

## ABSTRACT

Preventable or undiagnosed visual impairment and blindness affect billion of people worldwide. Automated multi-disease detection models offer great potential to address this problem via clinical decision support in diagnosis. In this work, we proposed an innovative multi-disease detection pipeline for retinal imaging which utilizes ensemble learning to combine the predictive capabilities of several heterogeneous deep convolutional neural network models. Our pipeline includes state-of-the-art strategies like transfer learning, class weighting, real-time image augmentation and Focal loss utilization. Furthermore, we integrated Deep learning techniques like heterogeneous deep learning models, bagging via 5-fold cross-validation and stacked hybrid on CNN and LSTM models. LSTM can effectively preserve the characteristics of historical information in long text sequences, and extract local features of text by using the structure of CNN. We proposes a hybrid model of LSTM and CNN, construct CNN model on the top of LSTM, the text feature vector output from LSTM is further extracted by CNN structure. The performance of the hybrid model is compared with that of other models in the experiment. The experimental results show that the hybrid model can effectively improve the accuracy of text classification. The obtained accuracy for hybrid CNN and LSTM model algorithm is 95.8%.