

The background features a complex network of thin, light gray lines and dots, forming a web-like structure. Scattered throughout are various triangles of different sizes and orientations, some with solid black dots at their vertices. The overall aesthetic is minimalist and technical, suggesting a focus on geometry or network theory.

# Keeping an Eye on CNNs

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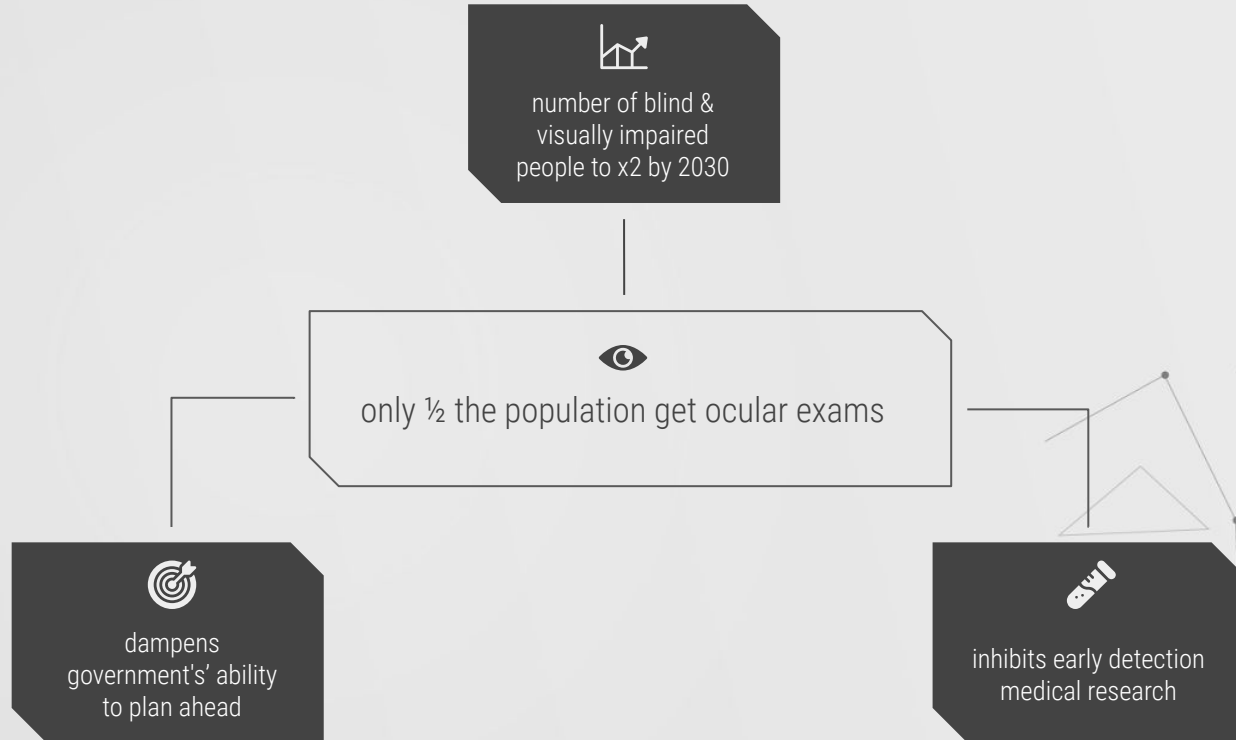
***“Every living person on this planet has their own  
unique pair of eyes. Each their own universe.”***

*- I Origins*

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# Introduction



# Ocular Disease Recognition Dataset

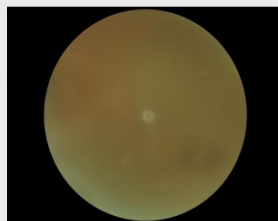


**3500 patients**

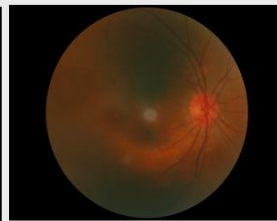
**age, sex, color fundus  
photographs, diagnostic  
keywords**



**classified into 8 groups**



0\_left.jpg: Cataract

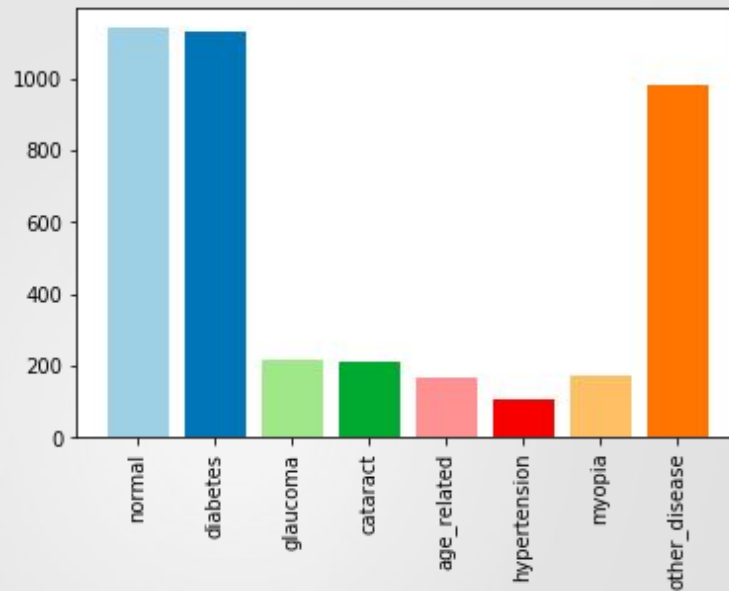


0\_right.jpg: Normal Fundus

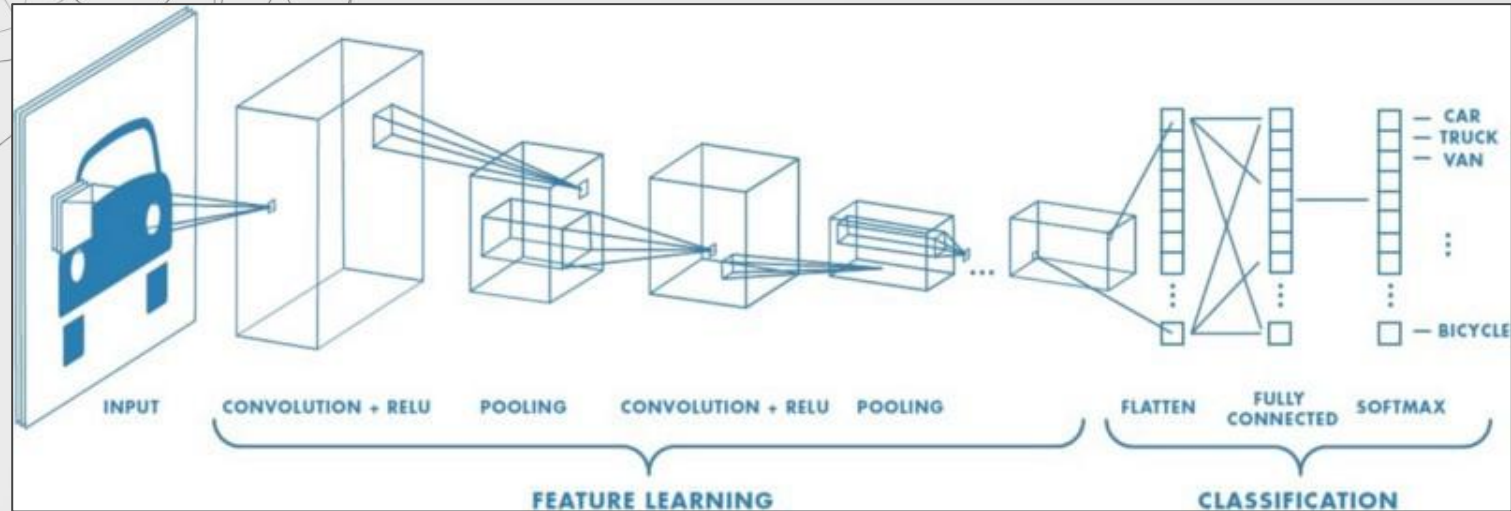
# IN DEPTH

## Descriptive Statistics

Mean Age: 58, ranging 1-91  
54% M & 46% F  
11% Left eye  
12% Right eye  
48% Both eyes  
29% Healthy



# Convolutional Neural Networks

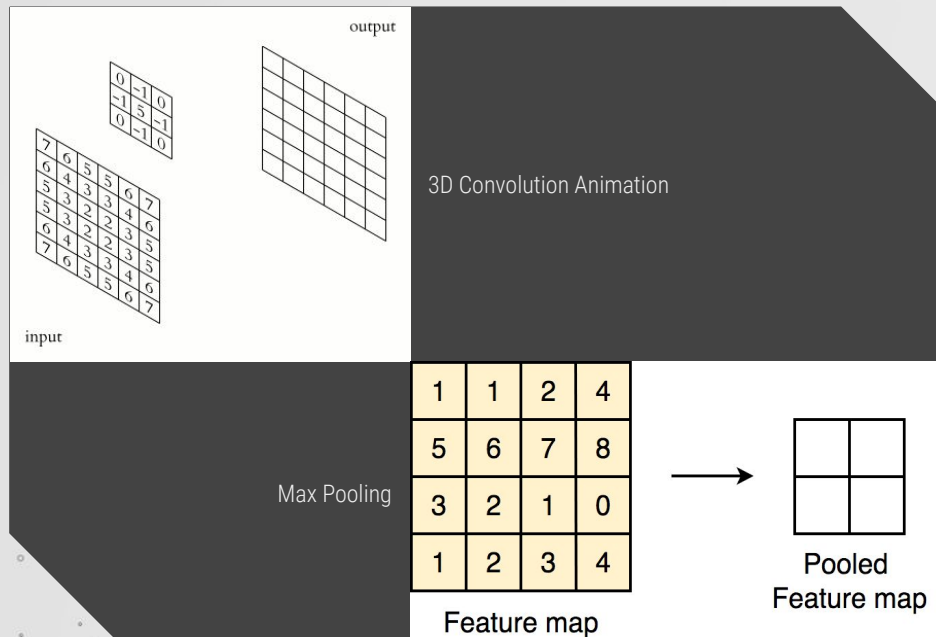


sense of locality &  
spatial information

lower  
computational cost

faster training time

# Convolutional Neural Networks



## Feature Learning

Convolution performed on the input, with the use of kernels, to produce feature maps

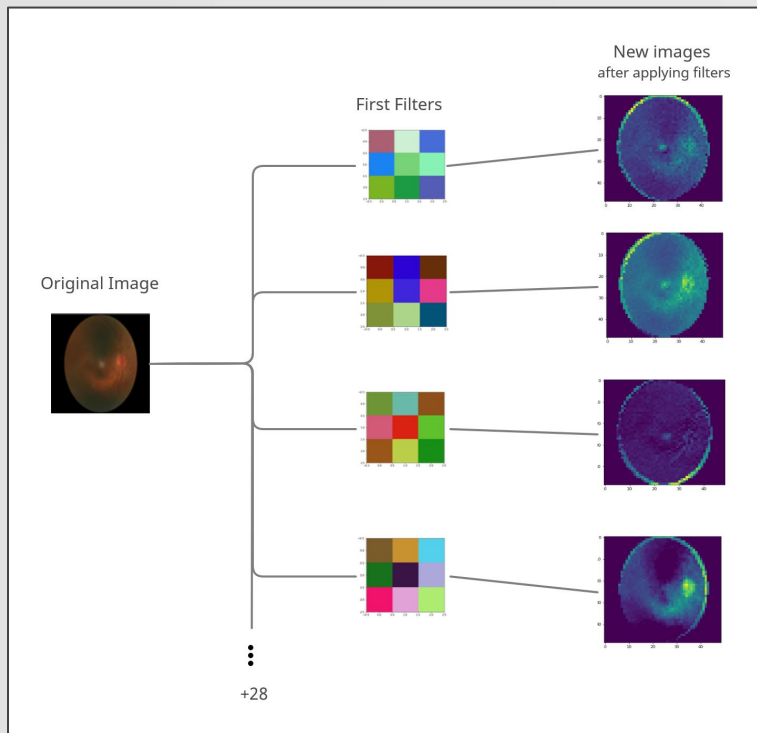
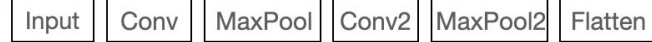
Kernel takes nearby pixels together, extracting positional relationship, while sliding over the input and performs matrix multiplication

After being passed through an activation function, max pooling will take place. At this step downsampling of the feature maps occurs and their dimensionality is reduced

Left



Right



# Our Model



# CNN Models for Merged Images

## Color

Composed by:

- 2 Convolution Layers
- Max Pooling
- Relu and Sigmoid activation
- Gradient Descent optimizer

**Model 1 Accuracy:**  
**0.3771**

## Greyscale

Composed by:

- 2 Convolution Layers
- Max Pooling
- Relu and Sigmoid activation
- Gradient Descent optimizer

**Model 2 Accuracy:**  
**0.3810**



# CNN Models for Separated Images

## Color

Composed by:

- 2 Convolution Layers
- Max Pooling
- Relu and Softmax activation
- Gradient Descent optimizer

**Model 3 Accuracy:**  
**0.4793**

## Greyscale

Composed by:

- 1 Convolution Layers
- Max Pooling
- Relu and Sigmoid activation
- Gradient Descent optimizer

**Model 4 Accuracy:**  
**0.44**



# CNN Model with Binary Classification

Reduced the number of labels

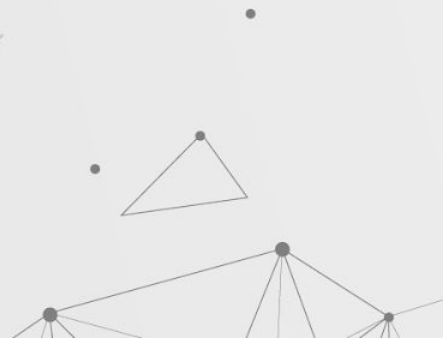
**Model 5 Accuracy: 0.5776**

**Normal (0)**

**Abnormal (1)**

44.95%

55.05%

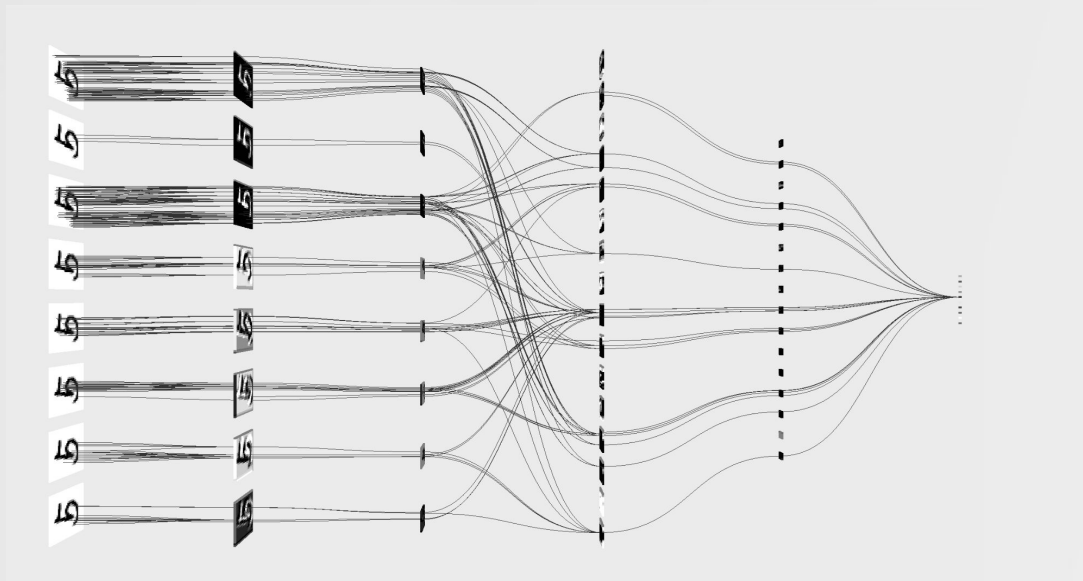


# Conclusion

More image pre-processing

More sophisticated model

Larger data set & more layers





**Thank you for listening!**