Artificial Intelligence and Machine Learning

Project Documentation format

1. Introduction

· **Project Title:** Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
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2. Project Overview

· **Purpose:** Diabetic Retinopathy (DR) is a diabetes-related eye disease that can lead to vision loss if not detected early. Manual diagnosis requires expert ophthalmologists and is time-consuming.
The purpose of this project is to automatically detect diabetic retinopathy at an early stage using deep learning techniques by analyzing retinal fundus images. This system helps in faster, accurate, and cost-effective screening, especially useful in rural and underserved areas.

- . · **Features:**

- Upload retinal fundus images for analysis

- Automatic classification of diabetic retinopathy stages

- Deep learning–based prediction with high accuracy

- User-friendly web interface

- Secure handling of medical image data

- Fast and reliable results

3. Architecture

· **Frontend:** The frontend is developed using React.js, providing a responsive and interactive user interface.
Key features include:

- Image upload functionality

- Display of prediction results

- Clean and intuitive UI for users

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· **Backend:** The backend is implemented using Node.js and Express.js, which:
- Handles image upload requests
- Sends images to the ML model for prediction
- Returns classification results to the frontend
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Database:
MongoDB is used to store:
- User details
- Image metadata
- Prediction results

4. Setup Instructions

Prerequisites

Install the following software:

- Node.js

- npm

- MongoDB

- Python

- Scikit-learn

- OpenCV.

5. Folder Structure

·client/

| —— src/

| ├—— components/   # Reusable UI components

```
│   ├───── pages/           # Application pages (Home, Upload, Results)

│   ├───── services/        # API service calls

│   ├─── App.js             # Main React component

│   └─── index.js           # Entry point

├─── public/

├─── package.json
```

6. Running the Application

• Provide commands to start the frontend and backend servers locally. ○
      Frontend: `npm start` in the client directory.
   ○ **Backend:** `npm start` in the server directory.

7. API Documentation

• Document all endpoints exposed by the backend.
• Include request methods, parameters, and example responses.

8. Authentication

• Explain how authentication and authorization are handled in the project. •
Include details about tokens, sessions, or any other methods used.