Requirements Gathering

1. Stakeholder Analysis

Identifying key stakeholders and their needs:

- **Healthcare Professionals (Doctors, Dentists, Oncologists):** Need accurate, fast, and interpretable AI predictions to assist in early oral cancer diagnosis.
- **Hospital Administrators:** Require predictive insights to optimize resource allocation and reduce patient readmission rates.
- **Patients & Caregivers:** Need clear and understandable risk assessments to make informed healthcare decisions.
- **Healthcare Data Analysts:** Require access to well-structured datasets for further analysis and performance monitoring.
- **Regulatory Bodies (e.g., HIPAA Compliance, Ministry of Health):** Ensure data privacy, security, and compliance with healthcare regulations.

2. User Stories & Use Cases

- **User Story 1: Doctor Diagnosing a Patient**
  - As a doctor, I want to input a patient's diagnostic data into the system so that I can receive an AI-generated oral cancer risk prediction to support my decision-making.
- **User Story 2: Hospital Resource Planning**
  - As a hospital administrator, I want to analyze historical patient data trends so that I can allocate resources effectively and prepare for patient inflow.
- **User Story 3: Patient Checking Health Risks**
  - As a patient, I want to receive a simplified report from the AI model so that I can understand my health risk and discuss it with my doctor.

3. Functional Requirements

List of features and functionalities:

- **AI Model for Oral Cancer Detection:** Implement a deep learning-based classification system.
- **Data Processing Pipeline:** Ensure efficient preprocessing, cleaning, and feature engineering for oral healthcare datasets.
- **Model Training & Optimization:** Experiment with different ML techniques and optimize hyperparameters for better accuracy.
- **Predictive Dashboard:** Develop a Power BI dashboard to visualize predictions and patient oral health insights.
- **API Deployment:** Build a REST API using Flask/FastAPI to integrate the AI model with hospital systems.
- **Performance Monitoring:** Implement MLOps practices to track model drift and automate retraining.

4. Non-functional Requirements

Performance, security, usability, and reliability criteria:

- **Performance:** The model should return predictions within 5 seconds for real-time usability.
- **Security:** Implement encryption and authentication mechanisms to protect sensitive healthcare data.
- **Usability:** The dashboard should have an intuitive UI for doctors and administrators to interpret results easily.
- **Reliability:** The system should maintain an uptime of 99.5%, ensuring continuous availability for healthcare professionals.
- **Compliance:** Adhere to HIPAA and other data protection regulations to ensure patient data privacy and ethical AI usage.