

# DIABETIC DETECTION THROUGH EYES

## Submitted By

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### 1. Introduction

The **Diabetic Detection through Eyes** system is an AI-powered application designed to assist in early detection of diabetes through retinal image analysis. Using deep learning algorithms and medical imaging techniques, the system identifies potential signs of diabetes-related eye conditions, enabling timely intervention and treatment.

This system provides a non-invasive and accessible approach to diabetes detection, improving diagnostic accuracy and supporting healthcare professionals in patient care.

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### 2. Key Features

#### Image Analysis and Detection:

- Identify diabetic retinopathy and related abnormalities from retinal images.
- Highlight affected regions in analysed images for better visualization.

#### Predictive Analytics:

- Risk assessment based on detected patterns in retinal images.
- Insights into diabetes progression based on historical data.

#### Interactive User Interface:

- Easy-to-navigate platform for uploading and analyzing images.
  - Visualization of results through annotated images and graphs.
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### 3. Technical Implementation

#### **Libraries and Tools Used:**

- **Core Libraries:**
  - OpenCV and Pillow: Image processing and manipulation.
  - NumPy and Pandas: Data handling and preprocessing.
  - Matplotlib and Seaborn: Data visualization.
- **Deep Learning Frameworks:**
  - TensorFlow and Keras: For building and training CNN models.
  - Pre-trained models like ResNet or EfficientNet for feature extraction.

#### **Model Architecture:**

- A Convolutional Neural Network (CNN) fine-tuned on diabetic retinopathy datasets.
- Metrics: Accuracy, Precision, Recall, and F1-score for model evaluation.

#### **Implementation Workflow:**

1. **Data Preprocessing:**
    - Resize and normalize retinal images.
    - Augment data to improve generalization.
  2. **Model Training:**
    - Train the CNN using labelled datasets (e.g., EyePACS or APTOS 2019).
    - Optimize using techniques like dropout and learning rate decay.
  3. **Prediction and Visualization:**
    - Classify images as diabetic or non-diabetic.
    - Annotate and display results.
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### 4. Challenges Addressed

#### **Data Quality Issues:**

- Addressed imbalance in datasets using data augmentation and resampling.

#### **High Computational Requirements:**

- Optimized the model to work efficiently on GPUs or cloud platforms.

### Model Interpretability:

- Incorporated Grad-CAM to visualize regions influencing predictions.
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## 5. Project Structure

### Main Application:

- Central application script (e.g., main.py).

### Image Processing:

- Scripts for preprocessing and augmentation (image\_preprocessing.py).

### Model Training:

- Training scripts (model\_training.py) for CNN architecture.

### Prediction and Visualization:

- Scripts for image classification and result visualization (predict\_and\_visualize.py).

### Resources:

- Folder for datasets and pre-trained models.
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## 6. Future Enhancements

- **Real-Time Analysis:** Develop mobile or web applications for instant analysis.
  - **Integration with Healthcare Systems:** Store results in electronic health records (EHR).
  - **Multi-Disease Detection:** Extend the system to identify other conditions like glaucoma or macular degeneration.
  - **Explainable AI Features:** Enhance interpretability for better trust among medical professionals.
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## 7. Conclusion

The **Diabetic Detection through Eyes** project leverages AI to provide a reliable tool for detecting diabetes-related eye conditions. By integrating advanced machine learning techniques with a user-friendly interface, the system enhances diagnostic accuracy and contributes to improved patient outcomes. With its modular design, it is scalable for additional features and healthcare applications.

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## Screenshots and Visuals

(Include sample annotated retinal images and interface screenshots.)

# Diabetic Retinopathy Prediction

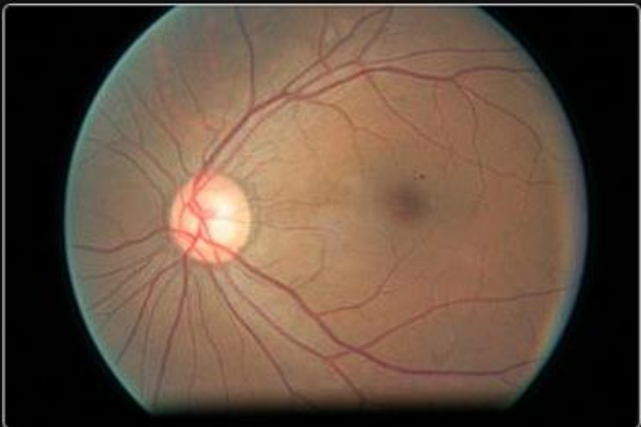
Diabetic retinopathy is the leading cause of blindness in the working-age population of the developed world. It is estimated to affect over 93 million people.

Upload an image :  129\_right.jpeg

# Diabetic Retinopathy Prediction

## Prediction Result

Prediction: Moderate



0 - No DR | 1 - Mild | 2 - Moderate | 3 - Severe | 4 - Proliferative DR