DIABI CARE

Staging Diabetic Retinopathy using Montage Fundus Images

Sarala Kumari, Nimasha Padmakumara, Chanuka Balagalla, Waruni Palangoda, Pradeepa Samarasingha

What is DIABI Care?

DIABI Care is an Intelligent smartphone application for staging diabetic retinopathy and predict diabetic retinopathy using patient demographics.

Why is DIABI Care?

- Currently Diabetic recorded as the **6th** most common cause of death
- The Association of Vitreo-retina specialists of Sri Lanka, mention that the diabetic retinopathy often has **no early warning signs**
- By 2045 this will rise to 153 million.
  - Total adult population :14,109,200
  - Prevalence of diabetes in adults : **8 .7%**
  - Total cases of diabetes in adults :1,232,800

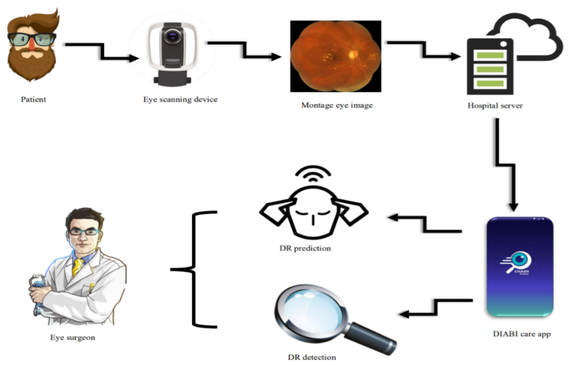
Specialty DIABI Care?

- First time in Sri Lanka
- 90% accuracy for staging Diabetic Retinopathy with totally unique data.
- Customized reports with graphical representations
- Low cost simple and smart

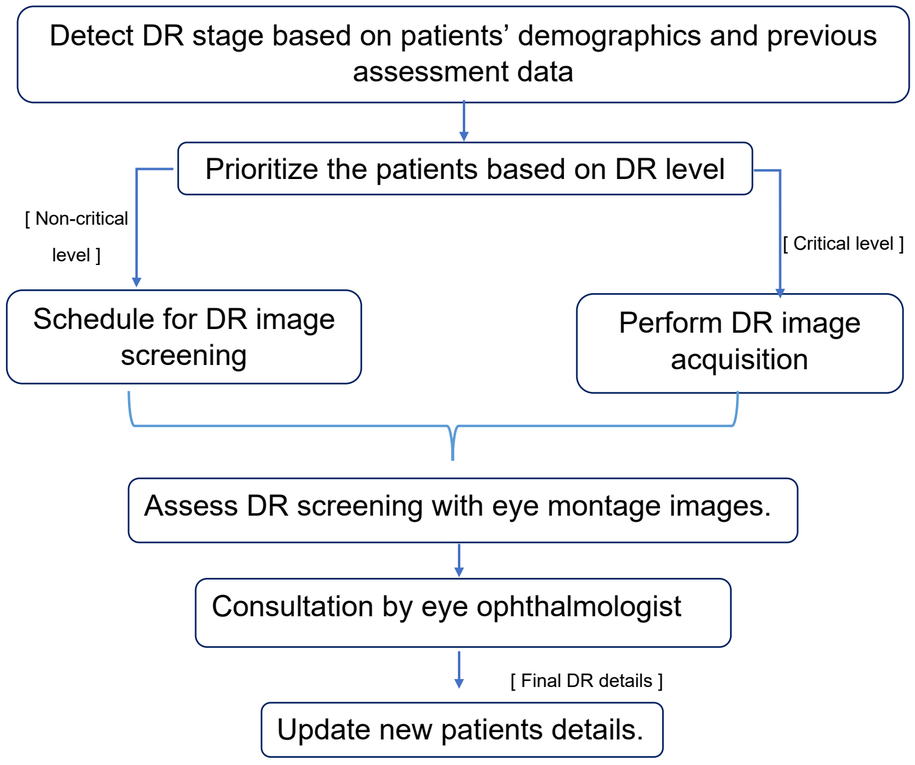
Objectives

- Predict DR stages by using patient demographics.
- Detect DR stages by using scanned eye images.
- Detect special symptoms like Media Opacity, Cotton

System Diagram



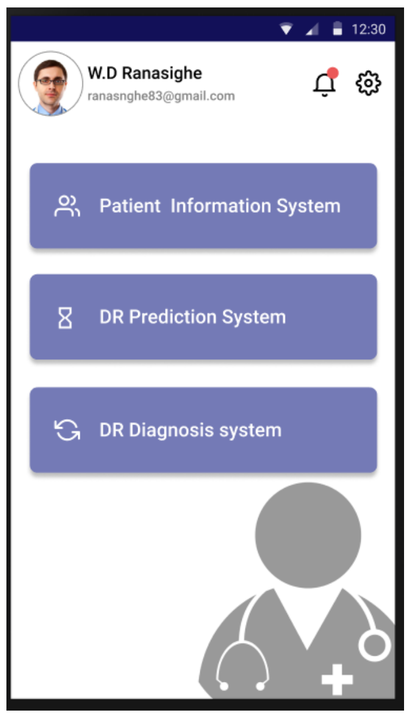
Methodology

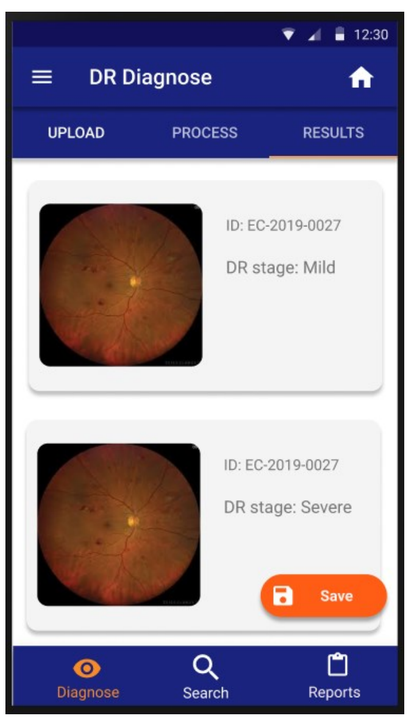


Results & Discussion

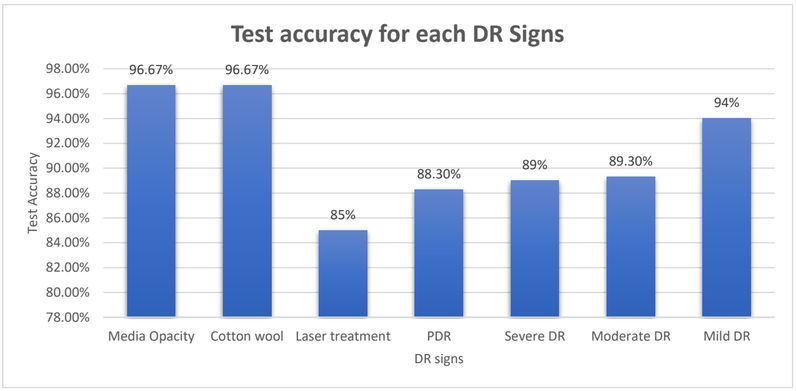
This system can be used by ophthalmologist, eye care assistance etc. Mainly this system has three functions.

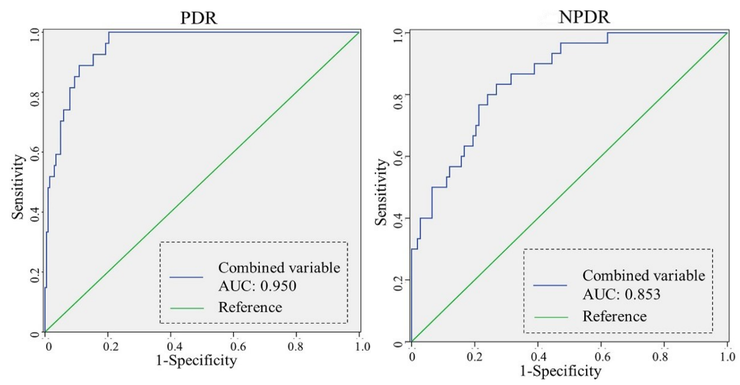
1. Patient information system.
2. DR prediction System.
3. DR diagnosis system.





All the component used VGG16 as the final mode.





References

The research has achieved promising results on our DR severity classification system using Sri Lankan dataset. The research has used several pre-trained CNN models such as VGG16, InceptionV3 and ResNet50 for DR detection and used a ML XG-Boost model for DR prediction. The model was tested on unseen data to test the generalizability of the model. The key challenges in this research project were the less amount of image data and data imbalance for the DR prediction. The accuracy graphs were analyzed more closely as an error analysis strategy to improve the models. The results show that the models have been able to achieve better performances due to the various techniques like ML, CNN & under sampling majority class resampling technique.

References

[1] Fernando, K. A. E., Weerasinghe, M. D. K. B., Piyasena, M. M. P. N., & Dissanayake, H. T. R. W. (2019). A Descriptive Analysis of PatientsFundus Photographs Presenting for Diabetic Retinopathy Screening at University Hospital, KDU.

[3] Piyseana, M. M. P. N., & Murthy, G. V. S. (2020). Availability of eye care infrastructure and human resources for managing diabetic retinopathy in the western province of Sri Lanka. *Indian Journal of Ophthalmology*, *68*(5), 841.

[4] Brownlee, J. (2019). Transfer Learning in Keras with Computer Vision Models.

[5] Esmaeli, B., Koller, C., Papadopoulos, N., & Romaguera, J. (2001). Interferon-induced retinopathy in asymptomatic cancer patients. *Ophthalmology*, *108*(5), 858-860.

Achievements

- Our research project is in the Winner's Circle of NBQSA 2020
- Our Research project will represent Sri Lanka at InnoServe Awards 2020

Tell: +94702086259 (Sarala Kumari)
Twitter: https://twitter.com/home