Project Design Phase
Proposed Solution Template

Date	08/02/2026
Team ID	LTVIP2026TMIDS83275
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	Diabetic Retinopathy (DR) is a leading cause of preventable blindness among diabetic patients. Early detection is essential but manual screening of fundus images requires trained ophthalmologists, is time-consuming, and prone to human error. Rural and under-resourced areas face limited access to specialists, causing delayed diagnosis and treatment.
2.	**Idea / Solution Description**	Develop an AI-powered Deep Learning system that analyzes retinal fundus images using a Convolutional Neural Network (CNN) model to automatically detect and classify the severity of Diabetic Retinopathy. The system provides instant predictions through a web-based interface, enabling fast and scalable screening support.
3.	**Novelty / Uniqueness**	The solution combines automated image preprocessing with deep learning-based classification to reduce subjectivity in diagnosis. It transforms expert-dependent screening into AI-assisted decision support. The model can be deployed in rural clinics, screening camps, and hospitals, making advanced medical AI accessible beyond specialist centers.
4.	**Social Impact / Customer Satisfaction**	The system helps in early detection of DR, reducing preventable blindness. It supports healthcare professionals by reducing workload and improving diagnostic consistency. Patients benefit from faster results and increased confidence in screening accuracy. It promotes equitable healthcare access in underserved regions.
5.	**Business Model (Revenue Model)**	Revenue can be generated through: • Subscription model for hospitals and clinics • SaaS-based cloud deployment for screening centers • Licensing model for healthcare institutions • Government healthcare partnerships • Integration with telemedicine platforms
6.	**Scalability of the Solution**	The solution follows a modular, cloud-compatible architecture. It can scale horizontally by deploying on cloud servers. The model can be retrained with larger datasets for improved accuracy. It supports integration with hospital management systems and telemedicine platforms, enabling large-scale screening programs.

Overview

The proposed system is a web-based deep learning application designed to detect diabetic retinopathy from retinal fundus images.

System Components

1. User Interface (Web-based)
2. Flask Backend Server
3. Image Preprocessing Module
4. Deep Learning CNN Model
5. Result Display Module

Working Process

1. User uploads fundus image.
2. Image is resized and normalized.
3. Processed image is fed into trained CNN model.
4. Model predicts DR severity level.
5. Result is displayed on webpage.

Output Classes (Example – Modify if Needed)

- No DR
- Mild
- Moderate
- Severe
- Proliferative DR

Benefits

- Real-time prediction
- Automated feature extraction
- Supports healthcare screening
- Easy to deploy