# CLASSIFICATION OF EYE DISEASES

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# PROBLEM STATEMENT

- Suppose a patient provides with a fundus image of their eye (Left or Right), the classifier can quickly diagnose whether the patient suffers from any known (diseases the classifier is trained on) or not.

- The purpose of Machine Learning is to make an attempt to automate some tasks that will lead to quick response regarding the concerned problem(s).

# CLASSIFICATION

- Data mining technique

- Produces a categorical output from a set of input parameters

- Model becomes more accurate if quality and quantity of data is appropriate enough

- 2-step process:
  - Learning Step (Training Phase)
  - Classification Step (Testing Phase)

# TYPES OF ML CLASSIFIERS

- Decision Trees

- Naïve Bayes Classifiers

- Neural Networks

- K-Nearest Neighbor

- Support Vector Machines

- Linear Regression

- Logistic Regression

- Random Forest Classifier

# MLP

- Multi-Layered Perceptron

- Simplest and oldest form of Neural Networks

- Works well for structures data

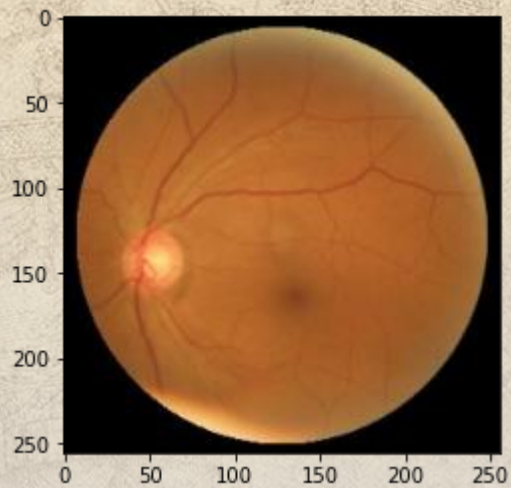- In case of un-structured data, only simple tasks can be done

# CNN

- Convolutional Neural Network

- Works best on image data

- Has Convolutional and MaxPooling layers

- After passing through above layers, the output is sent to an MLP model for classification
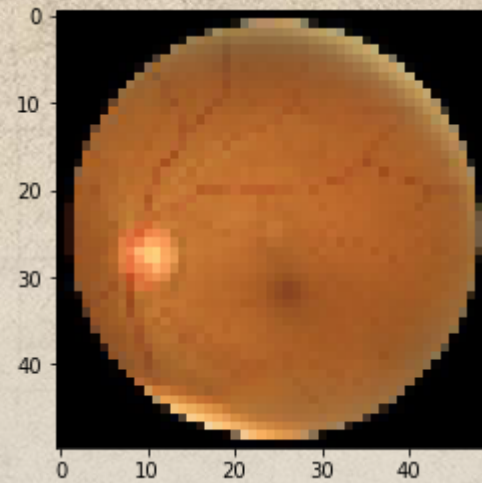
# PREPROCESSING

- Image data takes huge amount of time to read

- It is better to convert and store it in binary format

    - Here we used pickle library

- Resize images down to 50 x 50 for reducing possibly unnecessary load on the model

- Normalize colour values by dividing by 255
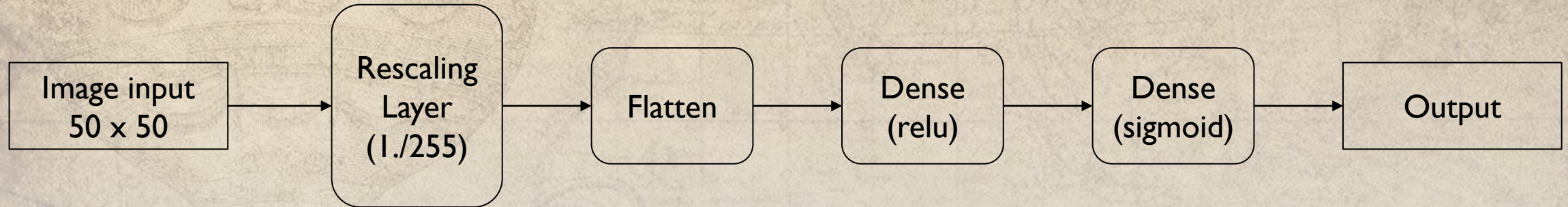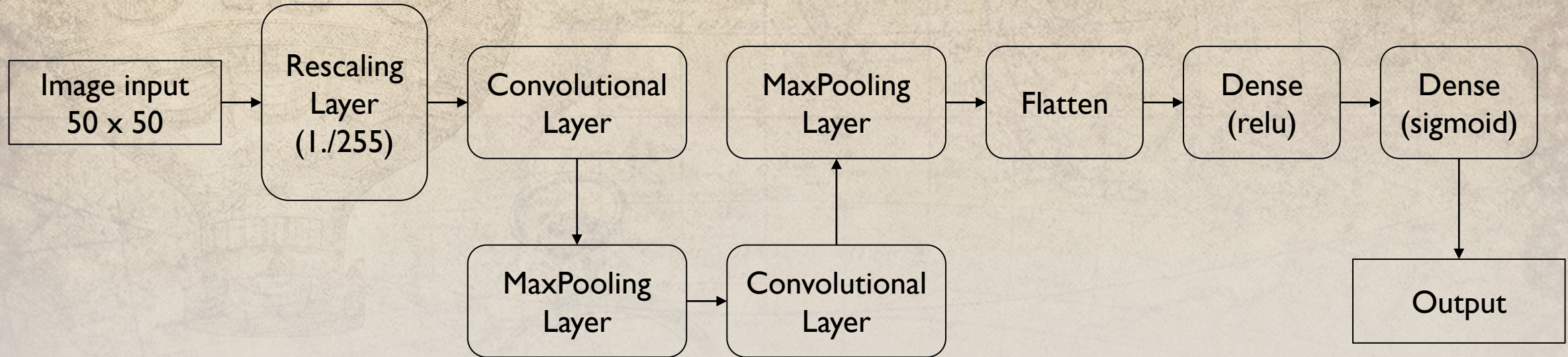
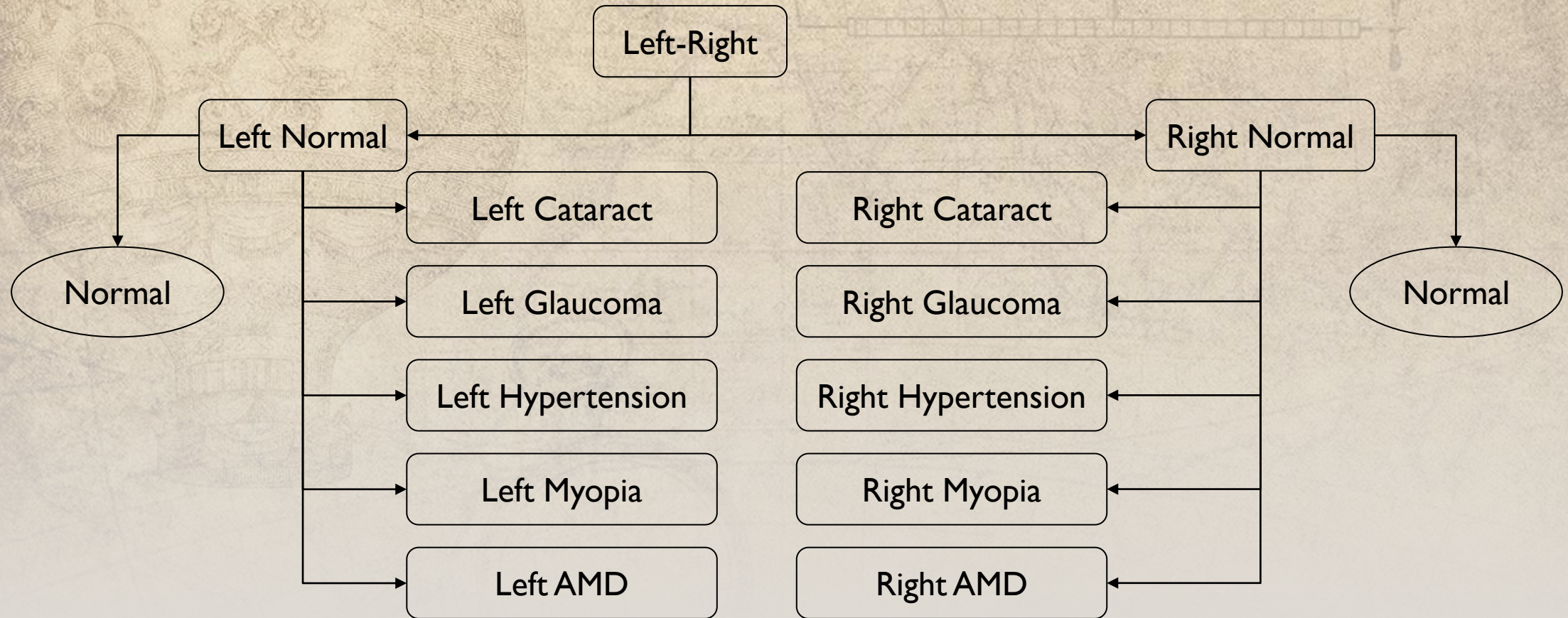# RESIZING THE IMAGE



Original



Resized

# MODEL STRUCTURE (MLP)

Image input 50 x 50 → Rescaling Layer (1./255) → Flatten → Dense (relu) → Dense (sigmoid) → Output

# MODEL STRUCTURE (CNN)

# OUR CLASSIFIERS

# CLASSIFIER ACCURACIES

| Model | Accuracy | Model | Accuracy |
|---|---|---|---|
| Left-Right | 94.8 | -- | -- |
| Left Normal | 95.6 | Right Normal | 95.4 |
| Left Cataract | 99.2 | Right Cataract | 99.8 |
| Left Glaucoma | 97.4 | Right Glaucoma | 97.3 |
| Left Hypertension | 99.5 | Right Hypertension | 97.5 |
| Left Myopia | 98.2 | Right Myopia | 98.1 |
| Left AMD | 96.1 | Right AMD | 99.4 |

# Thank You