Retinopathy Detection

AI client project 3

Brief Documentation

1. Introduction

This project involves building a machine learning model to detect the type of diabetic retinopathy from retinal images. The final model is deployed as a web application using Flask and hosted on an open-source platform (Render).

2. Dataset

The dataset contains labeled retinal images classified into three categories:
 - No DR (No Diabetic Retinopathy)
 - Mild DR
 - Severe DR
 The dataset was used to train, validate, and test the deep learning model.

3. Data Preprocessing

Images were resized to 224x224 pixels, normalized, and augmented. The images were converted into NumPy arrays and split into training and validation datasets.

4. Model Building

A Convolutional Neural Network (CNN) with a custom focal loss function was used. The model was compiled with Adam optimizer and categorical crossentropy/focal loss as the loss function. The best performing model was saved using model checkpointing.

5. Model Evaluation

The model was evaluated using metrics such as accuracy, precision, recall, and F1-score. The classification report showed high performance, especially for the 'No DR' and 'Severe DR' classes.

6. Web Application

A Flask-based web app was built where users can upload an image and get the predicted retinopathy type. The app loads the trained model and returns predictions after processing the image.

7. UI Design

The HTML template was styled to provide a professional and clean interface. Users can upload images and view the result instantly.

8. Deployment on Render

The project was deployed using Render. The steps included:
 - Creating a GitHub repository and pushing all files.
 - Adding `requirements.txt` and `render.yaml` files.
 - Linking the GitHub repo with Render and deploying the app.
 - Testing the deployment and ensuring predictions work on uploaded images.

9. Conclusion

This project demonstrates how deep learning can be effectively used for medical image classification. It also highlights how to deploy a model as a web application on a cloud platform. You can access it on https://retinopathy-g5tz.onrender.com