Iris Dataset Analysis (Program 7)

Pandas Functions:

- pd.read_csv() - Read CSV file.
- .shape - Get dimensions of the DataFrame.
- .head() - View first 5 rows.
- .tail() - View last 5 rows.
- .size - Get the total number of elements.
- .value_counts() - Count unique values.
- .describe() - Statistical summary of data.

Seaborn Functions:

- sns.pairplot() - Create pair plots for pairwise relationships.
- sns.displot() - Create a distribution plot.

Matplotlib Functions:

- plt.title() - Set the plot title.
- plt.show() - Display the plot.

KNN Implementation (Program 8)

Sklearn Functions:

- train_test_split() - Split data into training and testing sets.
- KNeighborsClassifier() - Create KNN classifier model.
- .fit() - Train the model.
- .predict() - Make predictions.
- accuracy_score() - Calculate accuracy score.
- classification_report() - Detailed classification metrics (precision, recall, F1 score).

DataFrame Functions:

- .iloc[] - Index selection (rows, columns).
- .values - Convert DataFrame to a NumPy array.

Simple Linear Regression (Program 9)

Sklearn Functions:

- LinearRegression() - Create linear regression model.
- .fit() - Train the model.
- .predict() - Make predictions.
- mean_absolute_error() - Calculate Mean Absolute Error (MAE).
- mean_squared_error() - Calculate Mean Squared Error (MSE).

Matplotlib Functions:

- plt.scatter() - Create scatter plot.
- plt.plot() - Create line plot for regression line.
- plt.xlabel() - Set x-axis label.
- plt.ylabel() - Set y-axis label.
- plt.legend() - Add legend.
- plt.show() - Display the plot.

Multiple Linear Regression (Program 10)

Pandas Functions:

- pd.read_csv() - Read data from CSV.
- .drop() - Remove a column from the DataFrame.

Sklearn Functions:

- train_test_split() - Split data into training and testing sets.
- LinearRegression() - Create linear regression model.
- .fit() - Train the model.
- .predict() - Make predictions.
- mean_squared_error() - Calculate Mean Squared Error (MSE).
- r2_score() - Calculate R-squared (coefficient of determination).

Seaborn Functions:

- sns.pairplot() - Create pair plots for exploratory data analysis.

Naive Bayes Classification (Program 11)

Sklearn Functions:

- GaussianNB() - Create Gaussian Naive Bayes classifier.
- .fit() - Train the Naive Bayes model.
- .predict() - Make predictions.
- accuracy_score() - Calculate accuracy score.

Array Operations:

- .sum() - Count mismatched predictions.
- zip() - Pair actual and predicted values.

K-Means Clustering (Program 12)

Sklearn Functions:

- KMeans() - Create K-means clustering model.
- .fit() - Train the K-means model.
- .predict() - Assign clusters to data points.
- .cluster_centers_ - Get the cluster centers.

Matplotlib Functions:

- plt.scatter() - Create scatter plot.
- plt.xlabel() - Set x-axis label.
- plt.ylabel() - Set y-axis label.
- plt.show() - Display the plot.

Common Library Imports

```
import pandas as pd  # For data handling and manipulation
import numpy as np  # For numerical operations
import matplotlib.pyplot as plt  # For plotting graphs and charts
import seaborn as sns  # For advanced data visualization
from sklearn.model_selection import train_test_split  # For splitting datasets
```

Functions by Category

1. Data Loading & Preprocessing:

- pd.read_csv() - Read CSV data.
- .iloc[] - Index selection (rows and columns).
- .values - Convert to a NumPy array.
- train_test_split() - Split data into training and testing sets.

2. Model Creation & Training:

- KNeighborsClassifier() - KNN classifier.
- LinearRegression() - Linear regression model.
- GaussianNB() - Naive Bayes classifier.
- KMeans() - K-means clustering model.
- .fit() - Train the model.
- .predict() - Make predictions.

3. Evaluation Metrics:

- accuracy_score() - Calculate accuracy.
- mean_squared_error() - Calculate Mean Squared Error (MSE).
- mean_absolute_error() - Calculate Mean Absolute Error (MAE).
- r2_score() - Calculate R-squared value.
- classification_report() - Detailed classification metrics (precision, recall, F1 score).

4. Visualization:

- plt.scatter() - Create scatter plots.
- plt.plot() - Create line plots.
- plt.show() - Display plots.
- sns.pairplot() - Create pairwise relationship plots.
- sns.displot() - Create distribution plots.

5. Data Analysis:

- .describe() - Generate a statistical summary of the data.
- .value_counts() - Count unique values in a column.
- .head() - View the first 5 rows of the DataFrame.

- .tail() - View the last 5 rows of the DataFrame.
- .shape - Get the shape (dimensions) of the DataFrame.
- .size - Get the total number of elements in the DataFrame.