LAB ASSIGNMENT-11

Title: Implement Dimensionality reduction using Principle Component Analysis (PCA) method.

Objective: The objective of this lab assignment is to implement Dimensionality Reduction using Principal Component Analysis (PCA) and gain hands-on experience in reducing the dimensionality of a dataset while preserving its essential information.

Dataset: Load a dataset of your choice or generate a synthetic dataset.

Tasks:

1) Implement the PCA algorithm from scratch or using scikit-learn.
2) Perform data standardization (mean-centering and scaling) as a preprocessing step for PCA.
3) Determine the number of principal components to retain.
4) Apply PCA to the preprocessed dataset and reduce its dimensionality.
5) Visualize the dataset before and after PCA using scatterplots or other appropriate visualizations.
6) Evaluate the impact of dimensionality reduction on the dataset's performance in a machine learning task (e.g., classification or regression).
7) Suggest possible use cases where PCA can be beneficial.

Submission:
Prepare a PDF file that covers all the tasks mentioned above. Include code snippets, visualizations, and tables to support your analysis. Clearly explain the steps you took, the results you obtained, and your interpretation of the findings.