**Title: Linear Regression and Multiple Linear Regression Implementation**

**Objective:** The objective of this code is to implement simple linear regression and multiple linear regression models from scratch and using scikit-learn. Additionally, the code includes data preprocessing and feature selection steps, as well as performance evaluation.

**Environment:**

- Python

- Required libraries: pandas, numpy, matplotlib, seaborn, scikit-learn

**Data Source:** The code reads data from a CSV file using the pandas library. The dataset used in this code is stored in the file `bottle.csv`.

**Data Preprocessing**

**1. Data Loading:**

- The code begins by loading the dataset from a CSV file and displaying its shape.

- It excludes non-numeric columns from the correlation analysis to focus on numeric features.

**2. Feature Selection:**

- The code computes the correlation matrix and selects features that have a correlation with the target variable (`Salnty`) greater than a threshold of (0.5).

- It creates a new DataFrame with the selected features and displays information about missing values.

**3. Handling Missing Values:**

- Columns with missing values exceeding a threshold (50%) are dropped from the dataset.

- The code then displays summary statistics of the cleaned dataset.

**Simple Linear Regression**

**4. Simple Linear Regression - Scratch:**

- A custom class `LinearRegressionFromScratch` is implemented for simple linear regression from scratch.

- The class includes methods to fit the model and make predictions.

- It calculates the regression coefficients (`m` and `b`) using the least squares method.

- Performance metrics, such as R-squared, are computed and displayed.

**5. Simple Linear Regression - scikit-learn:**

- A simple linear regression model is trained using scikit-learn.

- The model is evaluated using performance metrics, and mean absolute error and mean squared error are computed.

- Coefficients and the intercept of the linear regression model are displayed.

**Multiple Linear Regression**

**6. Multiple Linear Regression - scikit-learn:**

- A multiple linear regression model is trained using scikit-learn.

- The model is evaluated, and mean squared error and R-squared are computed.

- Coefficients and the intercept of the multiple linear regression model are displayed.

**7. Multiple Linear Regression - Scratch:**

- A custom class `MultiLR` is implemented for multiple linear regression from scratch.

- The class includes methods to fit the model and make predictions.

- The least squares method is used to calculate the regression coefficients.

- Performance metrics, such as R-squared, are computed and displayed.