## 📌 Problem Statement:

Medical lab reports—such as blood tests, lipid profiles, and diagnostic summaries—are often filled with **technical jargon**, **abbreviations**, and **reference values** that the average person cannot interpret without a doctor. Furthermore, reports come in **various formats** (PDFs, scans, images), making it even harder to access understandable information quickly.

## ❓The Challenge:

Design and develop an AI-powered assistant that can:

- Extract data (text, numbers, tables) from **scanned medical reports or PDFs**
- Use **NLP** to analyze and structure the content
- Apply **Generative AI** to explain test results in **simple, human-understandable language**
- Optionally, **suggest follow-up actions** or flag values that are out of range

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## 🎯 Project Objectives:

1. **Input Handling**
    - Allow users to **upload medical report files** in image format (JPEG/PNG) or scanned PDFs.
    - Preprocess the input (denoising, binarization) using **OpenCV** to improve accuracy.
2. **Text Extraction (OCR)**
    - Use **Tesseract** or **EasyOCR** to extract content from reports.
    - Extract structured data like:
        - Test Name

        - Measured Value
        - Normal Range
        - Unit (mg/dL, etc.)

3. **NLP-based Structuring**
    - Use rule-based or ML-based logic to:
        - Map extracted rows into structured format (dictionary or table).
        - Identify values **outside** the normal reference range.
        - Categorize values (e.g., Critical, Borderline, Normal).

4. **Generative AI Explanation**
    - Use **GPT-3.5 or Gemini Pro** via API to explain each test result using a prompt like:

      "Explain in simple language what it means if the patient's Hemoglobin is 9.5 g/dL, given the normal range is 13–17 g/dL."

    - Return explanations for **each abnormal result** or all if time allows.

5. **Optional Risk Summary / Follow-up Suggestion**
    - Based on extracted values and explanations, optionally generate:
        - A **summary paragraph**
        - A list of **suggested actions** like "Consult a cardiologist" or "Increase iron intake."

6. **User Interface (Streamlit / Flask)**
    - File upload box
    - OCR result viewer

- Explanations in expandable/collapsible sections
- Downloadable **PDF summary** of results