Project Title:RAG-Based Medical Report Summarizer with Personalized Nutrition

Team Name: InnovateX

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Project Description: This project presents a Retrieval-Augmented Generation (RAG)–based medical report summarizer integrated with personalized nutrition recommendations. It processes multiple document formats (PDF, DOCX, images) using OCR, applies semantic chunking, and stores embeddings in ChromaDB for precise medical context retrieval. A multi-agent system (CrewAI) coordinates extraction, analysis, and summary generation using open-source LLMs like Llama2 for offline, privacy-preserving operation. The system identifies 18+ conditions, proposes medications, estimates recovery timelines, and generates diet plans from six specialized nutrition databases. It outputs professional PDF summaries suitable for both patients and clinicians, ensuring scalable, secure, and actionable health insights.

Problem Statement

Medical reports are often lengthy, complex, and difficult for patients to understand, leading to confusion about diagnoses, recovery plans, and dietary requirements.

Solution Overview

This system uses a RAG-based AI pipeline and multi-agent processing to summarize medical reports and deliver actionable insights. It detects conditions, interprets medical data, and provides medication suggestions, recovery estimates, and personalized diet plans based on specialized nutritional databases.

Tech Stack

Core AI/ML: LangChain for RAG orchestration,Sentence-Transformers for embeddings,ChromaDB for vector search,CrewAI multi-agent coordination,Llama2

Document Processing: PyPDF2, python-docx, Tesseract OCR, Pillow

Interface: Gradio UI, ReportLab for PDF generation

Expected Impact : This solution empowers patients with clear, personalized medical insights while supporting clinicians with structured summaries, ultimately improving healthcare understanding and decision-making.

Brief on LLM Usage:LLMs are used for medical context interpretation, summarization, disease explanation, and tailored diet planning. Integrated through LangChain and CrewAI, the system leverages embeddings and retrieved knowledge to ensure accurate, safe, and locally deployable RAG-based reasoning using open-source Llama2 models.

Github url:https://github.com/Yasmeen-Begum/Aicte-edunet-projects/tree/main/Aichallenge