Ideation Phase
Define the Problem Statements

Date	31 January 2026
Team ID	LTVIP2026TMIDS81330
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
Maximum Marks	2 Marks

Define Problem Statement

1. Introduction

Diabetic Retinopathy (DR) is one of the leading causes of blindness worldwide. It is a complication of diabetes that affects the retina of the eye. Early detection is critical to prevent permanent vision loss.

However, manual diagnosis requires expert ophthalmologists and specialized equipment, which may not be accessible in rural or underdeveloped areas.

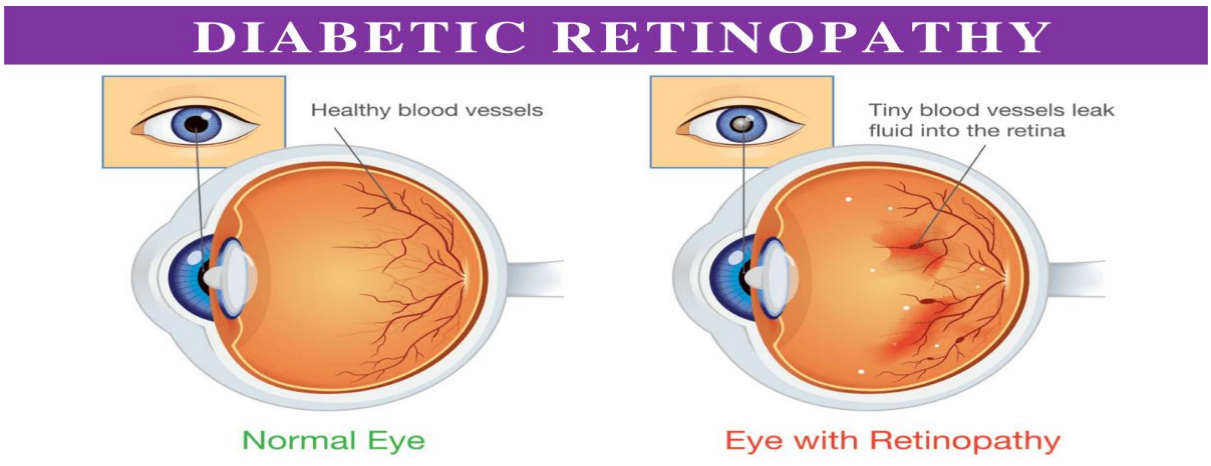
2. Problem Definition (Technical Perspective)

The problem is to develop an automated system capable of:

- Analyzing retinal fundus images
- Detecting signs of diabetic retinopathy
- Classifying the disease into severity levels
- Providing real-time prediction results

The system must:

- Use Deep Learning techniques
- Achieve high classification accuracy
- Provide user authentication
- Be accessible through a web interface



3. Problem Statement (User Perspective)

From a user's point of view:

A diabetic patient needs regular eye screening. Visiting a specialist frequently may be expensive and time-consuming.

There is a need for:

- A quick screening tool
- Easy image upload interface
- Instant diagnosis
- Secure data handling
- Reliable results

Users should be able to:

1. Register and login securely
2. Upload retinal image
3. Receive prediction result
4. Understand disease severity
5. Log out safely

4. Real-World Usage

In real-world scenarios, this system can be used in:

- Hospitals
- Clinics
- Rural health centers
- Telemedicine platforms
- Mobile healthcare units

It can assist doctors by:

- Providing preliminary diagnosis
- Reducing manual workload
- Screening large populations
- Prioritizing severe cases

5. Challenges Identified

While defining the problem, the following challenges were identified:

- Availability of quality retinal images
- Model training complexity
- Need for accurate classification
- Secure user authentication
- Real-time performance

6. Proposed Solution

To address these challenges, the solution involves:

- Using Xception CNN model
- Applying Transfer Learning
- Building Flask-based web app
- Integrating Cloudant NoSQL database
- Providing modern medical dashboard UI

7. Expected Outcome

The expected outcome of the project is:

- Accurate classification of retinal images
- Automated detection of DR stages
- Secure and user-friendly application
- Reduced dependency on manual diagnosis
- Improved early detection capability

Conclusion

The defined problem addresses a critical healthcare challenge. By leveraging Artificial Intelligence and Deep Learning, the project aims to provide an efficient, scalable, and reliable solution for Diabetic Retinopathy detection.

The system bridges the gap between technology and healthcare, enabling early diagnosis and preventing blindness in diabetic patients.