Mobile Price Classification Using Machine Learning

Introduction:
In todays market, mobile phones come in a wide range of prices, each offering different features and specifications. For consumers, selecting a mobile phone that aligns with their budget and requirements can be challenging. To assist consumers in making informed decisions, this project aims to develop a machine learning model that can classify mobile phones into different price ranges based on their features.

Problem Statement:
The task is to build a predictive model that can accurately classify mobile phones into predefined price ranges based on various attributes such as battery power, camera features, memory, connectivity options, and more. The dataset provided contains information about several mobile phones, including their specifications and corresponding price ranges.

Dataset Description:
The dataset comprises the following columns:

- battery_power: Total energy a battery can store in mAh.
- blue: Bluetooth enabled (1 if yes, 0 if no).
- clock_speed: Speed at which microprocessor executes instructions.
- dual_sim: Dual SIM support (1 if yes, 0 if no).
- fc: Front Camera mega pixels.
- four_g: 4G network support (1 if yes, 0 if no).
- int_memory: Internal Memory (in gigabytes).
- m_dep: Mobile Depth in cm.
- mobile_wt: Weight of mobile phone.
- n_cores: Number of cores of the processor.
- pc: Primary Camera mega pixels.
- px_height: Pixel Resolution Height.
- px_width: Pixel Resolution Width.
- ram: Random Access Memory in megabytes.
- sc_h: Screen Height of mobile in cm.
- sc_w: Screen Width of mobile in cm.
- talk_time: Longest time that a single battery charge will last when you are talking.
- three_g: 3G network support (1 if yes, 0 if no).
- touch_screen: Touch screen support (1 if yes, 0 if no).
- wifi: Wifi connectivity (1 if yes, 0 if no).
- price_range: Price range of the mobile phone (0 - low cost, 1 - medium cost, 2 - high cost, 3 - very high cost).

Objectives:
- Explore and preprocess the dataset to handle missing values, outliers, and any other data inconsistencies.
- Perform exploratory data analysis (EDA) to gain insights into the relationships between different features and the target variable (price range).
- Select appropriate machine learning algorithms for classification and evaluate their performance using suitable metrics.
- Fine-tune the chosen model to improve its predictive accuracy.
- Validate the final model using cross-validation techniques to ensure its robustness.
- Deploy the model for real-time predictions if applicable.

Deliverables:
- Jupyter Notebook or Python script containing the code implementation.
- Documentation detailing the step-by-step process, including data preprocessing, model selection, evaluation metrics, and results interpretation.
- Visualization of key findings from EDA.
- Trained machine learning model for mobile price classification.
- Deployment instructions (if applicable).

6. Conclusion:
By successfully developing an accurate classification model, this project aims to empower consumers with a tool that can assist them in making informed decisions while purchasing mobile phones within their budget constraints. Additionally, the insights gained from this project could be valuable for manufacturers and retailers in understanding consumer preferences and market trends.