**HYPER-PERSONALISATION**

**Problem Statement:**

Banks handle large amounts of customer data that must be analyzed to recommend suitable financial products and estimate loan amounts. Manual processing is slow, inconsistent, and inefficient. This project aims to build a web application that automatically segments customers, predicts the most appropriate financial products, estimates credit limits, and generates clear, concise insights. The system leverages machine learning models and Genrative AI summarization to streamline decision-making and improve customer targeting.

**Features:**

* Upload customer CSV data for batch processing.
* Predict customer segment using clustering.
* Recommend financial products (Credit Card, Home Loan, Personal Loan)
* Estimate loan amounts and credit limits.
* Generate clear AI-powered customer insights using Gemini.
* Export and view recommendations.

**Technologies:**

* Python 3
* Flask
* pandas
* scikit-learn
* PyMySQL
* Google Gemini API

**Project Structure:**

├── app.py

├── models/

│ ├── kmeans.pkl

│ ├── scaler.pkl

│ ├── multi\_target\_classifier\_model.pkl

│ ├── rf\_regressor\_credit\_card\_model.pkl

│ ├── rf\_regressor\_home\_loan\_model.pkl

│ └── rf\_regressor\_personal\_loan\_model.pkl

├── templates/

│ ├── home.html

│ ├── index.html

│ └── view\_results.html

├── static/

└── README.md

**Setup Instructions:**

**1.Install dependencies:** Create a virtual environment (recommended).

**python -m venv venv**

**source venv/bin/activate # Linux/macOS**

**venv\Scripts\activate # Windows**

**2. Configure Gemini API Key:**

**genai.configure(api\_key="YOUR\_API\_KEY")**

**3. Prepare MySQL Database:** Create the database and tables**.**

**4.** **Place Pre-trained ModelsPlace Pre-trained Models**: Put your .pkl model files in this folder.

**5. Run the Application:**

**Python app.py**

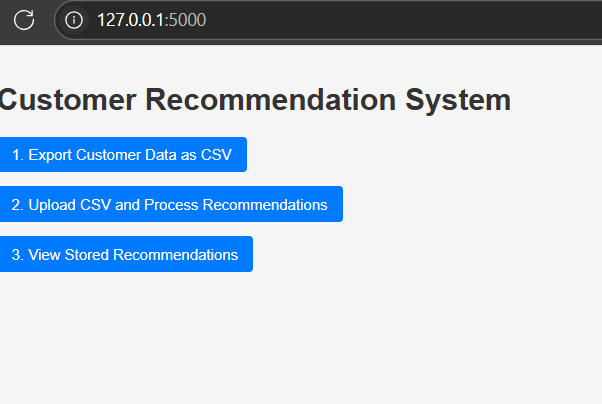
**How It Works**

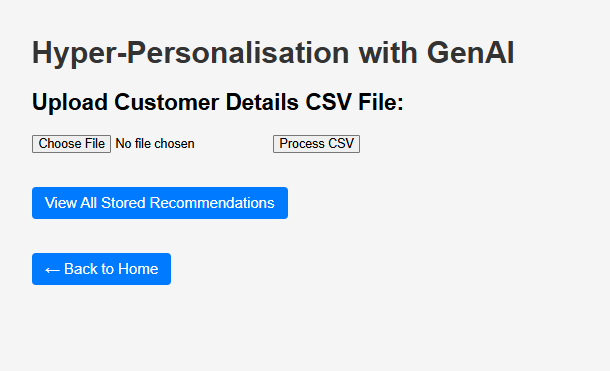
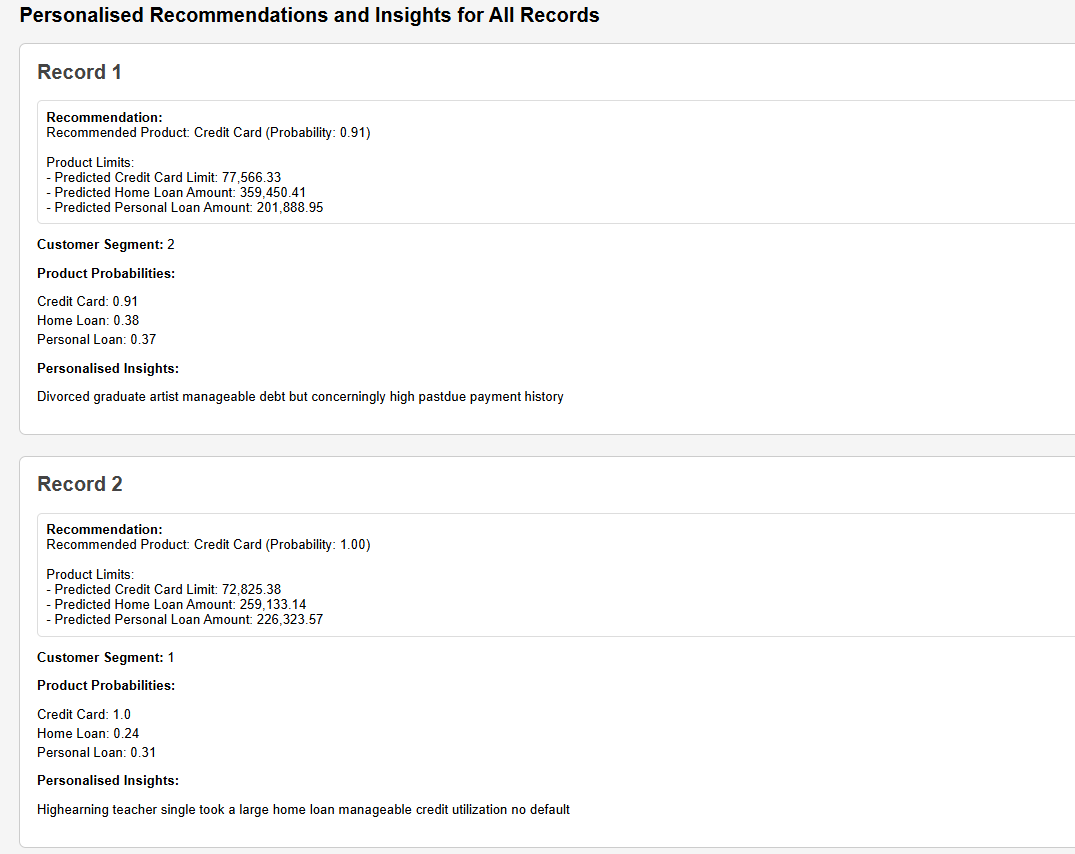
1. **Data Processing**
   * Reads uploaded CSV data.
   * Preprocesses and scales features.
2. **Customer Segmentation**
   * Predicts customer segment using KMeans clustering.
3. **Product Recommendation**
   * Predicts suitability probabilities for Credit Card, Home Loan, and Personal Loan.
   * If no probability >0.5 → No recommendation.
   * If top 2 probabilities are close → Recommend both.
   * Otherwise → Recommend the top product.
4. **Limit Estimation**
   * Predicts credit limits or loan amounts using regressors.
5. **Insight Generation**
   * Creates a 20-word summary using Google Gemini.
6. **Storage**
   * Saves all results to the recommendation\_result table.

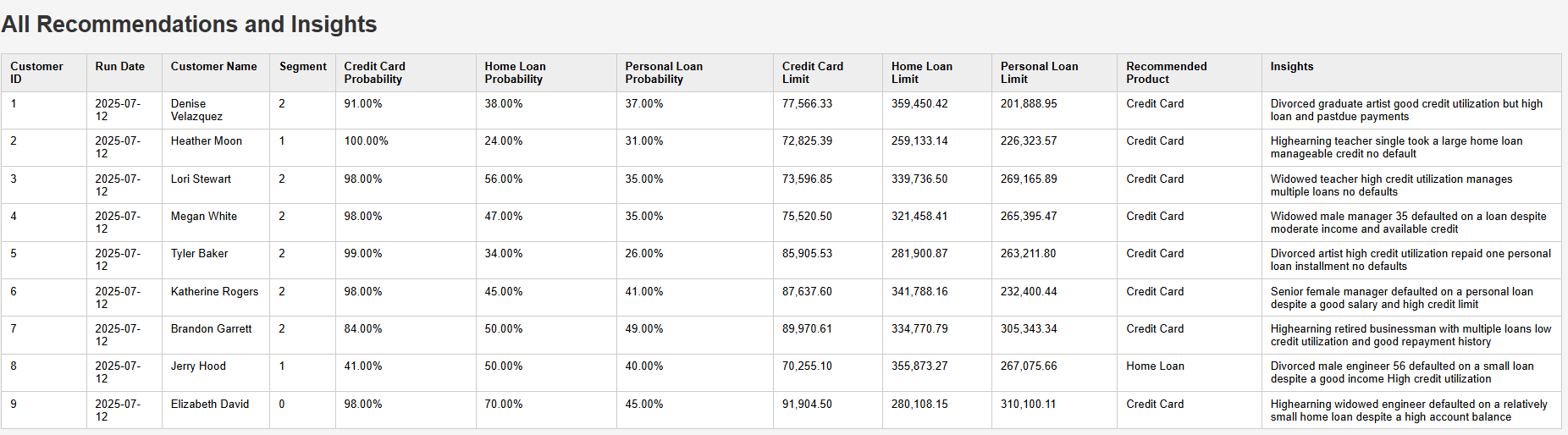
**Conclusion:**

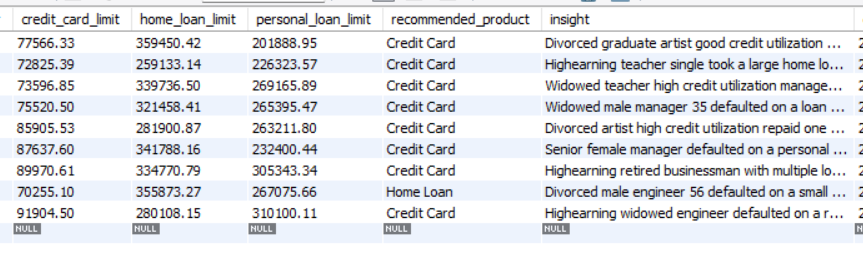
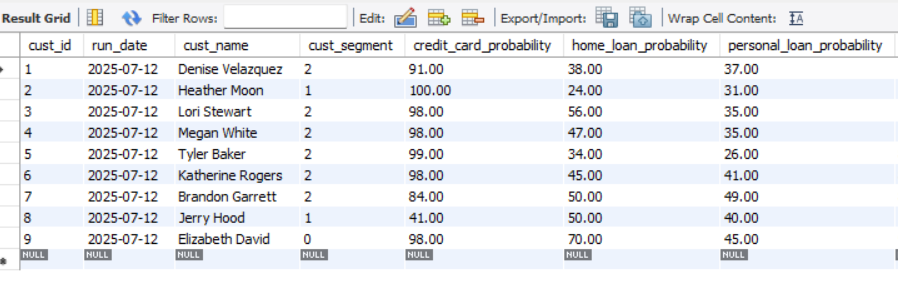
This project successfully demonstrates an end-to-end automated system for customer segmentation, product recommendation, and personalized insight generation in the financial domain. By combining machine learning models with AI-powered text summarization, the application enables banks and financial institutions to analyze customer data efficiently and consistently. The user-friendly web interface allows for easy data upload, processing, and results retrieval, reducing manual effort and improving decision-making. Overall, this solution streamlines the recommendation workflow and enhances the customer experience through data-driven, intelligent recommendations.

**Screenshot:**

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