**AI-Powered Customer Experience Enhancement System**

**🧠 Problem Statement**

In modern retail environments, delivering a personalized and seamless customer experience is essential to increasing engagement and boosting sales. However, identifying customer preferences and emotional states in real-time and responding accordingly remains a challenging task. Our project aims to solve this by using AI-powered modules integrated into a smart video processing pipeline.

**🎯 Objective**

The primary goal is to develop an AI-driven system that:

* Recognizes customers upon entry using facial recognition.
* Detects their current emotional state in real time.
* Recommends personalized products based on their identity and emotion.
* Responds using a voice assistant for an engaging shopping experience.

**🔧 System Modules**

**1. Face Recognition Module**

* **Function**: Identifies customers entering the store by comparing detected faces against a database of known customer images.
* **Model Used**:
  + Face Detection: face-detection-retail-0004
  + Face Recognition: arcfaceresnet100-8
* **Output**: A unique customer ID or label (e.g., olivia\_392e5d7c).

**2. Emotion Detection Module**

* **Function**: Analyzes facial expressions to detect emotional states.
* **Model Used**: emotion-ferplus-2 (OpenVINO compatible).
* **Output**: Emotion category (e.g., happiness, sadness, neutral, etc.)

**3. Recommender System Module**

* **Function**: Based on the detected identity and emotion, it recommends products or services tailored to the user's current mood.
* **Logic**: Uses a rule-based approach (e.g., happiness → ice cream, sunglasses).

**4. Voice Assistant Module**

* **Function**: Responds to the customer with a personalized greeting and recommendations.
* **Response Format**: Friendly and dynamic verbal interactions.
* **Future Extension**: Will integrate GenAI-based intent recognition and response generation.

**🔄 Pipeline Workflow**

1. **Face Registration**: Extract faces from initial video clips and save them with labels into the data/ folder.
2. **Inference Phase**:
   * Load a video feed.
   * Detect faces in every 10th frame to optimize performance.
   * For each detected face:
     + Identify the person using the recognition model.
     + If the face is known and not previously responded to:
       - Detect emotion.
       - Recommend products.
       - Speak to the customer via the assistant.
       - Mark the customer as “served” for this session.
3. **Avoid Repetition**: Once a customer is served, they are skipped in further frames to avoid redundancy.

**📁 Folder Structure**

bash

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project\_root/

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├── data/ # Saved registered face images

│ ├── olivia\_\*.jpg

│ └── jason\_\*.jpg

│

├── models/ # OpenVINO IR models

│ ├── face-detection-retail-0004.xml/bin

│ ├── arcfaceresnet100-8.xml/bin

│ └── emotion-ferplus-2.xml/bin

│

├── main.py # Main video inference script

├── face\_register.py # Script for face extraction from video

├── face\_identifier.py # Face recognition logic

├── emotion\_detector.py # Emotion classification logic

├── recommender.py # Rule-based product recommendation

└── voice\_assistant.py # Voice assistant response module  
  
  
  
the codes of all these files have been added into the jupyter notebook and has been shown for the implementation purposes.

**✅ Conclusion**

This AI-based system bridges real-time face recognition and emotional intelligence with personalized customer interaction. It showcases the power of OpenVINO-optimized models and a modular pipeline, offering immense potential for smart retail and beyond.

In the future, the system can be enhanced using GenAI models for intent detection and dynamic dialogue, creating a truly intelligent in-store assistant.