Ocular Disease Recognition

Sprint 1

September 8, 2023

Overview

Ophthalmology is the branch of medicine that deals with eye health, including the diagnosis and treatment of eye diseases.

Eye diseases like glaucoma, cataracts, and age-related macular degeneration often progress silently until they reach an advanced stage.

Early detection is crucial for effective treatment but current diagnostic methods are often time-consuming, expensive, or require specialized equipment.

Data Science Vision:
Using machine learning, how might we leverage patient data and fundus imaging to predict the likelihood of ocular diseases?

Methodology

Supervised Learning

Using labeled data to train a model:

- Image classification for the fundus photos
- Predictive analytic algorithms for patient data

Potential Impact

Healthcare Savings

Early detection means less invasive treatments, potentially reducing healthcare costs by a significant margin.

Quality of Life

Prevent vision loss through early intervention, thereby improving individuals' quality of life.

Scalability

The model can be integrated into existing healthcare systems and telehealth solutions, making screening more accessible.

The Data

ODIR-5 Dataset

Consists of 5,000 patients' data and 14,400 fundus images.

Quality Concerns:

- Outliers in 'Patient Age' need to be handled.
- Class imbalance in disease labels (see Fig 1).

Preliminary EDA Findings:

- Age and gender are significant factors in disease prevalence.
- There are some noticeable co-occurrence patterns between different diseases

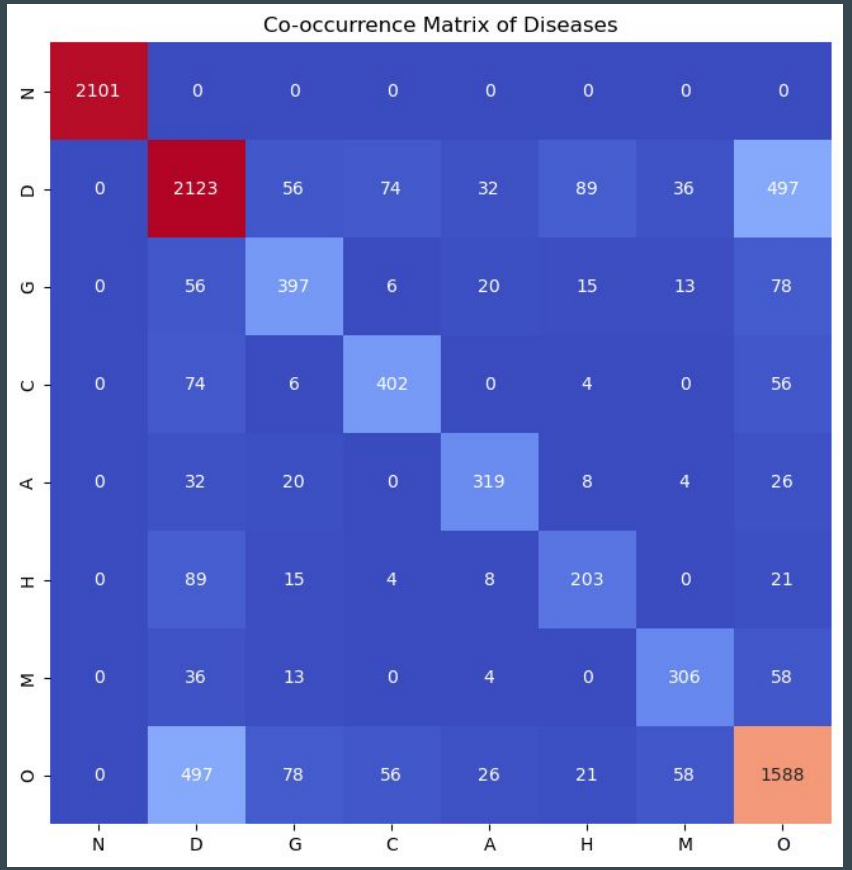

Figure 1: Co-occurrence Matrix of Diseases

Next Steps

Data Preprocessing	• Deal with outliers • Address class imbalance
Feature Engineering	• One-hot encoding variables • Address redundant columns (Filepath & Filename)
Hypothesis Testing	• Make hypothesis based on data • Gender and age relationships with disease
Advanced EDA	• Dive into some deeper analysis • Explore the image datasets
Baseline Models	• Train some baseline models

Thank You

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