

Linear Regression

Mobile Price Prediction using Linear Regression

Mobile prices are influenced by various factors such as the amount of RAM, the quality of the camera, battery power, screen resolution (PPI) and other hardware specifications. Your goal is to analyze these factors, build a Linear Regression model, and use it to make accurate predictions of mobile phone prices based on the dataset provided.

Dataset Link:

https://raw.githubusercontent.com/ArchanaInsights/Datasets/main/mobile_price.csv

Machine Learning Model Building Steps:-

1. Explore the Dataset:

- 1.1. **Understand the Data:** Begin by getting an overview of the dataset. Check the type and amount of data available, and understand the structure of the dataset.
- 1.2. **Examine Statistical Summary:** Look at basic statistics of the dataset to understand the distribution of features.
- 1.3. **Correlation Analysis:** Create a heatmap to visualize the correlation matrix. Focus on the relationship between the features and the target variable '*Price*'.
- 1.4. **Relationship Analysis:** Identify the top 4 features that show the highest correlation with the target variable '*Price*'. For each of these features, plot a scatter plot to observe how well each feature correlates with '*Price*'. Display all four scatter plots side by side in a single figure.

2. Prepare the Data:

- 2.1. **Feature Selection:** Select the features and the target variable for your analysis.
- 2.2. **Split the Dataset:** Divide the dataset into training and testing sets. Use 80% of the data for training and 20% for testing.

3. Build and Train the Model:

- 3.1. **Create a Linear Regression Model:** Build a linear regression model using the training data.

3.2. **Train the Model:** Fit the model to the training data.

4. Evaluate the Model:

4.1. **Predict:** Use the model to make predictions on the test set.

4.2. **Metrics Calculation:** Evaluate the model's performance using the following metrics:

- **Slope (Coefficient) and Intercept:** Print the slope (coefficient) and intercept of the regression line.
- **Model Performance Metrics:** Calculate and report the following metrics:
 - ★ **R² Score:** How well does the model explain the variance in the target variable?
 - ★ **Mean Absolute Error (MAE):** What is the average absolute difference between predicted and actual values?
 - ★ **Mean Squared Error (MSE):** What is the average of the squared differences between predicted and actual values?

5. Conclude the Analysis:

5.1. **Model Evaluation:** Based on the performance metrics, assess how well the model predicts mobile prices. Discuss whether the model's performance is satisfactory or if there are areas for improvement.

5.2. **Insights and Discussion:**

- ★ What insights did you gain from the correlation analysis and scatter plots?
- ★ How do the selected features contribute to the prediction of mobile prices?
- ★ What do the slope (coefficient) and intercept reveal about the relationship between the features and the target variable?
- ★ How well does the model perform based on the evaluation metrics? Are there any discrepancies between the predicted and actual values?
- ★ What might be some potential improvements or additional steps you could take to enhance the model's performance?