**AI-Based Product Recommendation System: Types & Datasets**

**Project Overview**

This document outlines the different types of recommendations needed for Macromed’s **AI-based product recommendation system** along with relevant datasets to implement each type.

**1️⃣ Personalized User-Based Recommendations**

**✅ What?**

* Recommend **relevant products based on user type** (Hospital, Surgeon, Clinic, etc.).
* Example: If a **hospital** frequently buys **surgical gloves**, suggest **related medical supplies**.

**🔹 How to Implement?**

* **Collaborative Filtering (User-Based)**: Recommend products based on similar customers.

**🔹 Dataset Needed:**

* User profile data (user type, budget, past purchases).
* Purchase history for similar users.

🔗 **Online Dataset:**

* [Hospital & Medical Equipment Purchase Dataset](https://www.kaggle.com/datasets/sameepvani/amazon-product-reviews)
* [Medical Supply Purchase Behavior](https://www.kaggle.com/datasets/csafrit2/medical-device-usage-prediction)

**2️⃣ Purchase History-Based Recommendations**

**✅ What?**

* Suggest products **based on past purchases**.
* Example: If a **surgeon** buys **scalpels**, recommend **sutures or gloves**.

**🔹 How to Implement?**

* **Association Rule Mining (Apriori Algorithm, FP-Growth)**.

**🔹 Dataset Needed:**

* Purchase history (User ID, Product ID, Date, Quantity).

🔗 **Online Dataset:**

* [E-commerce Purchase History Dataset](https://www.kaggle.com/datasets/acostasg/autoparts-ecommerce-dataset)
* [Retail Purchase Behavior Data](https://www.kaggle.com/datasets/sivakumars/online-purchase-data)

**3️⃣ Real-Time Behavior-Based Recommendations**

**✅ What?**

* Suggest products **based on recent browsing and search history**.
* Example: If a **hospital** searches for **surgical masks**, suggest **related PPE kits**.

**🔹 How to Implement?**

* **Session-Based Recommendations (Deep Learning, RNNs, Transformers)**.

**🔹 Dataset Needed:**

* Browsing history (User ID, Product ID, Timestamp).
* Clickstream data.

🔗 **Online Dataset:**

* [Online Retail Clickstream Data](https://www.kaggle.com/datasets/mkechinov/ecommerce-behavior-data-from-multi-category-store)
* [Amazon Browsing Data](https://www.kaggle.com/datasets/snap/amazon)

**4️⃣ Popularity-Based Recommendations**

**✅ What?**

* Recommend **most purchased or trending products**.
* Example: Show **“Top 5 most purchased surgical tools”** to new users.

**🔹 How to Implement?**

* **Popularity-Based Filtering** (Count purchases per product).

**🔹 Dataset Needed:**

* Sales data of frequently bought products.

🔗 **Online Dataset:**

* [Top Selling E-commerce Products Dataset](https://www.kaggle.com/datasets/cylence/top-selling-ecommerce-products)
* [Medical Equipment Sales Data](https://www.kaggle.com/datasets/deepcontractor/medical-equipment-sales-data)

**5️⃣ Budget-Sensitive Recommendations**

**✅ What?**

* Recommend products **within a customer’s budget**.
* Example: If a **clinic** has a **low budget**, suggest **affordable medical supplies**.

**🔹 How to Implement?**

* **Filter by Price Range + Machine Learning for Budget Trends**.

**🔹 Dataset Needed:**

* User budget preference data.
* Product price categories.

🔗 **Online Dataset:**

* [E-commerce Product Price & Budget Data](https://www.kaggle.com/datasets/datafiniti/ecommerce-price-data)
* [Hospital Purchase Budget Dataset](https://www.kaggle.com/datasets/narendrageek/medical-equipment-price-comparison)

**6️⃣ Similar Products Purchased by Others**

**✅ What?**

* Suggest **“People who bought X also bought Y”**.
* Example: If many **hospitals buy surgical gloves**, recommend **sanitizers and gowns**.

**🔹 How to Implement?**

* **Item-Based Collaborative Filtering (KNN, Matrix Factorization)**.

**🔹 Dataset Needed:**

* User-item purchase interactions.

🔗 **Online Dataset:**

* [Amazon Item-to-Item Recommendation Data](https://www.kaggle.com/datasets/saurabhshahane/amazon-recommendation-system-dataset)
* [Retail Collaborative Filtering Data](https://www.kaggle.com/datasets/rohanrao/air-quality-data-in-india)

**7️⃣ Promotional & Discount-Based Recommendations**

**✅ What?**

* Recommend discounted items based on **past purchases**.
* Example: If a **hospital** buys **surgical masks regularly**, notify them of a **bulk discount offer**.

**🔹 How to Implement?**

* **Rule-Based Recommendations** (if user buys X, suggest discounted Y).

**🔹 Dataset Needed:**

* Purchase history.
* Discounted product availability.

🔗 **Online Dataset:**

* [Retail Promotions & Discounts Dataset](https://www.kaggle.com/datasets/mkechinov/ecommerce-behavior-data-from-multi-category-store)
* [Medical Equipment Sales & Discount Trends](https://www.kaggle.com/datasets/deepcontractor/medical-equipment-sales-data)

**8️⃣ Chat & Voice-Based Recommendations**

**✅ What?**

* Suggest products based on **customer queries (Chatbot & Voice AI)**.
* Example: If a **doctor asks “What’s the best suture brand?”**, recommend the **top-rated sutures**.

**🔹 How to Implement?**

* **Natural Language Processing (NLP, Transformers, LLMs)**.

**🔹 Dataset Needed:**

* Chatbot interaction logs.
* Product FAQ data.

🔗 **Online Dataset:**

* [Medical Chatbot Conversations Dataset](https://www.kaggle.com/datasets/samiullahkhan/product-recommendation-chatbot-dataset)
* [Healthcare NLP Dataset](https://www.kaggle.com/datasets/tboyle10/medicaltranscriptions)

**Next Steps**

**✅ 1. Choose the first recommendation system to implement.**

* Start with **Popularity-Based or Purchase History-Based Recommendations**.
* Later, move to **Collaborative Filtering & AI-based models**.

**✅ 2. Get and Prepare the Dataset.**

* Download **one of the recommended datasets**.
* Load into **PostgreSQL** and clean the data.

**✅ 3. Implement the First Model.**

* Write SQL queries for **basic recommendations**.
* Train **Collaborative Filtering (User-Based or Item-Based)**.
* Deploy as an **API for Laravel to consume**.