🛍️ Shopper Spectrum

🎯 Project Title:
Shopper Spectrum: Customer Segmentation and Product Recommendations in E-Commerce

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📌 Overview
Shopper Spectrum is a full-scale machine learning project aimed at enhancing customer experience in e-commerce by:
- Segmenting customers using **RFM analysis**
- Building a **personalized recommendation system**
- Deploying the solution via an **interactive Streamlit dashboard** (hosted using Ngrok)

🧠 Objectives

- 📊 **Understand customer behavior** using RFM (Recency, Frequency, Monetary) metrics
- 🎯 **Cluster customers** to enable targeted marketing
- 🤝 **Recommend products** based on purchase history and similarity
- 🌐 **Deploy** everything with an interactive web app

🧾 Dataset

- **Source**: [UCI Online Retail Dataset](https://archive.ics.uci.edu/ml/datasets/online+retail)
- **File**: `Online Retail.xlsx`
- Contains 541,909 transactions from a UK-based e-commerce store from 2010–2011

🛠️ Technologies Used

Category	Tools/Packages
Programming	Python, Pandas, NumPy
ML Models	KMeans, Cosine Similarity
Dashboard	Streamlit
Deployment	Ngrok
Visualization	Matplotlib, Seaborn, Plotly

🧩 Project Structure

📁 Shopper_Spectrum_Project/
│
├── app.py # Streamlit app for dashboard
├── Shopper_Spectrum.ipynb # Full project notebook
├── Online Retail.xlsx # Dataset
├── models/
│ ├── kmeans_model.pkl
│ ├── scaler.pkl
│ └── similarity_matrix.pkl
├── assets/
│ └── plots, charts, and UI assets
└── requirements.txt

🔍 Key Features

1. 📈 RFM-Based Customer Segmentation
- Categorizes users into clusters like **High Value**, **Frequent Buyers**, **At-Risk**, etc.
- Uses **KMeans clustering** after feature scaling

2. 🛍️ Product Recommendation Engine
- Based on **collaborative filtering** using **cosine similarity**
- Suggests products similar to past user purchases

3. 💻 Streamlit Dashboard
- Clean UI with:
  - 📂 Upload data
  - 📊 Visualize segments
  - 🔍 Get product recommendations
- Accessible via **ngrok public URL** from Colab

🚀 How to Run

📦 1. Install Requirements
```bash
pip install -r requirements.txt
```

🧠 2. Train the Models (via Jupyter Notebook)

Open `Shopper_Spectrum.ipynb` and run all cells:

- Data cleaning
- EDA
- Clustering
- Recommendation engine
- Save models (`.pkl` files)

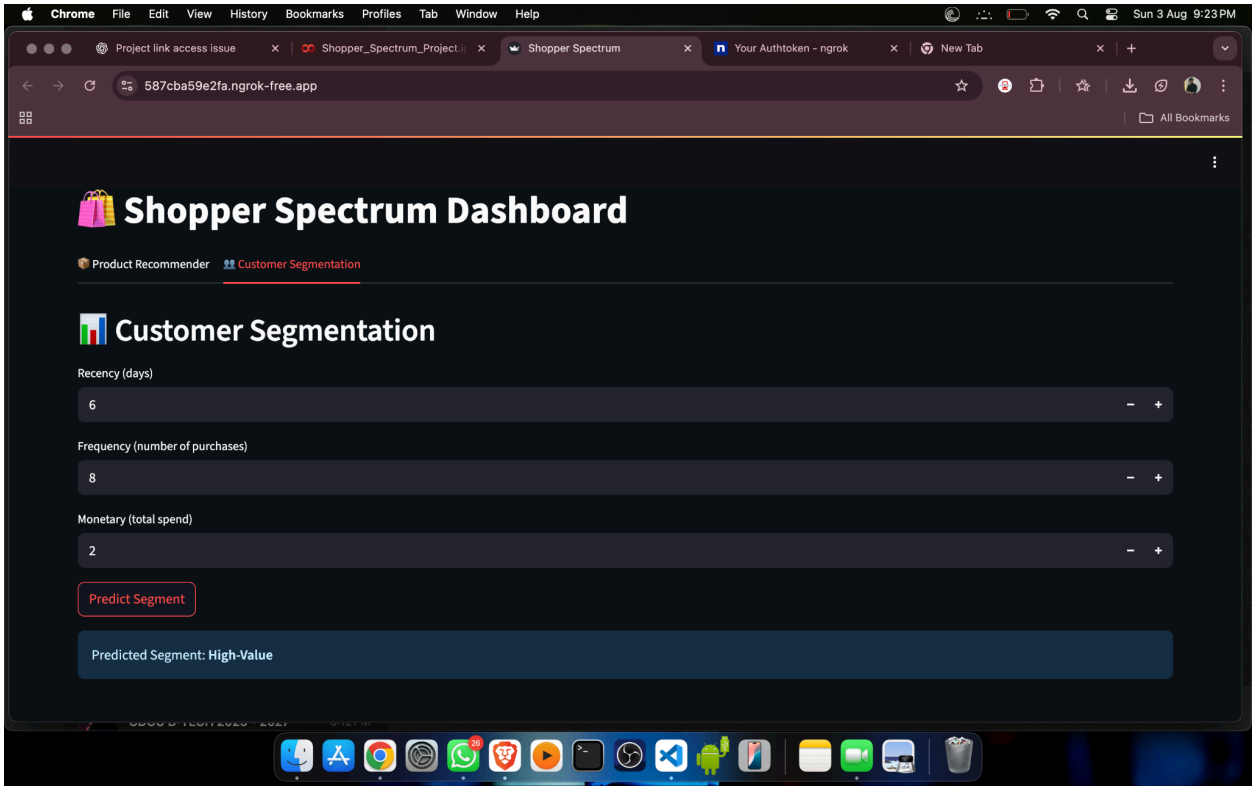
💻 3. Launch Streamlit App

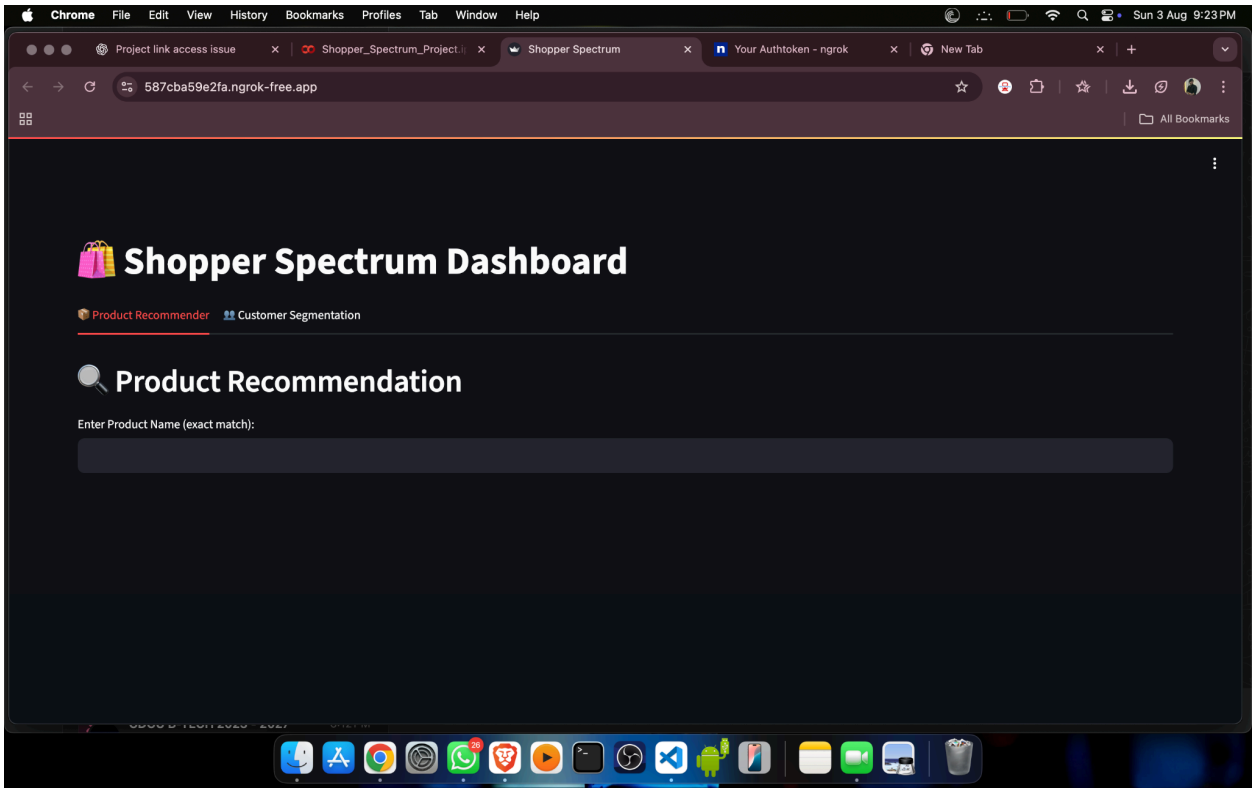
streamlit run app.py

🌐 4. Use ngrok to expose the dashboard

python
CopyEdit

```
from pyngrok import ngrok
ngrok.set_auth_token("YOUR_AUTHTOKEN")
ngrok.connect("http://localhost:8501")
```





💼 Business Impact

- 🎯 Helps target right customers with the right campaigns
- 🛒 Increases cross-selling opportunities
- 🤖 Automates personalization at scale

📚 Future Enhancements

- Integrate with live purchase data via APIs
- Add time-based cohort analysis
- Deploy to cloud (Streamlit Sharing, GCP, or AWS)

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📄 License

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