

Hyper-Personalized Product Recommendation System

1. Problem Statement

Businesses today struggle to provide **personalized product recommendations** that truly resonate with individual customers. Traditional recommendation systems often suggest generic products or multiple options, leading to **choice paralysis** and lower conversion rates.

Key Challenges:

1. **Lack of Focused Recommendations:** Customers receive too many options without clear guidance on the best choice.
2. **No Confidence-Based Filtering:** Recommendations are not ranked by how likely they are to match customer preferences.
3. **No API Integration:** Businesses need a way to integrate recommendations into their existing platforms.

Solution:

A **Spark-based AI recommendation engine** that:

- Generates synthetic customer data (profiles, transactions, social media activity).
- Uses **Alternating Least Squares (ALS)** for collaborative filtering.
- Recommends **only the single best product** per customer based on **confidence scores**.
- Provides an **API endpoint** for easy integration.

Solution Architecture

The system consists of:

1. **Data Generation** (Customer profiles, social media posts, transactions).
2. **Recommendation Engine** (ALS model for product recommendations).