IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, April 2025
Impact Factor: 7.67

A Blindness Avoid (Diabetic) Retinopathy Detection

Prof. Minal Chaudhari, Ashwini Gaikwad, Yogesh Rakh, Rasika Tohake, Rohit Tupe
Indala college of Engineering, Kalyan, India

Abstract: *The increasing volume of job applications poses a challenge for Diabetic Retinopathy (DR) is one of the leading causes of preventable blindness in the working-age diabetic population in India and across the world. It may lead to permanent blindness if not detected in the early stages. The International Diabetes Federation estimated that Diabetic Mellitus will affect 101 million people in India in 2030; the largest number in any nation in the world. Our work is an attempt to speed up preliminary screening of DR to cater to the future requirement of such a huge number of diabetic patients. We have trained and validated robust classification models on publicly available datasets for early detection of DR. We have applied state-of-the-art deep learning models based on Convolutional Neural Networks (CNN), to exploit data-driven machine learning methods for the purpose. We framed the problem as a binary classification for the detection of DR of any grade (Grade 1–4) vs. No-DR (Grade 0). The developed preliminary automated screening system will act as an aid to the manual diagnostic process by referring DR patients to an ophthalmologist for further examination (if detected positive) well in time to reduce the risks of vision loss.*

Keywords: *Diabetic Retinopathy*

I. INTRODUCTION

Diabetic Retinopathy (DR) occurs due to high blood sugar levels in diabetic patients. It damages the retina of the patient by making the blood vessels abnormal (leak or swell) at the posterior pole (backside) of the eye. It can lead to permanent vision loss if not detected in the early stages.

India has 77 million cases of diabetes in the year 2010, 2011, 2015 and 2019, respectively. The numbers and growth rates are very high as compared to the global average. Nearly one-third of this population is likely to have diabetes-related complications such as DR. The prevalence of DR was 18% in the year 2009, 21.7% in 2014 and 16.9% in 2019. As per the various studies reviewed in, in 2015, the DR prevalence was 13–18% in the urban Indian population and 9–10% in the rural Indian population. The International Diabetes Federation has estimated (in 2019) that India will have around 101 million cases of diabetes in the year 2030. For the year 2045, the same estimate is about 134 million cases. The main reason for such a high rate of prevalence is found to be poor awareness. Around 90% of the diabetic patients have never gone for fundamental evaluation for DR.

DR and diabetes are closely related. However, DR is not an infection but can be considered as a sign of uncontrolled diabetes. Both DR and diabetes are not mutually inclusive. The severity of DR is graded as per the International Clinical Diabetic Retinopathy Scale. The grades help to determine the need for referral, frequency of monitoring/screening, treatment, etc. As per the guidelines, short screening intervals (from six months to one year) are recommended in most of the DR cases. These intervals are reduced to few weeks in the cases of severe or worse DR. Manual screening process consists of diagnosing DR through visual assessment of fundus either by direct examination (in-person dilated eye examinations) and/or by evaluation of digital color fundus photographs of the retina.

II. LITERATURE SURVEY

A deep learning-based system named IDx-DR X2.1 was developed by Abràmoff et al. in using multiple CNNs trained over fundus images of publicly available datasets for automatic detection of lesions. The images in the dataset were graded by multiple human experts and adjudicated before training. The system provided four types of outputs including Negative (implying no or only mild DR present), rDR (implying referral DR is present), and vtDR (implying vision-

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, April 2025
Impact Factor: 7.67

threatening DR is present). The results achieved by the system include 96.8% sensitivity, 87% specificity, and AUC of 0.980 for the detection of rDR on the Messidor-2 dataset.

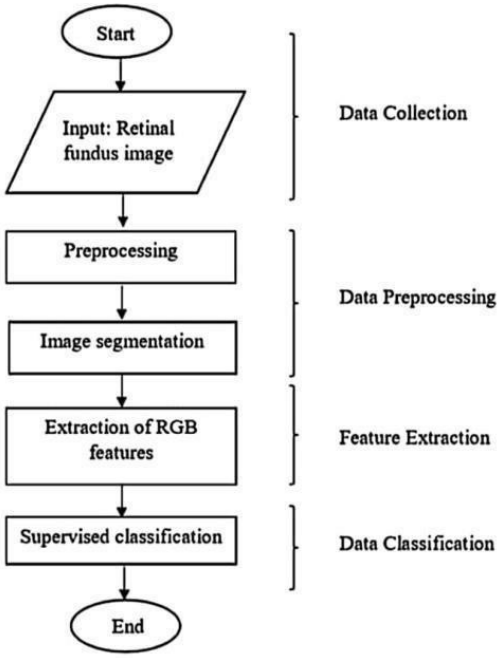
Programmed reviewing of DR assists ophthalmologists with planning custom fitted medicines to patients, in this manner is of essential significance in the clinical practice. In any case, earlier methods they rate one of DR, and overlook this relationship among DR and its intricacy, that is either, DME (Diabetic Macular Edema). Also, this area data, e.g., macula edema and delicate cotton wools explanations, are generally utilized in an earlier for evaluating. Such comments are expensive to get, subsequently it is alluring to foster programmed evaluating techniques with just picture level management. Our key commitments incorporate the infection explicit consideration module to specifically learn helpful highlights for singular illnesses. We assess this organization on two open classic data, i.e., ISBI 2018 IDRiD challenge dataset and Messidor dataset. In customized deep CNN model with the principle of deep residual learning was used. The output of the model was 0 for no DR or 1 for DR of any severity level. The pre-processing techniques including rotational invariance, contrast invariance and brightness adjustment were applied to the training set. A 5-fold stratified cross-validation was also applied during initial training and then average metrics were derived and fed during the final training. The model was able to secure 93% sensitivity and 87% specification. Public dataset Messidor-2 was used as a validation set.

III. METHODOLOGY

THE BLINDNESS AVOID (DIABETIC) RATINOPATHY DETECTION follows a structured pipeline:

1. Eye Image Upload: Users upload eye image in formats such as IMAGE, PDF, DOCX.
2. Preprocessing: Visualize eye images.
3. Image processing: To adjust for the image we carry out some image processing techniques .
4. image Augmentations: To generate robustness in the data by creating additional images from the dataset to make it generalize well on the new data with rotation flips, cropping, padding etc.
5. Visualization & Report Generation: Provides graphical insights into reports.

IV. FLOW CHART



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, April 2025
Impact Factor: 7.67

V. TECHNOLOGIES USED

• Programming Language: Python
• Frontend:
• Backend:
• Libraries:

VI. IMPLEMENTATION AND FEATURES

APPLICANT SIDE

- Upload eye images for analysis.
- Extracts and categorizes images details into structured sections.
- Provides diabetic report and enhancement tips.
- Generates a diabetic report based on detection, show, and detect.

ADMIN'S SIDE

- Stores parsed eye images data in a structured format.
- Provides medical report and detect diabetic .
- Classify data and Tracks diabetic.

VII. RESULT AND DISCUSSION

we can quickly detect Diabetic Retinopathy with high accuracy from our trained neural network system will help to reduce the damage cause by diabetic retinopathy at early stage. Our report generation system will give analysis of patient's eye and will help doctors to take quick action. Our system can be further enhanced by training our neural network model on different eye disease so one can get one stop solution for all eye diseases.

VIII. CONCLUSION

Our project is an analysis of a model to identify the severity of DR from Fundus Photogmphs. Our method performed well in comparison to other method. It is a fact that better and accurate the diagnosis, the more exact will be the treatment plan. So diagnostic measures should aim towards accuracy for an effective treatment regimen. In our study we were able to establish a good accuracy in the diagnosis.

REFERENCES

[1]. https://www.ijitee.org/wp- Report of the Expert Committee on the diagnosis and classification of diabetes mellitus American Diabetes Association. Diabetes Care. 1997; 20:1183–1201. [PubMed] [Google Scholar]
[2]. Clinical practice recommendations American Diabetes Association. Diabetes Care. 2002;25(Suppl 1): S1–S147. [PubMed] [Google Scholar]
[3]. Orozco-Beltran D, Cos-Claramunt FX. Primary care diabetes in Spain. Prim Care Diabetes. 2008; 2:101–103. [PubMed] [Google Scholar]
[4]. Castell C, Tresserras R, Lloveras G, Goday A, Serra J, Salleras L. Prevalence of diabetes in Catalonia, an OGTT-based population study. Diab Res Clin Prac. 1999; 43:33– 40. [PubMed] [Google Scholar]