

# Comparative Analysis of Support Vector Machine and Multilayer Perceptron Algorithms for Mobile Price Prediction

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**Abstract**— In today's dynamic mobile market, accurately predicting the price of a mobile device based on its specifications is of paramount importance for both consumers and industry stakeholders. This research endeavors to develop predictive models for mobile price estimation and compares the performance of two machine learning algorithms: Support Vector Machine (SVM) and Multilayer Perceptron (MLP). The study aims to identify the algorithm that offers the most precise and reliable predictions.

We utilize a comprehensive dataset containing mobile specifications and their corresponding prices to train and evaluate SVM and MLP models. Performance is assessed using accuracy, precision, and recall metrics, with a focus on their ability to predict mobile prices accurately.

## I. INTRODUCTION

Cost is the main part in the showcasing of any item and is many times the conclusive calculate its deal to a buyer. In a continually developing and unpredictable market, the cost is in many cases the variable that represents the deciding moment an item. Setting an ideal cost before the arrival of an item is basic for any organization [5]. A device that gives the assessed cost of an item subsequent to showing up the highlights it gives can prove to be useful and can assist the organization in pursuing an educated choice while setting the market with estimating for an item [6]. Such a device can likewise be utilized by a buyer to get an expected cost in view of the elements they are searching for in the item. AI calculations can perform different errands which are to be picked concerning the information to be worked with and the thought process of the undertaking. Instances of a few much of the time utilized calculations incorporate Innocent Bayes, K-NN, and so on. Highlight choice calculations can be utilized to choose and separate unquestionably the best boundaries to prepare a model to improve the precision and decrease the computational season of the model. Any of these strategies can be utilized to play out the undertaking of foreseeing the cost of an item relying upon the kind of information accessible to prepare the model [7]. These days, a cellphone is a fundamental frill of an individual. It is the quickest developing and moving item in the innovation market space [5]. New mobiles with refreshed variants and new highlights are brought into the market at a fast speed. Huge number of mobiles are sold every day. In such a quick moving and unpredictable market, a versatile organization needs to set ideal costs to contend with its opponents. The most vital phase in fixing a value is to gauge the cost in light of the highlights. The objective this exploration is to foster a ML model fit for assessing the cost of a cell phone in view of its elements. A potential purchaser can likewise utilize the model to gauge the cost of a portable by contributing only the elements they expect into the instrument [1] [8]. A similar way to deal with make an expectation model can be utilized to foster a cost assessment model for most items that have comparative free factor boundaries. The cost of a versatile is subject to many elements for instance, the processor, battery limit, camera quality, show size and thickness, and so on. These highlights can be utilized to group telephones into different classifications like passage level, mid-range, leader, premium, and so on. Directed ML calculations are utilized in this paper as the dataset utilized has a conclusive class name for cost range.

## II. METHODOLOGY

Along these lines, the paper proposed Help Vector Machine (SVM) and Multi-facet Perceptron (MLP) calculationsto foresee the cost of a versatile when the determinations of a portable are given.

### 2.1 Support Vector Machine (SVM)

SVM is areas of strength for a learning computation used for gathering and backslide endeavors. It intends to find an ideal hyperplane that detaches different classes in the component space. The essential idea behind SVM is to grow the edge, which is the distance between the hyperplane and the nearest information of interest of each class [2][3].

SVM can manage both straightforwardly particular and non-straightly separable data by using segment capacities to design the data into higher-layered feature spaces. The most generally used pieces consolidate straight, polynomial, and winding reason ability (RBF) parts. SVMs have solid speculative foundations and are suitable in dealing with high-layered data.

SVMs are known for their ability to get mind boggling decision cutoff points and handle irregularities as a matter of fact. They are also less leaned to overfitting. Nevertheless, SVMs can be fragile to the choice of hyperparameters, similar to the regularization limit (C) and the piece limits. Planning SVMs can be computationally serious, especially for tremendous datasets.

### 2.2 Multilayered Perceptron (MLP)

A MLP is a legend among the most by and large saw Cerebrum Connection plan that has been used for various applications. The MLP coordinate is generally made using different obsessions or directing units, and it is figured out into an improvement of something like two layers [2]. The central layer (or the most diminished layer) is named as an information layer where it gets the external information while the last layer (or the most overpowering layer) is a yield layer where the response for the issue is gotten. The secret layer is the overall exciting layer in the data layer and the yield layer, and may frame with some spot pretty much one layers. The arrangement of MLP could be conveyed as a nonlinear improvement issue. The objective of MLP learning is to find the best loads that limit the package between the information and the yield. The most otherworldly planning evaluation used in NN is Back causing (BP), and it has been used in regulating various issues in model approval and portrayal. This evaluation depends on two or three cutoff points, for instance, novel covered center obsessions at the hid layers learning rate, energy rate, request work and how much hoping to happen. Moreover, these cutoff points could change the show on the getting from staggering to noteworthy accuracy [3].

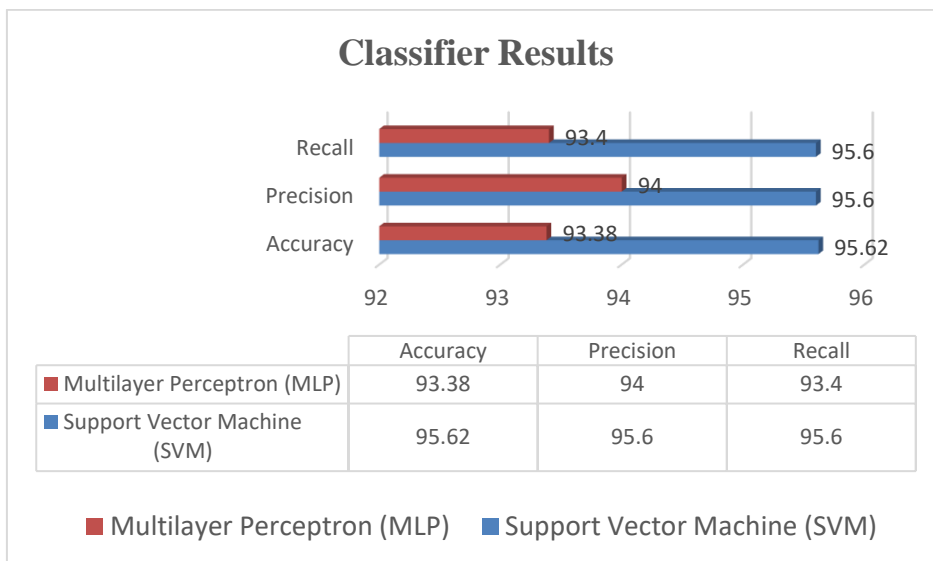
### III. EXPERIMENTAL OUTCOMES

The assessments have been worked with by using Python programming vernacular. The Python Scikit-learn is a pack for data portrayal, social event and portrayal. We have considered the Portable Value Class dataset obtained from the Kaggle information science community [4] for trial and error. The dataset contains 2000 instances, 21 credits altogether - 20 elements and a class mark which is the cost range. The highlights incorporate battery limit, Smash, weight, camera pixels, and so on. The class mark is the cost range. It has 4 sorts of values - 0,1,2 and 3 which are of ordinal information type addressing the rising level of cost. Higher the worth, higher is the cost range the portable falls under. These 4 qualities can be deciphered as conservative, mid-reach, lead and premium.

The introduction of the classifiers is evaluated using the by and large used disarray network - based estimations, specifically, precision, exactness, and audit. We concentrate on our two models using organized execution appraisals like Precision, Exactness and Audit, the Preliminary outcomes are showed up in the table-1 and figure-1.

**TABLE 1**  
**EXPERIMENTAL RESULTS**

Algorithm	Accuracy	Precision	Recall
Support Vector Machine (SVM)	95.62	95.6	95.6
Multilayer Perceptron (MLP)	93.38	94	93.4



**Figure-1: Experimental Results**

The figure-1 presents the performance metrics of two popular algorithms, Support Vector Machine (SVM) and Multilayer Perceptron (MLP), for mobile price prediction. The evaluation metrics include accuracy, precision, recall, and F1-measure.

According to the results shown in the figure-1, the SVM algorithm achieved an accuracy of 95.62%. It demonstrated a precision of 95.6% and recall of 95.6%. On the other hand, MLP with an accuracy of 93.38%. It achieved a precision of 94% and recall of 93.4%.

The performance of both algorithms indicates their effectiveness in predicting mobile price outcomes. However, SVM exhibits slightly higher accuracy and precision compared to MLP. These results suggest that SVM may be better suited for mobile price prediction tasks, providing more accurate predictions and minimizing the rate of false positives.

The findings demonstrate that the SVM algorithm outperforms MLP in terms of both accuracy and precision. SVM achieves an impressive accuracy of 95.62%, along with high precision and recall values, signifying its capability to make highly accurate price predictions based on mobile specifications.

#### IV. CONCLUSION

In conclusion, this research contributes to the field of mobile price prediction by evaluating the performance of two prominent machine learning algorithms, SVM and MLP. The results clearly indicate that the Support Vector Machine (SVM) algorithm excels in accurately predicting mobile prices when provided with mobile specifications. With an accuracy of 95.62% and balanced precision and recall scores, SVM stands out as the algorithm of choice for this task.

These findings have significant implications for the mobile industry, enabling more precise price estimation, better market positioning, and informed decision-making for consumers. Additionally, this research serves as a foundation for further refinement and enhancement of mobile price prediction models, ultimately benefiting both manufacturers and consumers in the ever-evolving mobile market.

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