

# APTOS Blindness Detection

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## Introduction

### Problem Statement:

Millions of people suffer from diabetic retinopathy, the leading cause of blindness among working aged adults. Aravind Eye Hospital in India hopes to detect and prevent this disease among people living in rural areas where medical screening is difficult to conduct. So they set up a competition on kaggle.com for competitors to build model which can help ophthalmologists to identify potential patients.

- **Goal:** Maximize the quadratic weighted kappa, which measures the agreement between true labels and predicted results.
- **Purpose:** Being able to detect blindness before it happened.

## Data Understanding

A clinician has rated each image for the severity of diabetic retinopathy on a scale of 0 to 4:

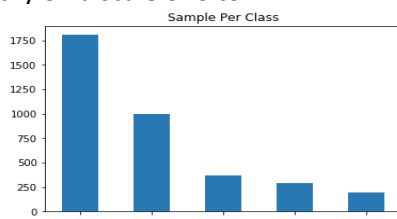
0 - No DR

1 - Mild

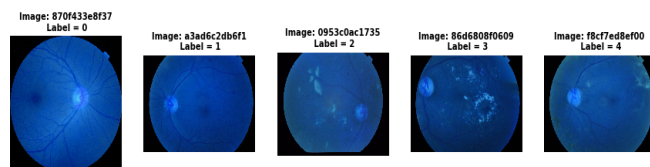
2 - Moderate

3 - Severe

4 - Proliferative DR



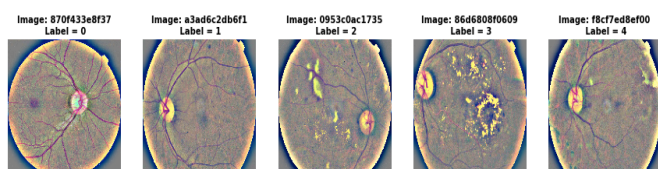
Training data contain 3662 samples, each sample contains one image and it's severity scale.



reprocessing training image pipeline.



Final training images:



## Models

### CNN

- 4 conv layers, 2 fc layers, 175K parameters
- Deal with overfitting: Dropout layer, Batch normalization, data augmentation
- Accuracy: **0.694**
- Kaggle submission:

kernel4eb76f9017 (version 1/1)  
6 days ago by Hank Chen  
From Kernel [kernel4eb76f9017]

Succeeded 0.552739 0.220898

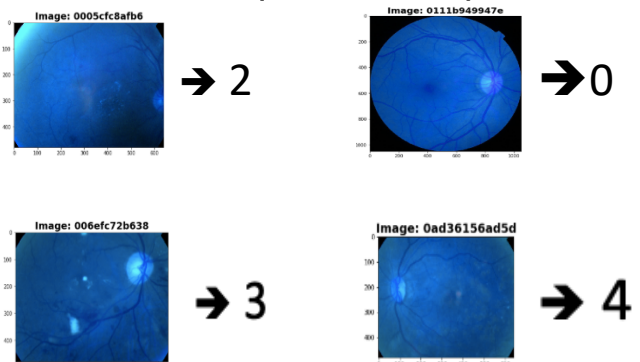
### Resnet50

- 49 conv layers, 1 fc layers, 36M parameters
- Deal with overfitting: Dropout layer, Batch normalization, data augmentation
- Pretrain big dataset and fine tune the complete model
- Improve optimization: go deeper to the model, skip connections for curing vanishing gradient.
- Accuracy: **0.8428**
- Kaggle submission:

kernel49d655b707 (version 3/6)  
4 days ago by Hank Chen  
From Kernel [kernel49d655b707]

Succeeded 0.835671 0.622312

## Prediction (test data)



## Future Work

- Try different models with more layers but less parameters but improve the accuracy.
- Try different cropping methods in order to efficiently extract useful features.