IDEATION PHASE-
LITERATURE SURVEY

Date	19 September 2022
Team ID	PNT2022TMID41433
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
Maximum Marks	2 Marks

Deep Learning Fundus Image Analysis For Early Detection Of Diabetic Retinopathy

Diabetic Retinopathy

Diabetic retinopathy is a diabetes complication that affects eyes.It's caused by damage to the blood vessels of the light-sensitive tissue at the back of the eye (retina).At first, diabetic retinopathy may cause no symptoms or only mild vision problems. Approximately four hundred and twenty million people worldwide have been diagnosed with diabetes mellitus. The prevalence of this disease has doubled in the past 30 years and is only expected to increase, particularly in Asia. Of those with diabetes approximately one-third are expected to be diagnosed with diabetic retinopathy (DR), a chronic eye disease that can progress to irreversible vision loss. Early detection which is critical for good prognosis, release on skilled readers and is both labour and time-intensive. Automated techniques for diabetic retinopathy diagnoses are essential to solving these problems.

1. Diabetic Retinopathy Detection and Retinal Image Generation (2021)

• To visualize the symptom encoded in the descriptor, they propose PathoGAN, a new network to synthesize medically plausible retinal images.

• By manipulating this descriptors, they could even arbitrarily control the

position, quantity, and categories of generated lesions. They also show that their synthesized images carry the symptoms directly related to diabetic retinopathy diagnosis. Their generated images are both qualitatively and quantitatively superior to the ones by previous methods.

• Besides, compared to existing methods that take hours to generate an image, their second level speed endows the potential to be an effective solution for data augmentation.

2. Transfer Learning based Detection of Diabetic Retinopathy from small Dataset (2019)

• Transfer learning from an already trained deep convolutional network can be used to reduce the cost of training from scratch and to train with small training data for deep learning.

• In this work, they used a pretrained Inception-V3 model to take advantage of its Inception modules for Diabetic Retinopathy detection.

• In order to tackle the labelled data insufficiency problem, they subsampled a smaller version of the Kaggle Diabetic Retinopathy classification challenge dataset for model training, and tested the model's accuracy on a previously unseen data subset. Their technique could be used in other deep learning based medical image classification problems facing the labelled training data insufficiency.

3. AUTOMATIC SEGMENTATION OF RENTINAL VASCULATURE:

- Author developed an unsupervised method for segmenting the retinal vessel.the entire algorithm consist of 4 stages:contrast enhancement,edge enhancement,optic disk removal and vessel segmentation and the post processing.

4. Development and Validation of a Deep Learning Algorithm for Detection of Diabetic Retinopathy in Retinal Fundus Photographs (2018)

• The original study used non-public fundus images from EyePACS and three hospitals in India for training. This Study used a different Eyepatch data set from Kaggle.

• The original study used the bench mark data set Messidor-2 to evaluate the algorithm's performance. This study used the same data

set. In the original study, ophthalmologist regraded all images for diabetic retinopathy, macular edema, and image gradeability.

• There was one diabetic retinopathy grade per image for data set, and assessed image gradability ourselves.

• The original study did not provide hyper-parameter settings. But some of these were later published.

REFERENCES:

1. Taylor, R. & Batey, D. *Handbook of Retinal Screening in Diabetes: Diagnosis and Management*. Wiley (2012).
2. Wang, F., Casalino, L. P. & Khullar, D. Deep Learning in Medicine-Promise, Progress, and Challenges. *JAMA Intern Med*. (2018).
3. Guan, M. Y., Gulshan, V., Dai, A. M. & Hinton, G. E. Who Said What: Modeling Individual Labelers Improves Classification. *arXiv e-prints*., https://ui.adsabs.harvard.edu/\#abs/2017arXiv170308774G. (Accessed March 01, 2017).