.537, pp.81, 2023.
3. Amit Kumar Bishnoi, Sanjeev Kumar Mandal, "Performance Analysis of Decision Tree Models and M5P Models for Mobile Phone Price Prediction", 2023 International Conference on Advances in Computation, Communication and Information Technology (ICAICCIT), pp.1298-1302, 2023.
4. Manoj Kumar, Urmila Pilania, Chirag Varshney, "Predicting Mobile Phone Prices with Machine Learning", 2023 3rd International Conference on Advancement in Electronics & Communication Engineering (AECE), pp.181-185, 2023.
5. Sata, M. (2013). Factors affecting consumer buying behavior of mobile phone devices. Mediterranean Journal ofSocial Sciences, 4(12): 103.
6. D. Singh Rana, S. Chandra Dimri, R. Singh Rawat, S. Ashish Dhondiyal and A. Dogra, "Machine Learning Approach for Malware Analysis and Detection," 2022 2nd International Conference on Innovative Sustainable Computational Technologies (CISCT), Dehradun, India, 2022, pp. 1-7, doi: 10.1109/CISCT55310.2022.10046632
7. Dhondiyal, S.A., Dimri, S.C., Rana, D.S. (2022). Efficient Mechanism for Multicasting in IoT-Enabled Wireless Sensor Network. In: Agrawal, R., He, J., Shubhakar Pilli, E., Kumar, S. (eds) Cyber Security in Intelligent Computing and Communications. Studies in Computational Intelligence, vol 1007. Springer, Singapore. https://doi.org/10.1007/978-981-16-8012-0_14.

8. Shonda Kuiper, “Introduction to Multiple Regression:How Much Is Your Car Worth? ” , Journal of StatisticsEducation · November 2008
9. Muhammad Asim, Zafar Khan, “Mobile Price Class prediction using Machine Learning Techniques”, International Journal of Computer Applications (0975 – 8887) Volume 179 – No.29, March 2018
10. Kanwal Noor, Sadaqat Jan, “Vehicle Price Prediction System using Machine Learning Techniques”, International Journal of Computer Applications (0975 – 8887) Volume 167 – No.9, June 2017
11. Kanwal Noor and Sadaqat Jan, “Vehicle Price Prediction System using Machine Learning Techniques” , International Journal of Computer Applications (0975 – 8887) Volume 167 – No.9, June 2017.
12. Kumuda S, Vishal Karur, Karthick Balaje S E, “Prediction of Mobile Model Price using Machine Learning Techniques”, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249-8958 (Online), Volume-11 Issue-1, October 2021
13. Miss.A.Renuka, Mr. Veer Sudheer Goud. “Online Mobile Price Prediction using Machine Learning”, Turkish Online Journal of Qualitative Inquiry (TOJQI) Volume 13, Issue 1, January 2022: 681-688
14. V. Kiran and Jebakumar R., “Prediction of Mobile Phone Price Class using Supervised Machine Learning Techniques,” International Journal of Innovative Science and Research Technology, vol. 7, pp. 248-251, Jan. 2022.
15. N. Hu, "Classification of Mobile Phone Price DatasetUsing Machine Learning Algorithms," 2022 3rdInternational Conference on Pattern Recognition andMachine Learning (PRML), Chengdu, China, 2022, pp.438-443, doi: 10.1109/PRML56267.2022.9882236.
16. KS Kalaivani, N. Priyadharshini, S. Nivedhashri andNandhini, "Predicting the Price Range of Mobile PhonesUsing Machine Learning Techniques," AIP ConferenceProceedings, Vol. 2387. No. 1. AIP Publishing LLC,2021.
17. A.Dogra, S. A. Dhondiyal and D. S. Rana, "Epilepsy Seizure Detection Using Optimised KNN Algorithm Based on EEG," 2023 International Conference for Advancement in Technology (ICONAT), Goa, India, 2023, pp. 1-6, doi: 10.1109/ICONAT57137.2023.10080847.
18. F. v. Younesi, S. Sahoo, and W. Ribeiro, “Mobile Price Prediction,”Kaggle, 2022.
19. -prediction (accessed Oct. 09, 2022).