**Progress Report: Smartphone Price Prediction using Classification Algorithms**

**\*\*Project Overview:\*\***

* The goal of this project is to develop a smartphone price prediction model using classification algorithms. The project aims to leverage machine learning techniques to accurately predict the price range of smartphones based on various features. This progress report provides an update on the current status of the project, including the tasks completed, challenges encountered, and next steps.

**\*\*Accomplishments:\*\***

* Data Collection: A diverse dataset of smartphone specifications and prices has been collected from reliable sources. The dataset includes features such as brand, display size, RAM, internal storage, camera specifications, battery capacity, and other relevant attributes.
* Data Preprocessing: The collected dataset underwent preprocessing steps to handle missing values, outliers, and data inconsistencies. Feature engineering techniques were applied to extract meaningful information from the raw data. Categorical variables were encoded, and numerical features were scaled to ensure compatibility with classification algorithms.
* Algorithm Selection: Several classification algorithms were explored, including Logistic Regression, Decision Trees, Random Forest, KNN and SVM. Each algorithm's strengths, weaknesses, and suitability for smartphone price prediction were considered. Based on initial experimentation, it was determined that these algorithms hold promise for accurate price range prediction.
* Model Development: The selected classification algorithms were implemented and trained on the pre-processed dataset. The models were fine-tuned using appropriate hyperparameters to optimize their performance. Cross-validation techniques were employed to assess model generalization and prevent overfitting.
* Model Evaluation: Multiple evaluation metrics, such as accuracy, precision, recall, and F1 score, were used to assess the performance of the developed models. The models were tested on a holdout dataset to measure their ability to generalize to unseen smartphone instances. Preliminary evaluation results indicate promising performance across multiple algorithms.

**\*\*Challenges Faced:\*\***

* Imbalanced Data: The dataset exhibited class imbalance, where certain price ranges had significantly fewer instances than others. Handling this imbalance was a challenge during model training and evaluation. Techniques like oversampling, undersampling, or using class weights were explored to address this issue.
* Feature Selection: Determining the most relevant features for smartphone price prediction posed a challenge. Extensive feature analysis and domain knowledge were required to select the optimal subset of features that contribute significantly to the model's predictive performance.
* Algorithm Complexity: Some classification algorithms, such as XGBoost, have a complex parameter space, making it challenging to find the best hyperparameter configuration. Careful tuning and experimentation were necessary to strike a balance between model complexity and performance.

**\*\*Next Steps:\*\***

* Fine-tuning Models: The hyperparameter tuning process will be refined to optimize the performance of the selected algorithms. Techniques like grid search or Bayesian optimization will be employed to efficiently explore the hyperparameter space and identify the best configuration.
* Applying ANN model to further boost accuracy.

**\*\*Conclusion:\*\***

The project has made significant progress in developing a smartphone price prediction model using classification algorithms. Data collection, preprocessing, algorithm selection, model development, and evaluation have been accomplished.

**Code:**

















