PROJECT REPORT

AI-Enhanced EHR Imaging & Documentation System

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1. Introduction

The healthcare industry generates large volumes of patient data, including medical images and clinical documentation. Efficient management and interpretation of this data are critical for accurate diagnosis and effective patient care. Traditional Electronic Health Record (EHR) systems often require significant manual effort for documentation and image analysis, which can increase workload and delay clinical decision-making.

This project, **AI-Enhanced EHR Imaging & Documentation System**, aims to enhance EHR workflows by integrating medical imaging data and structured clinical information into a unified system.

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2. Problem Statement

Healthcare professionals spend considerable time on:

- Manual clinical documentation

- Reviewing medical images with varying quality

- Mapping diagnoses to standard ICD-10 codes

These tasks reduce the time available for patient care and increase the risk of inconsistencies in medical records.

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3. Objectives

The objectives of this project are:

- To collect and preprocess medical imaging and EHR data

- To enhance medical images for improved visualization

- To generate structured clinical summaries and ICD-10 mappings

- To integrate imaging and clinical data into a single EHR interface

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4. System Architecture Overview

The system follows a modular architecture:

- **Data Layer**: Medical imaging data and EHR text data

- **Processing Layer**: Image enhancement and clinical data processing

- **Application Layer**: Streamlit-based EHR interface

- **Presentation Layer**: Browser-based dashboard for users

Each module is implemented milestone-wise to ensure clarity and scalability.

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5. Milestone-wise Implementation

5.1 Milestone 1: Data Collection and Preprocessing

- Collected open-source medical imaging datasets (X-ray, MRI, CT, Ultrasound)

- Collected structured and unstructured EHR data

- Cleaned, labeled, and standardized datasets

- Organized data into a well-defined folder structure

5.2 Milestone 2: Medical Image Enhancement

- Applied image denoising techniques

- Improved contrast and clarity using image enhancement methods

- Generated enhanced medical images for better visualization

5.3 Milestone 3: Clinical Note Generation and ICD-10 Mapping

- Structured patient clinical data into standardized formats

- Generated clinical summaries including diagnosis and treatment details

- Integrated ICD-10 codes with clinical records

5.4 Milestone 4: Streamlit-Based EHR Interface

- Developed a web-based EHR dashboard using Streamlit

- Implemented patient selection functionality

- Integrated clinical summaries, ICD-10 codes, and medical images

- Enabled viewing of raw EHR data in JSON format

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6. Technology Stack

- **Programming Language**: Python

- **Web Framework**: Streamlit

- **Data Format**: JSON

- **Image Processing**: Pillow / OpenCV

- **Version Control**: GitHub

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7. Results and Observations

- Successfully integrated imaging and clinical data into a single interface

- Enhanced images provide improved clarity for visualization

- Clinical summaries are displayed in a structured and readable format

- The system demonstrates smooth data flow across all milestones

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8. Conclusion

The AI-Enhanced EHR Imaging & Documentation System successfully consolidates medical imaging and structured clinical data into a unified EHR interface. The milestone-wise approach ensured systematic development and integration. This implementation demonstrates an effective workflow for managing enhanced medical data within an EHR system.

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