Stewart Muchuchuti
Title: Ensemble Convolutional Neural Network for Multiclass, Multilabel retinal disease detection

Brief summary

Millions of people are affected by retinal abnormalities worldwide. Early detection and treatment of these abnormalities could arrest further progression saving multitudes from avoidable blindness. Manual disease detection is time-consuming, tedious and lacks repeatability. There have been efforts to automate ocular disease detection riding on the successes in the application of Deep Convolutional Neural Networks (DCNNs) for Computer-Aided Diagnosis (CAD). These models have performed well, however, there remains challenges owing to the complex nature of the retinal lesions. And besides the bulk of the work that has been done focusses on the detection of single diseases. The assumption is that retinal diseases do not occur simultaneously. This assumption could lead to some retinal diseases that occur simultaneously being missed by the detection algorithm. The problem of detecting more than one disease at a time where the diseases occur simultaneously is a typical multiclass, multilabel problem. Limited work has been done in this area using convolutional neural networks and besides the work which has been done has yielded poor performances in a highly imbalanced classification task.

The purpose of this work is to explore the potential impact of using ensemble CNN architectures for detecting retinal diseases in a multiclass, multilabel problem.