# README for PCA Task Notebook

# PCA Task  
  
This repository contains a Jupyter Notebook titled \*\*"PCA\_Task.ipynb"\*\*, which demonstrates the application of Principal Component Analysis (PCA) for dimensionality reduction and feature transformation. The notebook focuses on preprocessing, PCA implementation, and analysis of the results.  
  
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## Features of the Notebook  
  
- \*\*Data Exploration\*\*:  
 - Overview of the dataset.  
 - Summary statistics and correlation analysis.  
  
- \*\*Data Preprocessing\*\*:  
 - Handling missing values.  
 - Feature scaling for PCA compatibility.  
  
- \*\*Principal Component Analysis (PCA)\*\*:  
 - Application of PCA for dimensionality reduction.  
 - Explained variance analysis to determine the number of components.  
  
- \*\*Visualization\*\*:  
 - 2D and 3D plots of PCA-transformed data.  
 - Contribution of each principal component.  
  
- \*\*Model Building\*\*:  
 - Using PCA-transformed data for machine learning models.  
 - Comparison of model performance before and after PCA.  
  
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## Getting Started  
  
### Prerequisites  
Ensure you have the following installed:  
- Python 3.8 or above  
- Jupyter Notebook or Jupyter Lab  
- Required Python libraries:  
 - `pandas`  
 - `numpy`  
 - `matplotlib`  
 - `seaborn`  
 - `sklearn`  
  
### How to Run  
1. Clone the repository:  
 ```bash  
 git clone <repository-link>  
 cd <repository-folder>  
 ```  
2. Open the notebook:  
 ```bash  
 jupyter notebook "PCA\_Task.ipynb"  
 ```  
3. Run the cells sequentially to perform PCA and analyze the results.  
  
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## Results  
  
- Reduced dataset dimensionality while retaining significant variance.  
- Visualized the dataset in lower-dimensional space.  
- Improved computational efficiency for downstream machine learning tasks.  
  
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## Acknowledgements  
  
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