A Gen-AI Framework for reducing inefficiencies in Indian Healthcare System

- **Problem Statement**

  India's healthcare system is burdened by inefficient data management and manual administrative tasks. Handwritten forms, disconnected systems, and unstructured patient records in PDFs. These workflows delay care, consume valuable staff time, and increase the risk of errors. Doctors and health workers are forced to prioritize paperwork over patient interaction.

  Globally, similar inefficiencies cost healthcare systems over $1 trillion annually. However, advancements in OCR, LLMs, and AI-powered automation now offer scalable solutions to extract, standardize, and integrate medical data. This enables faster, more accurate, and interoperable digital health infrastructure.

- **Relevance of the Problem and the Target Audience**
  - Staff Burnout & Workforce Shortage

    Manual data entry contributes to doctor/nurse burnout and dissatisfaction. India has a low doctor-to-patient ratio so wasting clinician time on admin tasks increases the problem.

  - Lack of Standardization

    Hospitals and clinics use incompatible software or paper-based systems, preventing seamless patient data transfer. On top of that there's no widely adopted, standardized patient record format which hinders government programs like Ayushman Bharat Digital Mission (ABDM).

  - Impact on Patient Outcomes

    Missing or misfiled records can result in incorrect diagnoses or duplicate tests, harming care quality. Delays in care due to paperwork directly impact patient health, especially in emergencies.

  - Government Push for Digital Health

    The Indian government is investing heavily in digital health infrastructure like Unique Health ID, Unique Health Interface, etc. These require clean, interoperable data which is difficult to achieve without automating data collection and structuring at the source.

  - Insurance and Claims Processing

    Manual processing of insurance claims is a big reason for delays and rejections. Insurers require structured, verifiable medical records which can be made accessible using AI powered document processing.

  Taking our core problems into consideration our solution will have the following entities as our main target beneficiaries:-

  - Private and public healthcare providers seeking to digitize records, reduce manual entry.
  - Frontline staff in remote areas who need lightweight, mobile-friendly tools to enter, update, and retrieve patient data
  - Organizations looking to integrate intelligent data extraction and interoperability features into existing software frameworks.
  - Entities requiring structured, standardized medical records for faster claims processing, fraud detection, and regulatory compliance.

- **Proposed solution with the aid of Generative AI integration**

  Our solution applies Generative AI and OCR to automate the extraction and management of patient data from scanned medical documents. Using APIs like Mistral OCR or Azure OCR, the system deals with prescriptions, lab reports, and handwritten discharge summaries to perform AI driven data validation to:

  - Extract structured patient information from unstructured, scanned medical documents (prescriptions, lab reports, discharge summaries).
  - Auto-populate digital forms and update longitudinal patient records using a universal Patient ID securely stored in a centralized database.
  - Use proper algorithms to validate data, identify anomalies (e.g., medication mismatches, age inconsistencies), and flag entries for review.
  - Deliver the solution through a simple, intuitive app interface, accessible to urban healthcare facilities and rural health workers alike.
  - Enable easyand efficient sharing of patient and insurer data via a RESTful API (FHIR-compliant), supporting interoperability between clinics, hospitals, and insurance systems.

- **Solution Framework / Workflow**

  Following is a proposed workflow for our solution working with scanned data is processed, validated, and synced across systems using Gen-AI and standard web technologies.

  - Step 1: Document Upload

    Health workers upload a scanned image or photo of medical documents using the app interface.

  - Step 2: OCR Processing

    Optical Character Recognition (OCR) extracts raw text from the image.

  - Step 3: AI Parsing & Validation

    A Generative AI model analyses extracted text to identify structured fields such as name, age, diagnosis, medications. Data is validated to detect inconsistencies or improbable entries.

  - Step 4: Database Sync

    Structured data is stored in a secure database (e.g., PostgreSQL/Firebase) under a universal Patient ID. If an existing patient is identified, the system appends the new information; otherwise, a new profile is created.

  - Step 5: API Export

    Finalized records are exported through a secure API in standard formats. Enables interoperability with hospitals, insurance providers, and national health platforms like ABDM and UHI.

- **Expected Impact**

  This solution significantly reduces inefficiencies, improves accuracy, and strengthens India's health data infrastructure.

  - Over 50% reduction in manual data entry time, giving medical staff more time for patient care.
  - Fewer administrative errors due to automated parsing, standardization, and AI-driven validation.
  - Seamless data exchange between healthcare institutions and insurance bodies, improving claim processing and care continuity.
  - Easily deployable in low-resource settings with offline support and sync capability, making it scalable across India’s rural and urban healthcare landscape.