

# Detection of Diabetic Retinopathy Using Machine Learning

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December 19, 2023

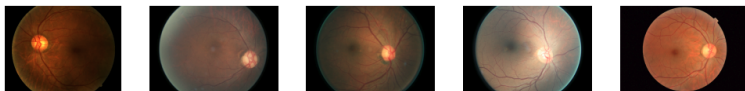


# Overview

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# Introduction

- Retinopathy is a condition which develops in the eye, which if not treated at early stages, could lead to permanent blindness.
- A major contributor towards this condition is diabetes and delayed diagnosis!!!
- This study aims to provide a reliable and efficient tool for early diagnosis, potentially improving the accessibility and affordability of DR screening.
- The outcomes of this research will contribute to the enhancement of healthcare for individuals with diabetes, reducing the burden of DR-related vision impairment.



(a) Retina images exhibiting non-sight-threatening diabetic retinopathy ( $y = 0$ ).



(b) Retina images exhibiting sight-threatening diabetic retinopathy ( $y = 1$ ).

**Figure 1:** Samples of retina scans from the EyePACS dataset showing varying degrees of diabetic retinopathy.

# Problem Statement

- Diabetic retinopathy is a significant and growing public health concern, as it remains a leading cause of vision loss among individuals with diabetes.
- The problem statement revolves around the need for an efficient and accurate detection system that can identify diabetic retinopathy at its early stages.

# Proposed Method

- We are here classifying the images into five stages such as Mild, Moderate, Severe, Proliferative and No DR and identifying the severeness of DR.
- We're actively assembling a diverse retinal image dataset and carefully enhancing its quality.
- We harness Support Vector Machines and employ transfer learning for feature extraction.

# Literature Survey

S.No	Title of the Paper	Author and Year of Publication	Description/Interpretation
1	Developments in the detection of diabetic retinopathy: a state-of-the-art review of computer-aided diagnosis and machine learning methods.	Ganeshsree Selvachandran, Shio Gai Quek, 2022.	In this paper, a comprehensive state-of-the-art review of the methods that have been introduced in the detection of DR is presented, with a focus on machine learning models such as convolutional neural networks (CNN) and artificial neural networks (ANN) and various hybrid models.
2	Machine Learning for Diabetic Retinopathy Detection using Image Processing	Ujwala.W.Wasekar, R.K.Bathla, 2021.	This research proposes an automated system for Diabetic Retinopathy (DR) identification in retinal images. It combines image processing and KNN classification, yielding an accuracy rate of 95 percent, aiding ophthalmologists and enhancing efficiency
3	Diabetic Retinopathy Detection using Machine Learning	Revathy.R,Nithya.B, Reshma.J, 2020.	This study recommends a hybrid machine learning technique to detect diabetic retinopathy with an 82 percent accuracy rate, vital for timely treatment and prevention of blindness.

# Implementation & Results

- CNNs have been extensively implemented for diabetic retinopathy detection due to their ability to extract complex features from retinal images.
- Implementations involved training CNN architectures on large datasets of retinal images to classify different stages of diabetic retinopathy with high accuracy.
- Ensemble methods, including bagging and boosting, were employed alongside traditional machine learning algorithms such as SVMs and decision trees.
- Results indicated reliable grading and classification, aiding in effective patient management and treatment decisions.



# Conclusion & Future Scope

- The integration of artificial intelligence (AI) and machine learning algorithms has shown remarkable progress in automating the detection and grading of diabetic retinopathy from retinal images.
- Expanding access to diabetic retinopathy screening remains a significant challenge, especially in underserved or remote areas.
- Beyond initial detection, continuous monitoring of diabetic retinopathy progression is vital.
- Collaboration among researchers, clinicians, technology developers, and policymakers will be crucial in driving comprehensive strategies for effective detection and management.

# Thank you