Project Title: Developing a Web Application for Diabetic Retinopathy Detection and Classification using Transfer Learning

1. Introduction:

Diabetic Retinopathy (DR) is a leading cause of vision loss in people with diabetes. Early detection and intervention are crucial to prevent irreversible damage. Traditional diagnosis involves manual analysis of retinal fundus images by ophthalmologists, which can be time-consuming, expensive, and prone to human error.

2. Project Objectives:

This project aims to develop a web application powered by a transfer learning model for automated DR detection and classification. The application will:

* Analyze retinal fundus images: Users upload images, and the model identifies the presence and severity of DR.
* Display results: The application provides a clear and concise analysis of the uploaded image, including DR type and confidence level.

3. Technical Approach:

3.1 Data:

* A labelled dataset of retinal fundus images will be used, categorized according to DR severity (e.g., No Disease, Mild NPDR, moderate NPDR, severe DR).
* Data will be split into training, and testing sets for model development and evaluation.

3.2 Model Building:

* A pre-trained convolutional neural network (CNN) will be used as a feature extractor. This leverages the model's pre-trained knowledge on image features, reducing training complexity and improving accuracy.
* Additional layers will be added to the pre-trained model for specific DR classification.
* The model will be trained on the training data, optimized on the validation set, and evaluated on the testing set.

3.3 Application Development:

* A user-friendly web interface will be built using HTML and CSS for image upload and result display.
* Python and Flask framework will be used to connect the web interface with the trained model.
* The application will be deployed in web browser.

4. Expected Outcomes:

* A web application capable of accurately detecting and classifying DR in retinal fundus images.
* Improved accessibility and early detection of DR, leading to better patient outcomes and reduced vision loss.
* Potential for further development and integration with existing healthcare systems.