



Project Report: Hyper-Personalized Recommendation Engine using Generative AI



Problem Statement

In today's digital economy, customers demand experiences tailored to their individual preferences, behaviors, and emotional states. Traditional recommendation systems often lack the contextual depth and adaptability needed to meet these evolving expectations.

This project aims to develop a **Generative AI-powered Hyper-Personalized Recommendation Engine** that leverages:

- ☐ Customer profiles
- ☐ Purchase and transaction patterns
- ☐ Sentiment analysis
- ☐ Demographic data
- ☐ Social media behavior

The goal is twofold:

1. **Deliver real-time, dynamic recommendations** tailored to the user's intent and lifestyle.
2. **Provide businesses with actionable insights** to optimize engagement strategies.



Expected Outcomes



1. Adaptive Recommendation Engine

A learning system that evolves with the user's behavioral shift.

- ☐ *Example:* A user transitioning from budget-conscious shopping to premium spending will start receiving luxury product recommendations.



2. AI-Generated Personalized Suggestions

Leverages multiple data sources (engagement, sentiment, transaction) to tailor suggestions.

- ☐ *Example:* Recommending international travel credit cards to users making overseas transactions.

✓ 3. Sentiment-Driven Content

Analyzes the emotional tone in user interactions and delivers relevant content.

- *Example:* Users anxious about market trends receive curated educational content on financial stability.

✓ 4. Predictive Customer Insights & Business Strategies

Forecasts user behavior and identifies cross-sell or upsell opportunities.

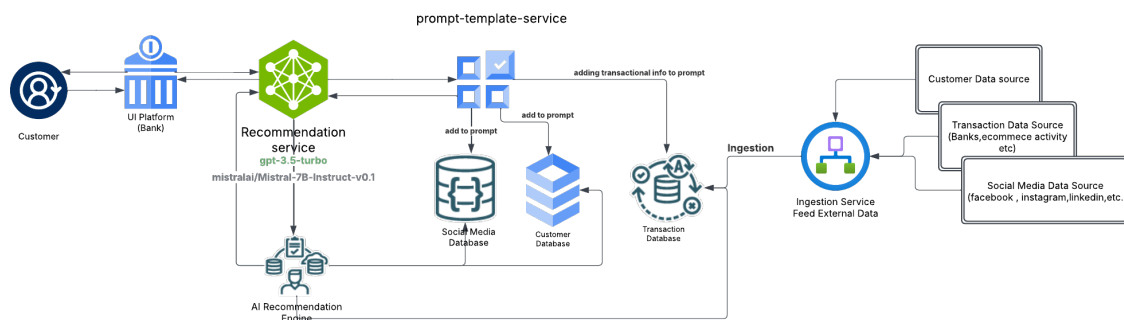
✓ 5. Multi-Model Personalization

Combines outputs from multiple LLMs to enhance the diversity and relevance of suggestions.

✓ 6. Personalized Financial Product Recommendations

Delivers financial offerings matched to user profiles, such as savings plans, investment tools, or credit products.

🧩 Architecture Overview



Data Sources:

- **Customer Data:** Preferences, demographics
- **Transaction Data:** Banking, e-commerce
- **Social Media:** Facebook, Instagram, LinkedIn activity

Data Flow:

1. **Ingestion Service:** Aggregates raw data in real-time
 2. **Database Storage:** Categorized into Customer, Transaction, and Social Media repositories
 3. **Prompt Generation:** Data converted into dynamic, contextual prompts
 4. **Generative Processing:**
 - Models used: gpt-3.5-turbo, mistralai/Mistral-7B-Instruct-v0.1
 5. **Recommendation Delivery:** Results rendered via the UI Platform for end-user interaction
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Functional Scenarios & Testing Highlights

Scenario 1: Banking & Investment

- Suggestions on personalized investment plans and real-time stock news.

Scenario 2: Sports & Food Enthusiast

- Receives local restaurant deals and sports content subscriptions.

Scenario 3: UK-Based User

- Recommends services and content specific to the UK audience.

Scenario 4: Nearing Retirement

- Personalized content around pensions, retirement planning, and healthcare.

Scenario 5: Beauty & Wellness

- Suggests spa deals, skincare guides, and subscription boxes.
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Generative AI Layer

The recommendation logic is driven by **Large Language Models (LLMs)**, such as GPT-3.5 and Mistral-7B, to:

- Understand nuanced prompts and user needs
 - Craft emotionally intelligent and human-like content
 - Adjust tone and content format for context-aware delivery
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Business Impact & Conclusion

- ☐ ☒ **Elevated User Engagement:** Personalized, relevant content increases time spent and repeat visits.
- ☐ ☒ **Smarter Marketing:** Actionable insights help optimize campaign targeting.
- ☐ ☒ **Higher Conversion Rates:** Tailored offers match real-time customer intent, boosting sales.