CLASSIFICATION OF FUNDUS IMAGES CAPTURED USING D-EYE SMARTPHONE RETINAL IMAGING SYSTEM

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PREFACE

Globally, the leading causes of vision impairment are cataract, age-related macular degeneration, glaucoma, diabetic retinopathy, corneal opacity, and trachoma. There is a substantial variation in the causes between and within countries with respect to their availability of eye care services, their affordability, and the eye care literacy of the population. To increase the standards of eye care services and to be able to detect the most common vision impairment causes early in a hassle-free manner, an efficient classification model is necessary. In order to do so, a proper and sophisticated dataset is a compulsion. Therefore, introducing the main cause of using a portable smartphone based retinal imaging system, D-EYE. D-EYE acts like a digital window to the eye. It is a revolutionary approach to retinal examination that will provide access to eye health everywhere which enables telemedicine and improves access to vital health care services. In addition, D-EYE could turn specific mobile devices into a digital ophthalmoscope which is capable of recording and transmitting high-definition photos and videos of the fundus oculi for clinical assessment.

The D-EYE system allows regular screening of the eye, providing information on noticeable eye diseases and capturing images for further evaluation of specific medical conditions. With the help of the D-EYE device, an efficient dataset of fundus images was generated, later on the images went through multiple image preprocessing techniques like image sharpening and masking techniques. Then, coordinates of the area of interest were found. The images were cropped with the help of the coordinates generated and were enhanced using SR- GAN to resemble high resolution fundus images of the eye. Finally, a binary classification model was built to classify fundus images as normal or abnormal i.e., Glaucoma effected or not. The classification model has reached its best performance with an accuracy of 85%.

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