Healthcare Multi-Specialist AI Assistant

Project Proposal

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1. Introduction

Our project aims to build a **Streamlit-based AI healthcare assistant** that delivers **specialist medical advice** using text and image inputs. Users can upload **medical images**, describe symptoms, or **chat with their medical reports**, receiving **personalized and structured health insights**. This virtual system includes specialists in **Dental, Dermatology, General Medicine, Diet & Nutrition, Mental Health, Fitness**, and now a **Medical Report & X-ray Analyzer**.

We leverage **LangChain**, **OpenAI (GPT-4 Vision)**, and **FAISS for vector search** to analyze images, documents, and user queries. The assistant is not a replacement for doctors but serves as a **preliminary screening and guidance tool**.

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2. Features & Specialist Modules

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1. Dental Diagnosis Module

Input:

- Dental image (JPG/PNG)
- Optional symptom description: "Toothache on the left side", "Sensitivity to cold drinks"

Output:

- **Diagnosis:** E.g., "Possible early-stage gingivitis due to gum inflammation"
- **Recommendations:**
    - Use antiseptic mouthwash
    - Visit a dentist in 1–2 weeks

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2. Dermatology (Skin Disease) Module

Input:

- Image of affected skin area
- Symptoms: "Itchy", "Red bumps", "Lasts for 3 days"

Output:

- **Diagnosis:** E.g., "Likely contact dermatitis or allergic reaction"
- **Treatment Suggestions:**
    - Apply hydrocortisone cream
    - Avoid potential irritants (e.g., soaps, metals)

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3. General Physician (Symptom Checker)

Input:

- Age, gender, weight, height
- Symptoms: "Fever and fatigue for 3 days", "Mild cough"

Output:

- **Possible Conditions:** E.g., "Viral flu or bacterial infection"
- **Next Steps:**
    - Rest and monitor temperature
    - See a doctor if symptoms worsen

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4. Diet & Nutrition Planner

Input:

- Age, weight, height, activity level
- Goal: "Weight loss" or "Muscle gain"
- Dietary restrictions: Vegan, gluten-free, diabetic, etc.

Output:

- **Calorie Target:** "1800 kcal/day"
- **7-Day Meal Plan:** Custom meals per day with estimated calories
- **Grocery List:** Oats, spinach, chicken, lentils, etc.

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5. Mental Health Counselor

Input:

- Mood description: "Feeling anxious and unmotivated"
- Sleep quality (1–10), Stress level (1–10)

Output:

- **Mental Health Assessment:** "Mild signs of anxiety"
- **Recommendations:**
    - Practice mindfulness or deep breathing
    - Avoid caffeine in the evening
    - Seek professional help if it continues

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6. Exercise & Fitness Advisor

Input:

- Fitness level: Beginner, Intermediate, Advanced
- Equipment available: None, Home, Gym
- Goal: Strength, Weight Loss, Flexibility

Output:

- **Weekly Workout Plan:**
    - Monday: Push-ups, squats
    - Wednesday: 30-min jog
    - Friday: Planks and lunges
- **Demo Links (Optional):** YouTube videos for form guidance

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7. Medical Report & X-ray Analyzer (New Feature)

Input:

- **Uploaded File:**
  - Medical PDFs (blood reports, prescriptions, lab summaries)
  - X-rays, MRI scans, ultrasound images (JPG/PNG/PDF)
- **User Questions (optional but encouraged):**
  - "What is this report saying?"
  - "Is anything serious in my results?"
  - "What does high creatinine mean?"
  - "Can you simplify this scan summary?"

Output:

- **Summarized Report Content:**
  - "This is a CBC (Complete Blood Count) report. Hemoglobin is slightly low. WBC count is within normal range."
- **Simplified Explanation:**
  - "Low hemoglobin may cause fatigue. It's usually treated with iron-rich food or supplements."
- **Follow-up Recommendations:**
  - "Please consult a physician for further anemia tests if symptoms persist."
- **X-ray/Scan Analysis:**
  - "This chest X-ray shows minor opacity in the lower left lung, possibly due to infection."

Behind the Scenes:

- **PDFs** are parsed and chunked using `PyMuPDF` or `pymupdf4llm`
- Text chunks are embedded and stored in **FAISS**
- LangChain agent uses memory to enable **multi-turn conversation** about the uploaded report
- No long-term user data storage; session memory is used for state tracking

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3. Tech Stack

Component	Technology
Frontend	**Streamlit**

Component	Technology
AI Engine	**LangChain + OpenAI GPT-4 Vision**
Image/Document Parsing	`PyMuPDF` , PIL, Pydub
Vector Storage	**FAISS**
Agent State Management	**LangChain Memory (no DB needed)**

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4. Key Outcomes

Provide instant, AI-powered feedback for medical images and reports
Educate users on their health before visiting a doctor
Reduce unnecessary clinic visits for minor or easily interpretable issues
Offer 24/7 accessible support across multiple health domains

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5. Future Enhancements

- **Telemedicine Integration** – Connect users to real doctors for live consultations
- **Wearable Device Sync** – Use Fitbit/Apple Watch data for analysis
- **Multilingual Support** – Expand to regional/local languages
- **Secure Profiles** – Allow users to save medical history securely (optional)

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6. Conclusion

This AI assistant empowers users to take charge of their health by providing fast, understandable, and expert-like advice across medical specialties. The **new report and X-ray analyzer** adds a crucial feature by helping patients interpret critical documents using **AI, LangChain, and FAISS**, all while ensuring **real-time, interactive support in one unified app**.