Using a Convolutional Neural Network for Early Detection of Retinal Diseases Proof of Concept

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Outline

- Business Problem
- Data Understanding
- How Neural Networks Work
- How does the model ‘Decide’
- Model Results and the metrics used

Business Problem

Stakeholder: Board of directors of a national network of eye hospitals.

Business Problem: The hospital is looking for a solution that would enable the early detection and diagnosis of ocular diseases.

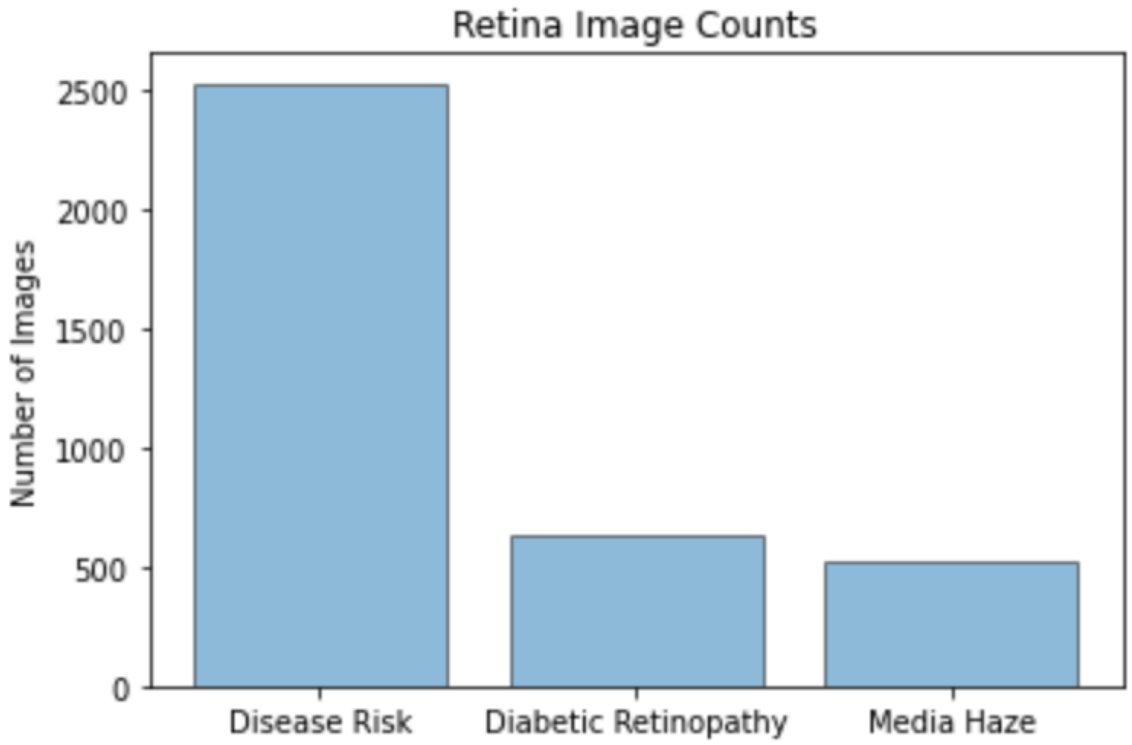
Proposed Solution: A machine learning model that could distinguish between the image of a healthy retina, and of an unhealthy one. It can also detect for media haze (cloudy vision), and diabetic retinopathy.

Solution Benefits:

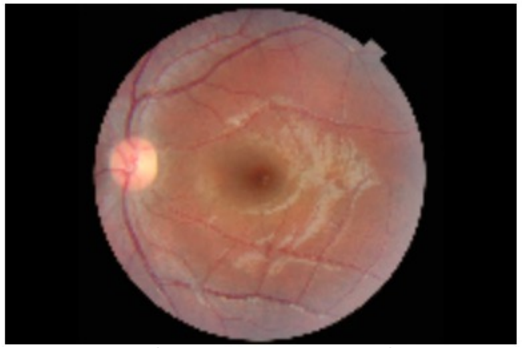
1. cost effective
2. non-invasive
3. would enable doctors to more effectively prevent, treat, and forestall the onset, of ocular diseases

Data Understanding

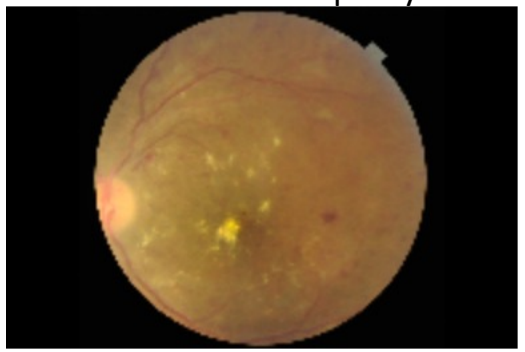
- The data comes from Kaggle.com.
- There are a total of 3200 images.



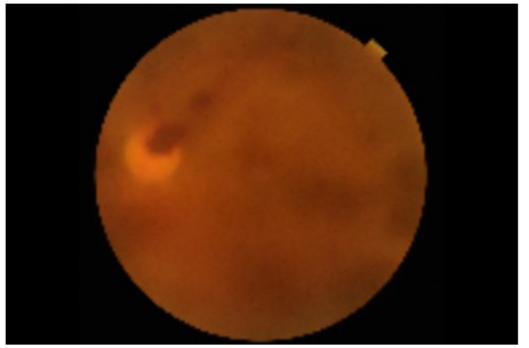
Normal



Diabetic Retinopathy

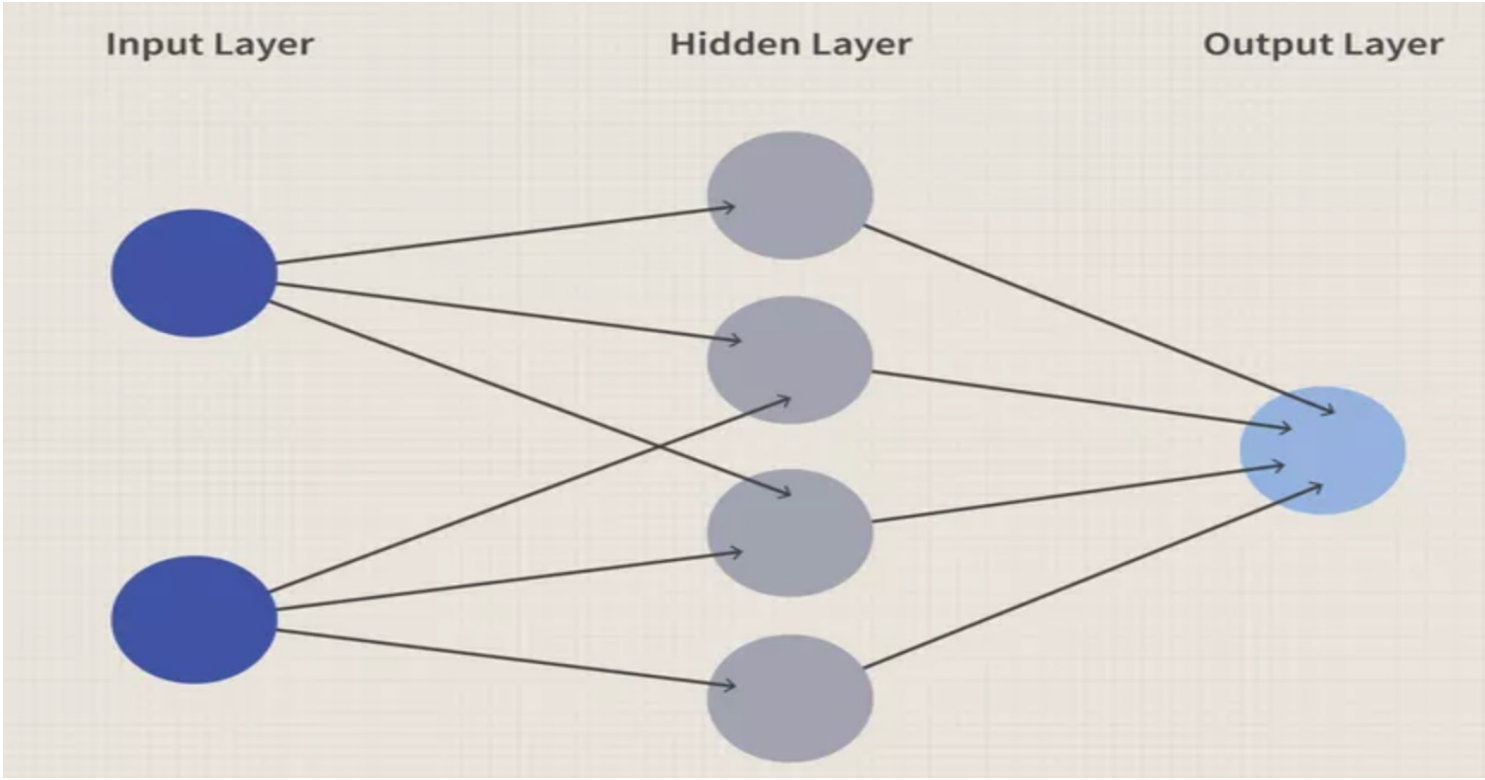


Media Haze



The Model: What are Neural Networks ?

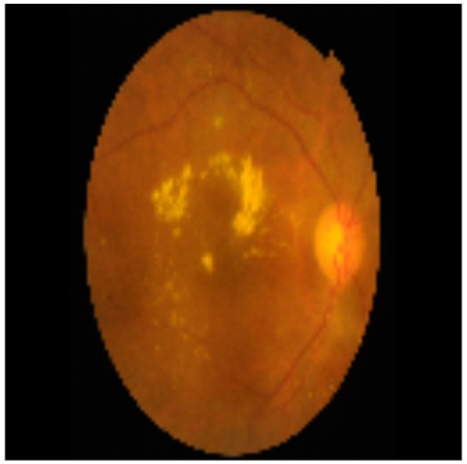
- **Neural networks were inspired by the human brain.**
- The data moves from left to right
- Neural networks are very scalable



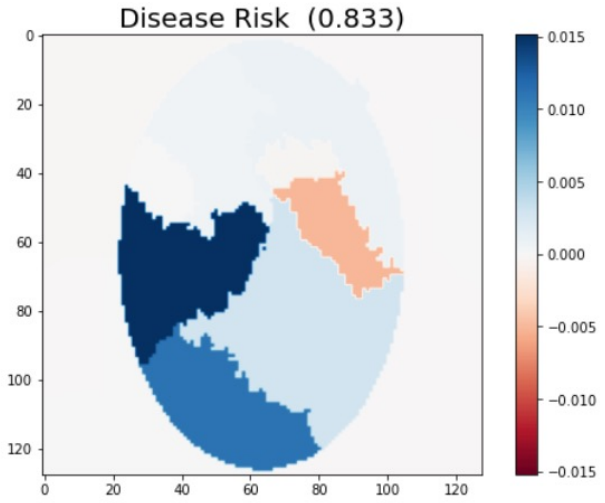
The circles are the ‘artificial neurons’ or nodes. The input layer receives the data. The output layer returns a result, and the hidden layer(s) are any layers in between the input and output layers.

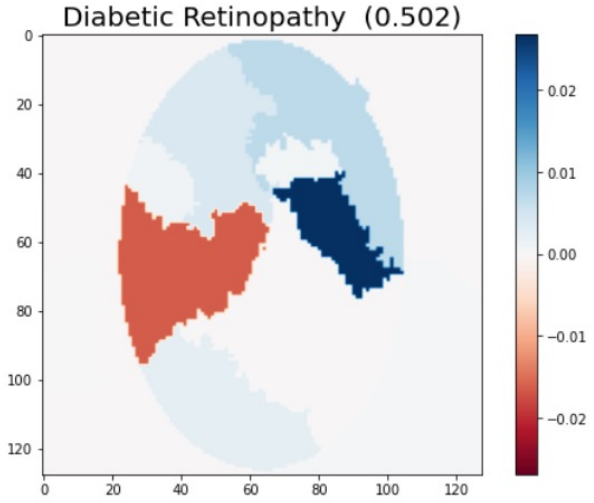
How Does the Model ‘Decide’:

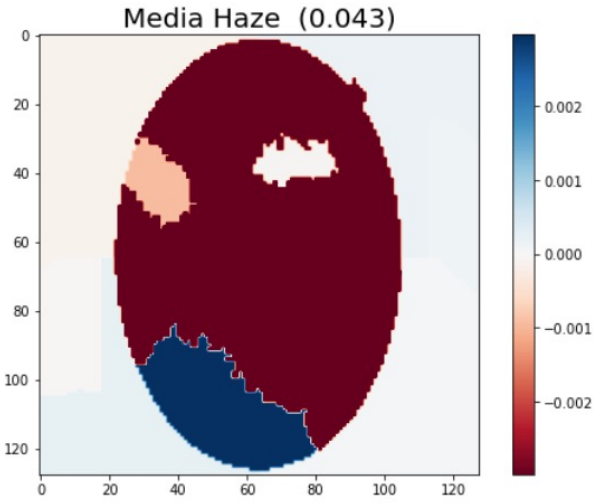
Disease Risk and Diabetic Retinopathy



Lime Explanation:

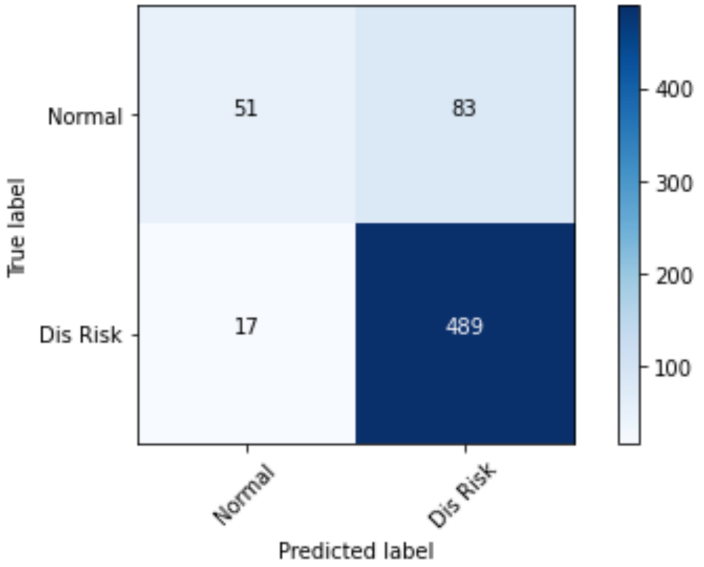




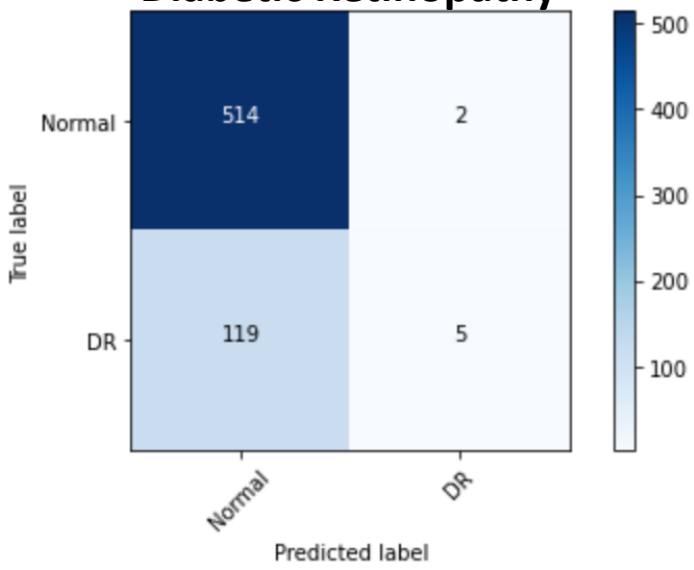


Model Results:

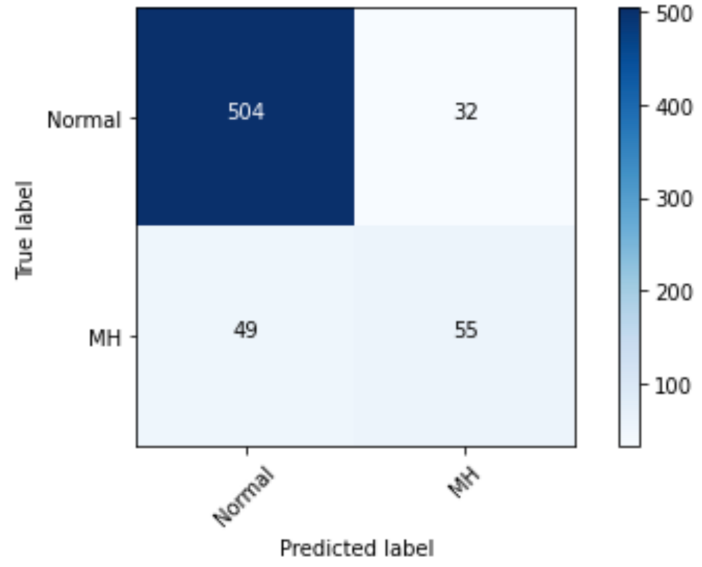
Disease Risk



Diabetic Retinopathy



Media Haze



Recall:	**..97**	**.04**	**.53**
Recall Macro Average:	**.51**		
Accuracy:	**.84**	**.81**	**.87**
Accuracy Macro Average:	**.84**		

Any Questions?

Thank You