

A. I. Opening Approach to

# DIABETIC RETINOPATHY

By Hoang Nguyen



# EYE-TINERARY

## Presentation Outline

1. Background
2. Diabetic Retinopathy
3. Data
4. Models
5. Recommendations
6. Next Steps

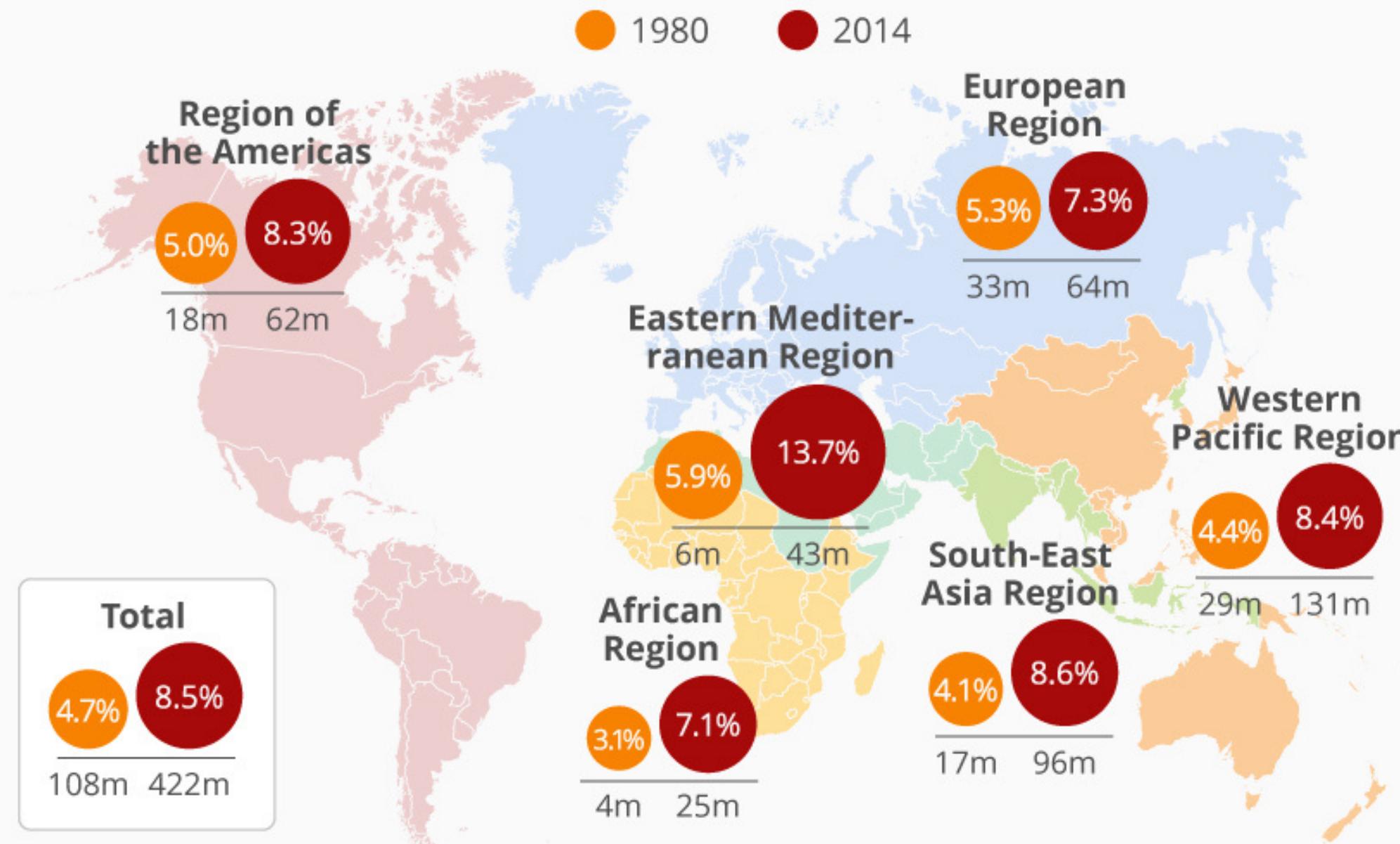




# GLOBAL CASES

## The Unrelenting March Of Diabetes

% prevalence and number of adults with diabetes by WHO region in 1980 and 2014\*



### Increasing Number of Cases

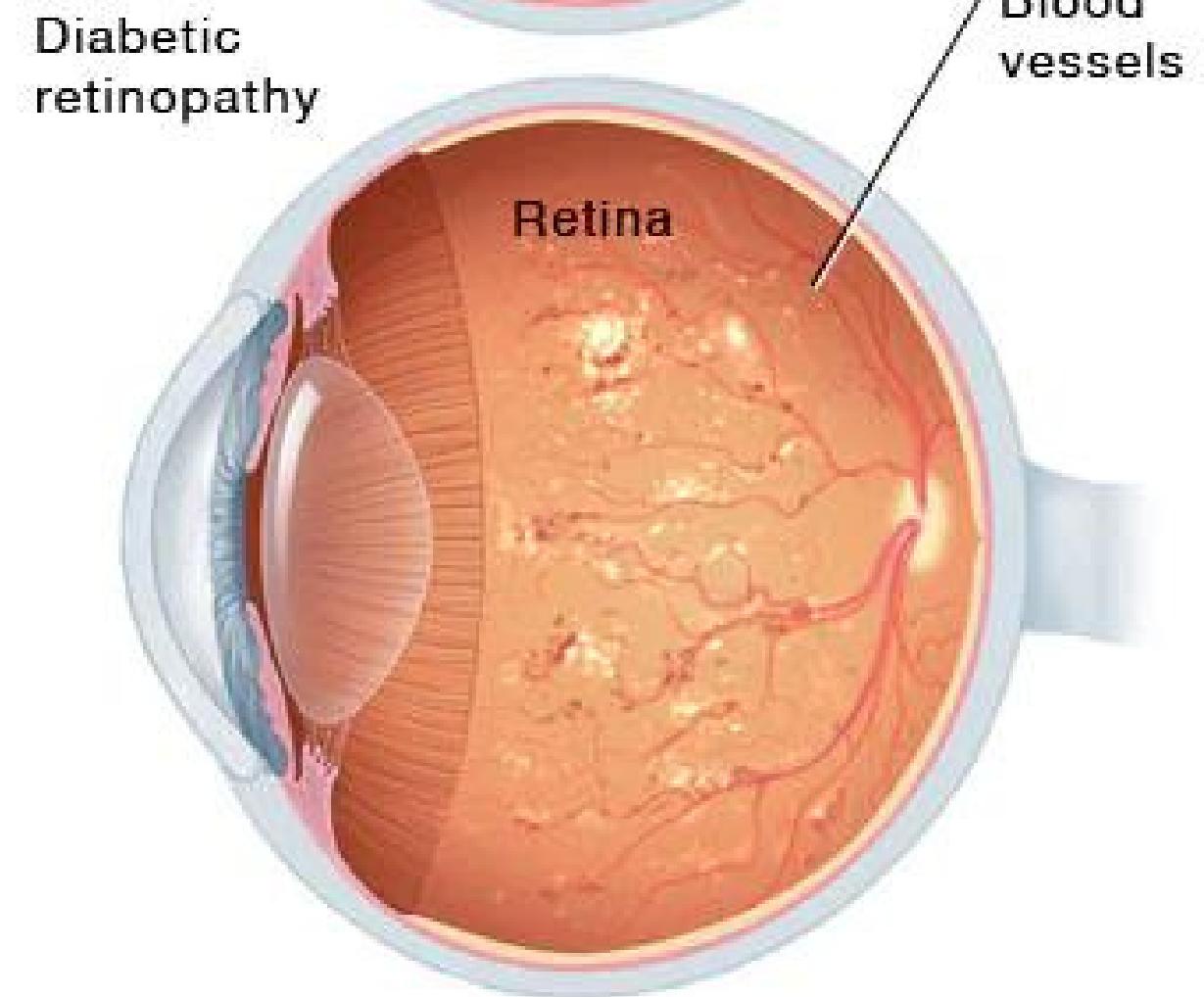
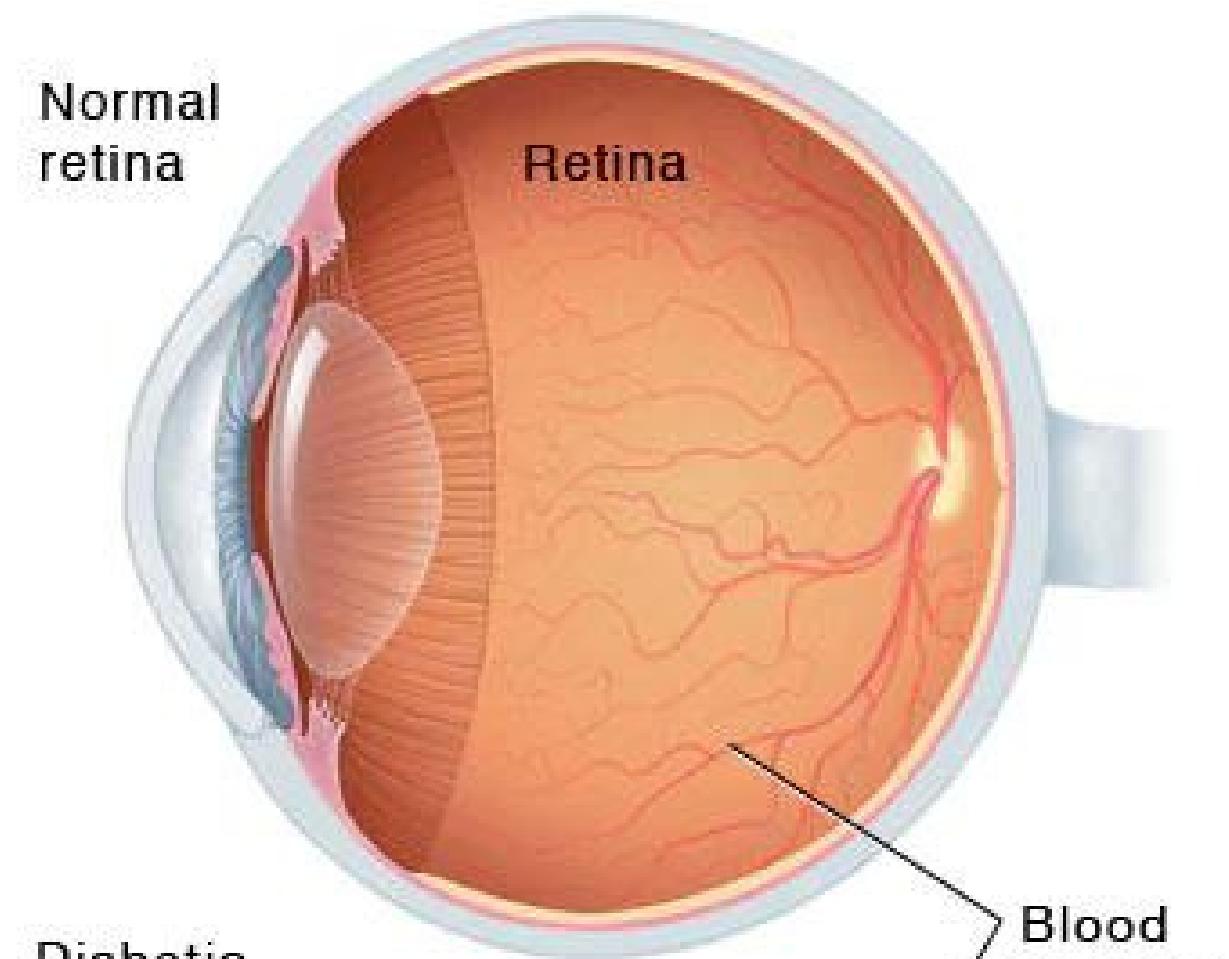
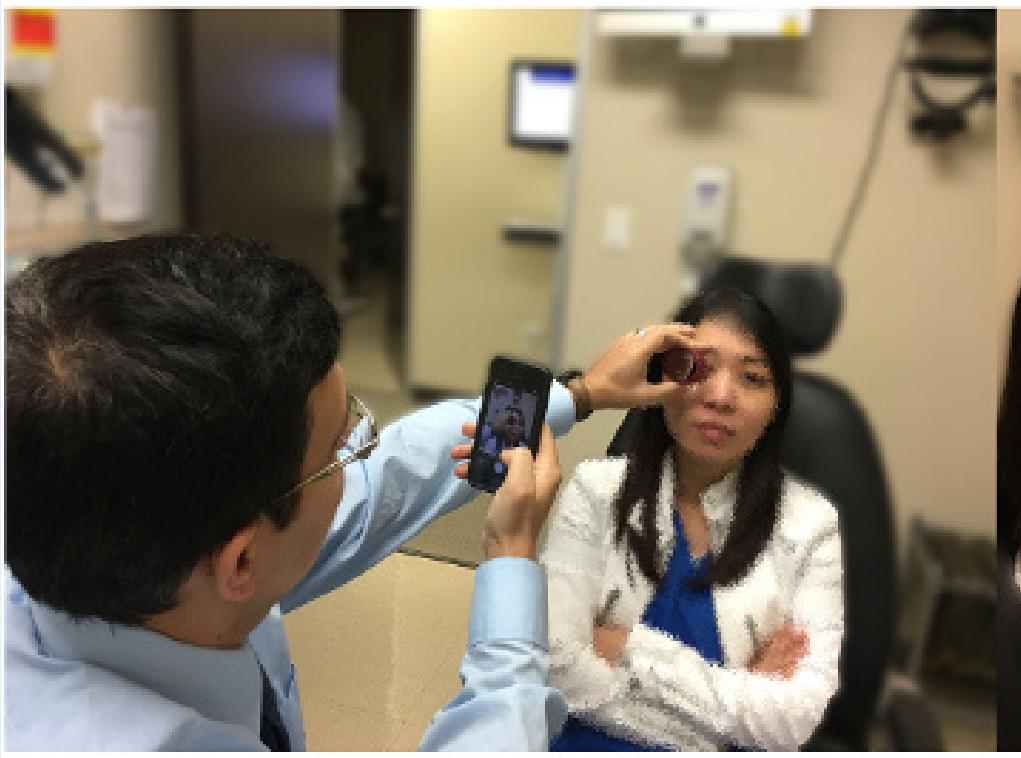
About 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades.

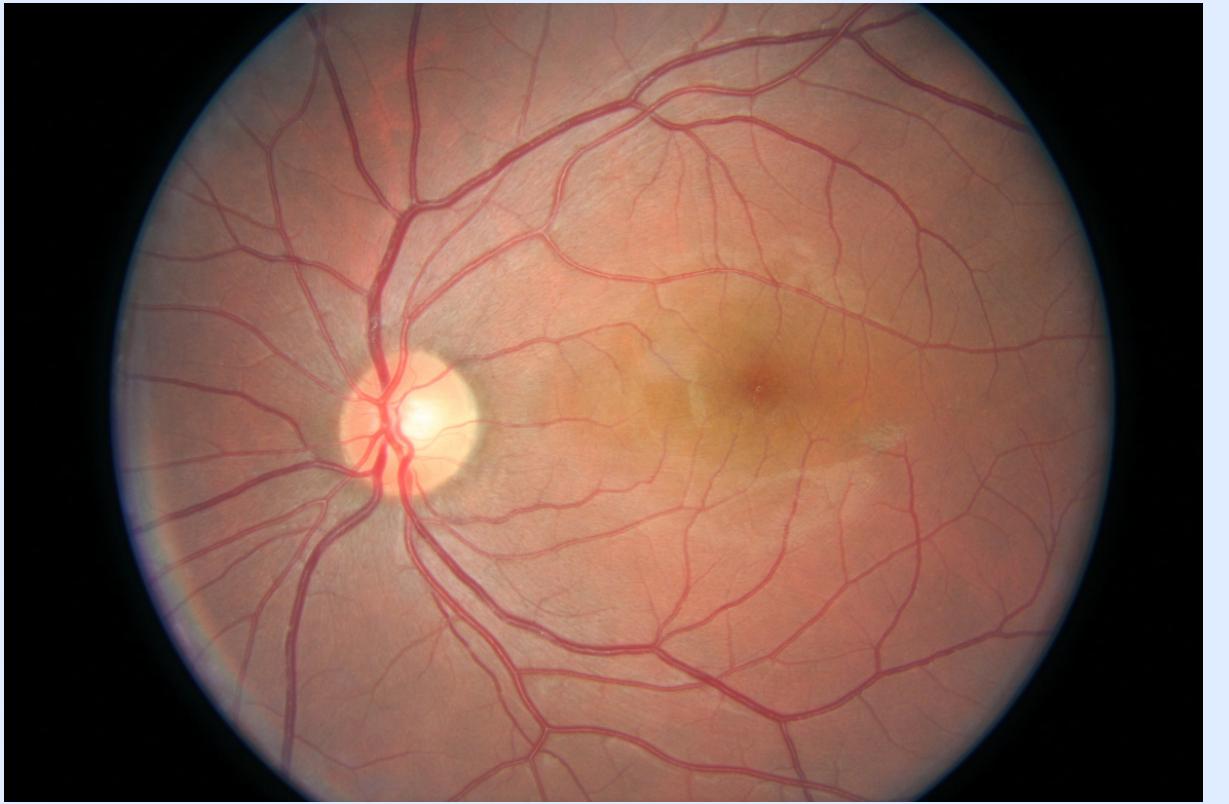
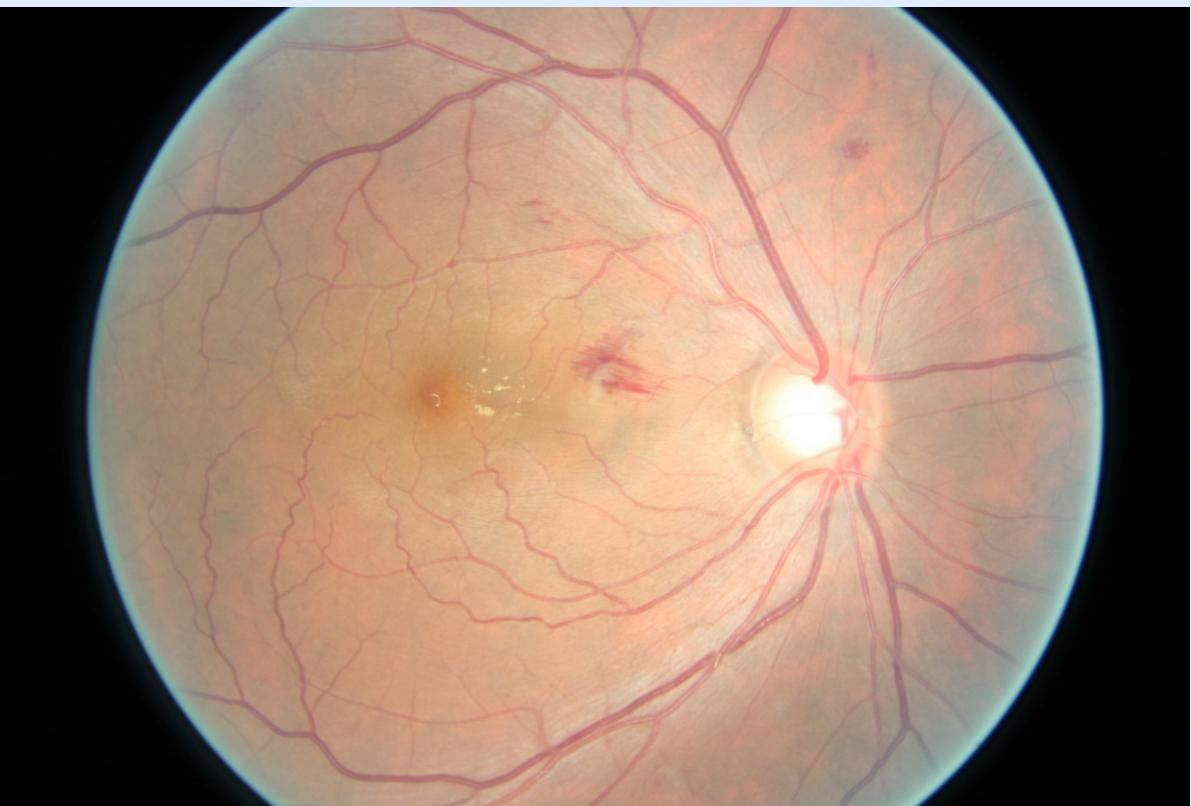
Source: WHO and statista

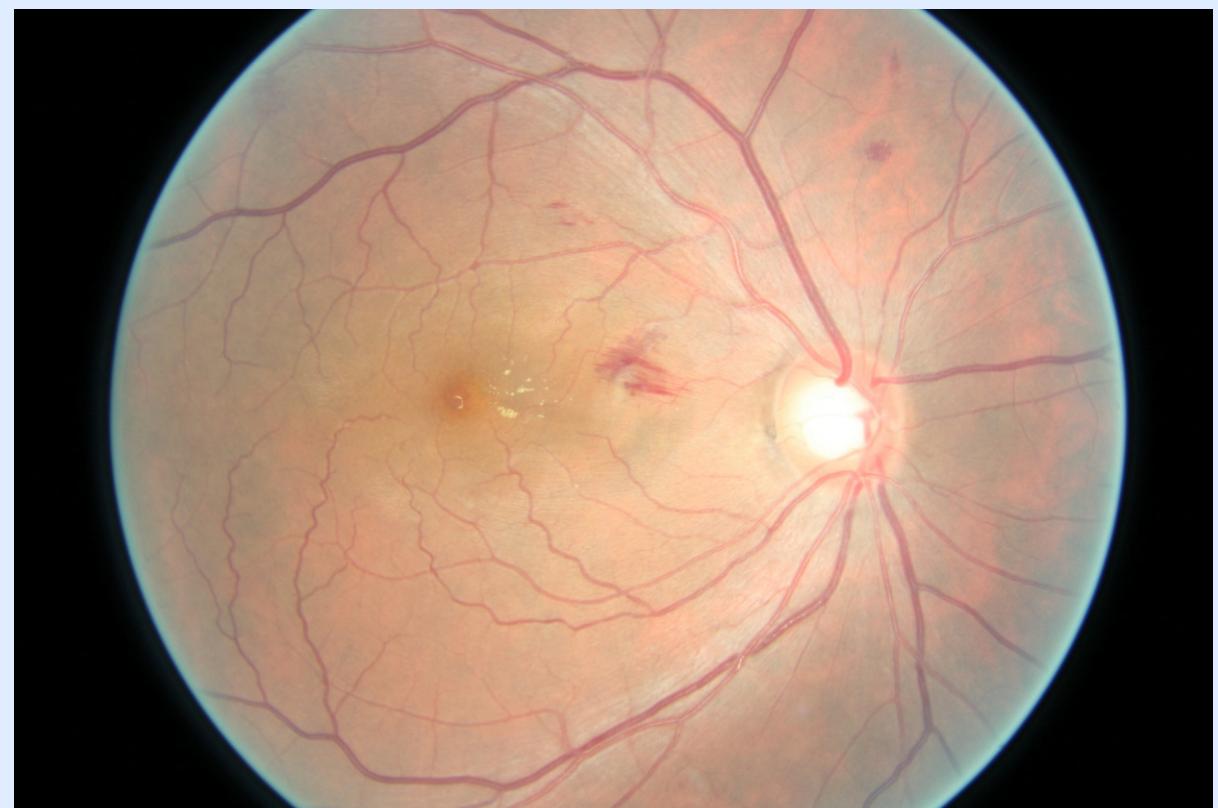
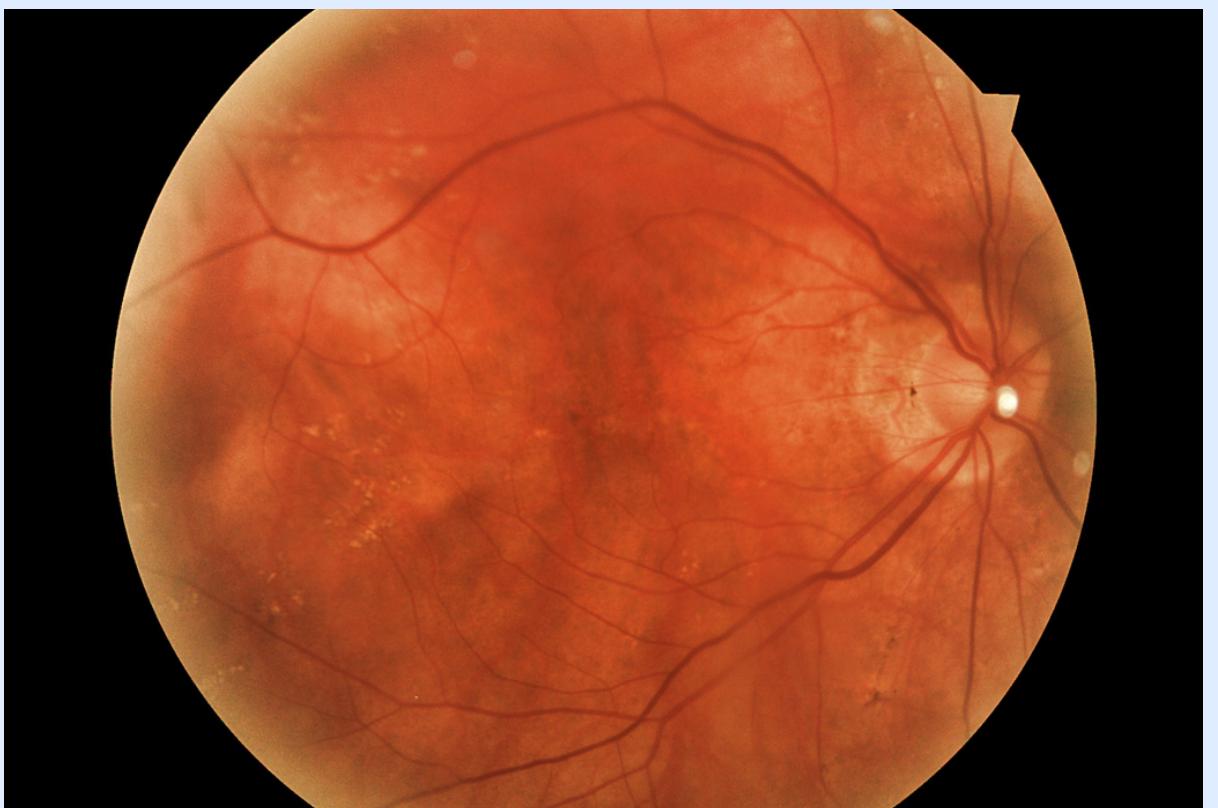
# DIABETIC RETINOPATHY

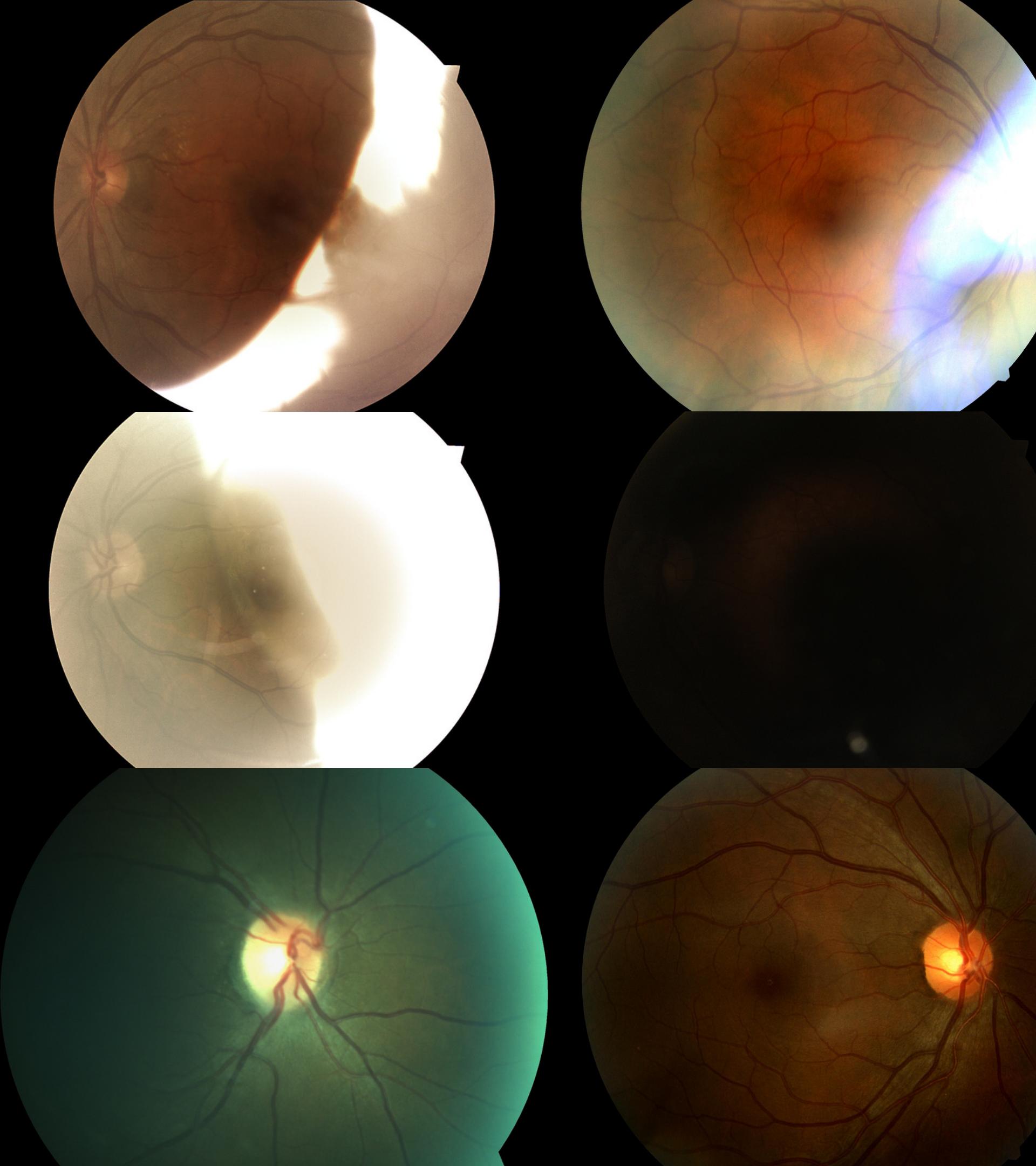
## Imaging

- Complications from diabetes that causes damage to the blood vessels in the retina. Can lead to blindness.
- Imaging often required specialized medical devices.
- Smartphone Fundus photography is a technique that can be used to capture high quality eye images.



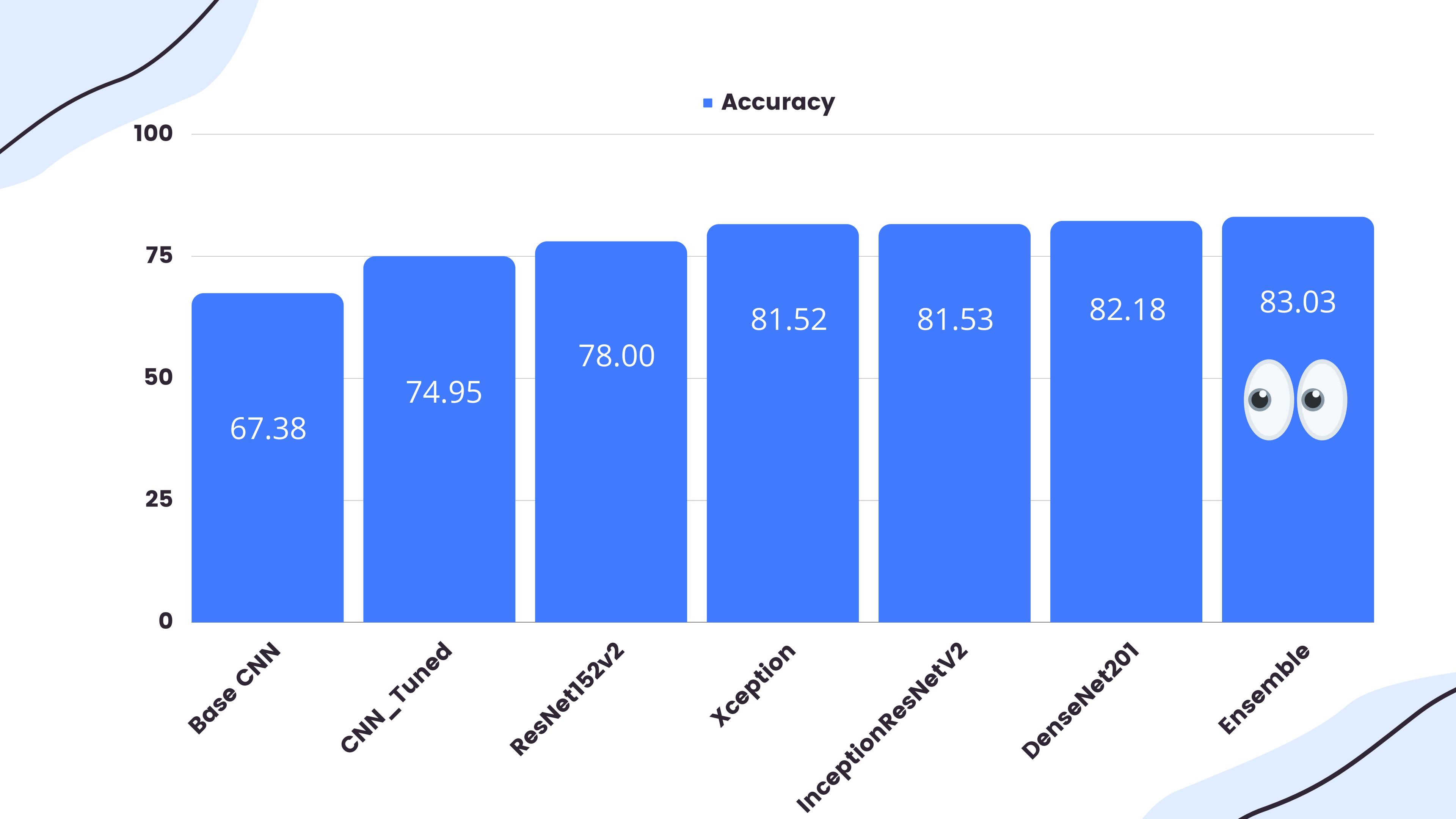
**A****B****C****D**

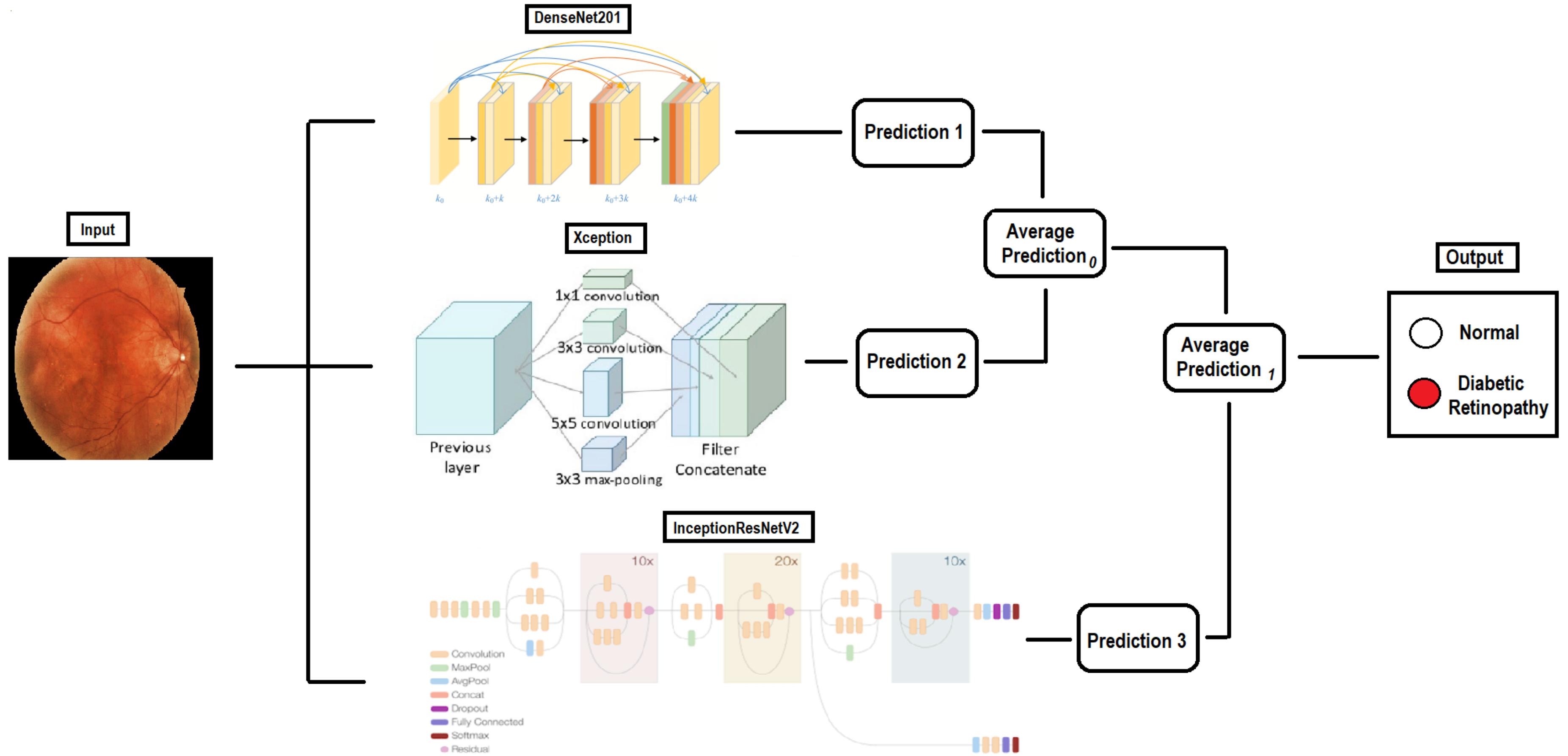
**A****B****C**

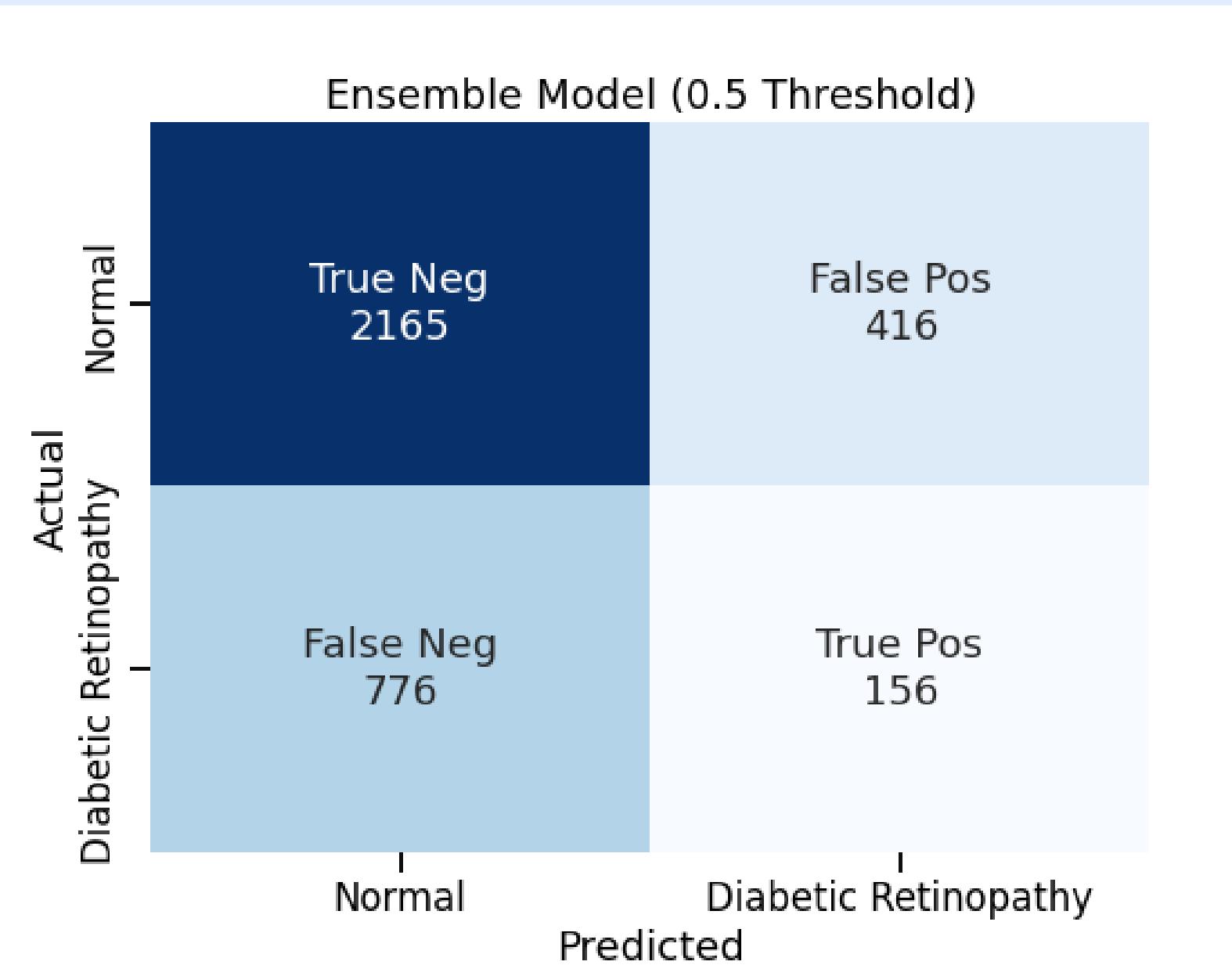


# The Data

- Kaggle Dataset
- 35216 Training Images
- Binary Classification
- Class Imbalance
- Robust sample with plenty of noise

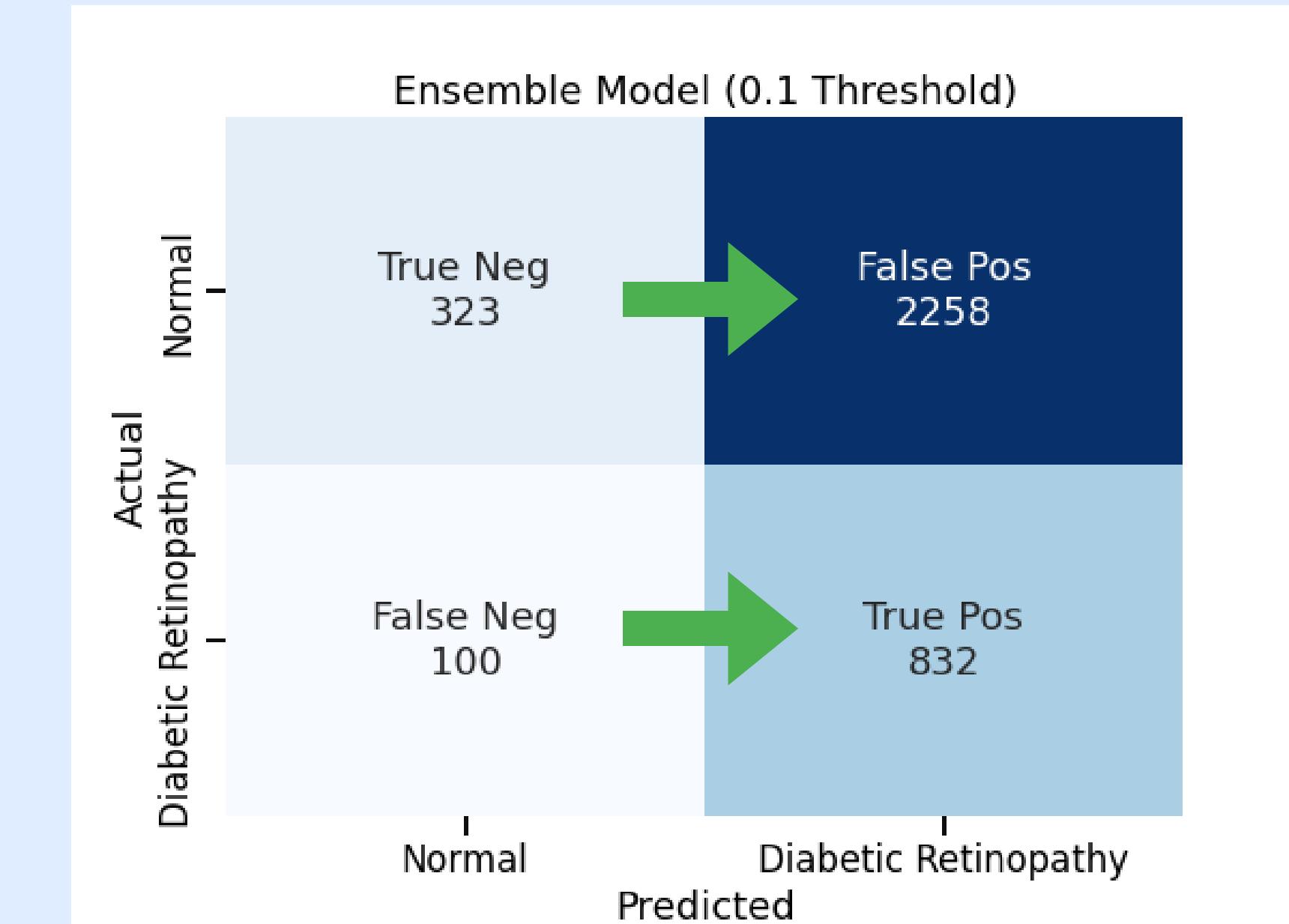






0.5 Threshold

Recall Score = 0.1674



0.1 Threshold

Recall Score = 0.8927

App Files and versions Settings

# Prediction of Diabetic Retinopathy (DR)

Demo for predicting the probability of having Diabetic Retinopathy based on image through DenseNet.

Image

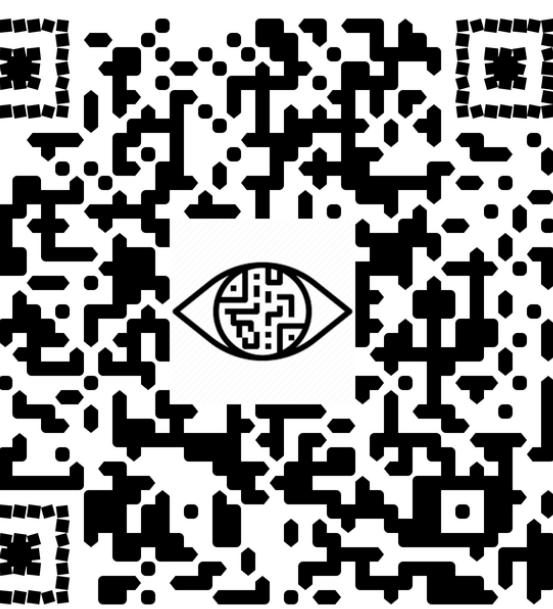
Drop Image Here  
- OR -  
Click to Upload

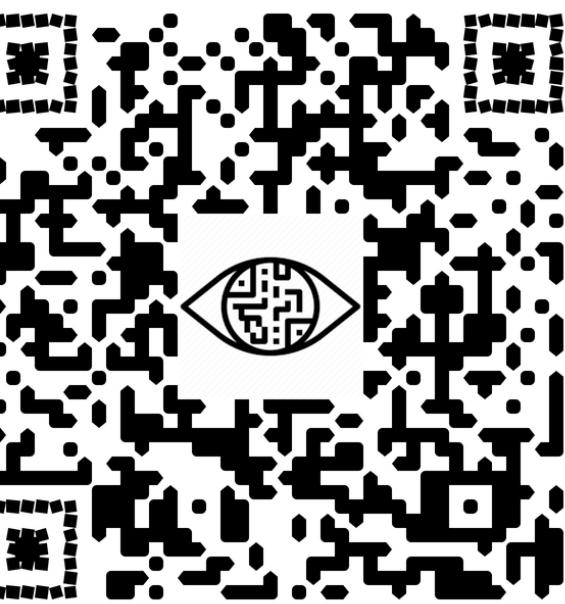
Clear      Submit

Examples



First two images both have DR and the model is confident in predicting. Next two images are examples of normal that the model is confident in predicting. 5th image has DR and the model guesses wrong. 6th image is normal and the model guesses wrong.





# RECOMMENDATIONS

## Our Vision



### Imaging

Accessible Imaging.

### Training

Train community health workers to use these diagnostic tools.

### Prediction

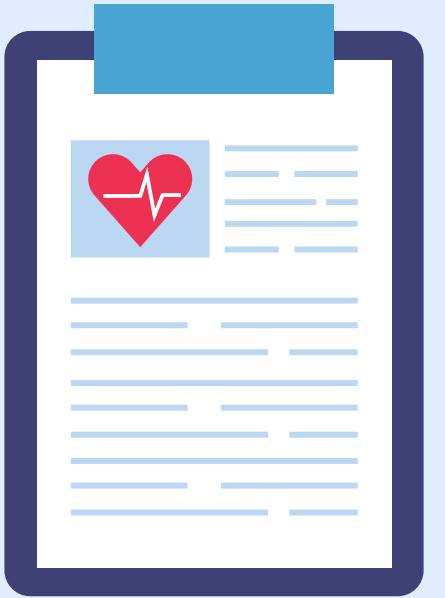
Use machine learning based algorithm to give a prediction.

### Follow Up

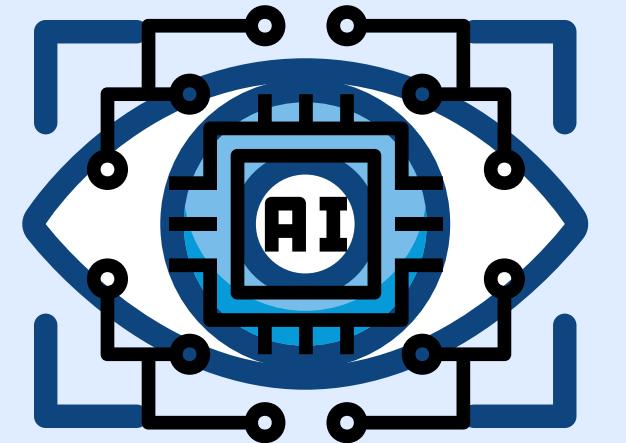
Based on prediction, patient can follow-up with a doctor.

# NEXT STEPS

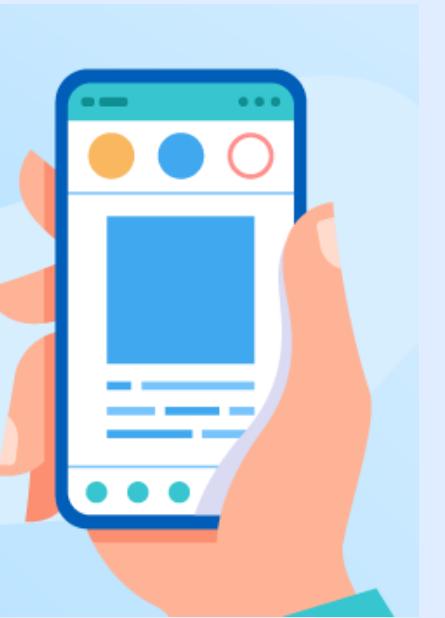
Where do we go from here?



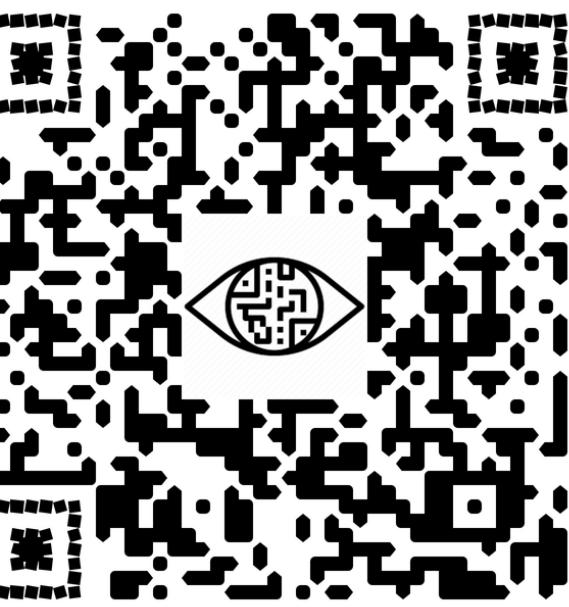
Tabular Data



Expand prediction  
to other illnesses



Improve on web  
application



# WORKS CITED



## Kaggle Dataset

<https://www.kaggle.com/c/diabetic-retinopathy-detection>

## Diabetes statistics and information

<https://www.who.int/publications/i/item/9789241565257>

[https://www.diabetesresearchclinicalpractice.com/article/S0168-8227\(19\)31230-6/fulltext](https://www.diabetesresearchclinicalpractice.com/article/S0168-8227(19)31230-6/fulltext)

<https://www.statista.com/chart/4617/the-unrelenting-global-march-of-diabetes/>

## Smartphone Fundus Imaging

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5609317/>

# THANK YOU!

Any Questions?



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<https://github.com/DataDoggo215>

