Group Members: Krishna Dubey (211020425), Pankaj Kumar Giri (211020430), Nayandeep (211000033)

GEMINICARE: AI-DRIVEN MEDICAL ASSISTANT FOR PRECISE HEALTHCARE

PROBLEM DEFINITION:

Healthcare professionals and patients often struggle to interpret complex medical images and jargon-laden reports, leading to confusion and delayed decisions. The current reliance on manual interpretation of medical scans can be error-prone, time-consuming, and inaccessible to non-experts. There is a pressing need for an AI-driven tool that can automatically analyze medical images, provide detailed diagnoses, recommend treatment options, and present the information in an understandable format.

OBJECTIVES:

Automate Medical Image Analysis: Leverage Google's Gemini Pro Vision model to create an AI assistant capable of analyzing medical images and providing detailed, accurate reports.

Enhance Accessibility: Make medical analysis more accessible by translating complex medical information into understandable language for both doctors and patients.

Improve Decision-Making: Assist healthcare professionals in making faster and more accurate decisions by providing AI-generated recommendations and treatment options.

Ensure Patient Safety: Integrate safety protocols and disclaimers to guide users toward consulting medical professionals, ensuring AI recommendations are used responsibly.

RESEARCH OUTCOMES AND DELIVERABLES:

AI-Powered Medical Image Analysis Tool: A fully functional application that can analyze medical images, generate detailed reports, and offer treatment suggestions using the Gemini Pro Vision model.

User-Friendly Interface: A streamlined front-end interface developed with Streamlit, allowing users to easily upload images and receive analysis.

Comprehensive Reports: Detailed analysis, findings reports, recommendations, and treatment options, structured in a clear and accessible manner.

Scalable Architecture: A scalable back-end system capable of handling multiple image analyses, with potential integration for mobile and web applications.

Safety and Compliance Features: Built-in safety settings and disclaimers to ensure that the AI-generated insights are used ethically and with professional oversight.

PHASE BY PHASE PLAN OF ACTION:

Objective: Develop and deploy a functional AI-powered medical image analysis tool prototype, with features ready for short-term use.

Week 1-2: Planning & Initial Setup

- Task: Finalize project requirements, acquire the necessary API keys (Google's Gemini Pro Vision model), and set up the development environment.
- Exp. Outcome: Approved project plan, tools, and environment set up for development.

Week 3-4: Front-End Development

- Task 1: Develop the Streamlit-based front-end, allowing users to upload medical images.
- Task 2: Implement basic UI features such as page configuration, logo placement, and file upload functionality.
- Exp. Outcome: Basic front-end interface ready for image upload and display.

Week 5-6: Back-End Development & API Integration

- Task 1: Configure the Gemini Pro Vision model with API keys and integrate safety settings.
- Task 2: Implement the core logic for processing uploaded images and generating AI-based analysis.
- Exp. Outcome: Back-end integrated with the front-end, capable of processing images and generating analysis.

Week 7-8: Detailed Analysis & Report Generation

- Task 1: Develop the system prompt to instruct the AI model on the specific analysis and report structure required.
- Task 2: Implement logic to generate and display detailed analysis, findings reports, and treatment recommendations.
- Exp. Outcome: Functional tool capable of providing detailed medical reports based on image analysis.

Week 9-10: Testing & Validation

- Task 1: Test the application with various medical images to ensure accurate analysis and reporting.
- Task 2: Validate the safety settings, ensuring appropriate disclaimers and recommendations are provided.
- Exp. Outcome: Tested and validated tool ready for initial deployment.

Week 11-12: Feature Enhancement & Short-Term Deployment

- Task 1: Add additional features such as image display and report formatting for better user experience.
- Task 2: Deploy the application for internal testing, collect feedback, and make necessary adjustments.
- Outcome: Ready-to-use AI-powered medical assistant tool, prepared for broader deployment and use.