**🛍️ Product Clustering Analysis**

This repository contains a Jupyter Notebook that performs clustering analysis on a dataset of products. The main objective is to group similar products together based on their features using unsupervised machine learning techniques.

**📌 Project Overview**

This notebook focuses on:

* Loading and exploring product-related data
* Preprocessing and normalizing the data
* Applying clustering algorithms (e.g., K-Means)
* Evaluating optimal clusters using the Elbow Method
* Visualizing the clustered groups

**📊 Use Cases**

* Product categorization
* Market segmentation
* Recommendation systems
* Inventory management

**🧰 Technologies & Libraries**

* Python 3.x
* Pandas
* NumPy
* Matplotlib / Seaborn
* Scikit-learn

**📂 File Structure**

bash

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📦 Product\_Clustering\_Analysis

└── Product\_Clustering\_Analysis.ipynb # Main notebook with full analysis

**🚀 How to Run**

1. Clone this repository:

bash

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git clone https://github.com/your-username/Product\_Clustering\_Analysis.git

cd Product\_Clustering\_Analysis

1. Install the required packages:

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pip install -r requirements.txt

1. Launch the Jupyter Notebook:

bash

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jupyter notebook Product\_Clustering\_Analysis.ipynb

⚠️ Make sure your environment has the necessary data file(s) expected by the notebook. If the dataset is not provided in the repo, you may need to modify the notebook to load your own.

**📈 Output**

The notebook generates:

* Cluster assignments for each product
* Cluster visualizations using PCA or 2D plotting
* Insights from grouping similar items