Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy

TEAM MEMBERS

SURYAA S A

SRIRAM S

YOGAPRAKASH K

SHANMUGAPRIYAN J

LITERATURE REVIEW

Diabetic Retinopathy is a retina complaint caused by diabetes mellitus and it's the leading cause of blindness encyclopedically. Beforehand discovery and treatment are necessary in order to delay or avoid vision deterioration and vision loss. To that end, numerous artificial-intelligence- powered styles have been proposed by the exploration community for the discovery and bracket of diabetic retinopathy on fundus retina images. This review composition provides a thorough analysis of the use of deep literacy styles at the colourful way of the diabetic retinopathy discovery channel grounded on fundus images. We bandy several aspects of that channel, ranging from the datasets that are extensively used by the exploration community, the pre-processing ways employed and how these accelerate and ameliorate the models' performance, to the development of similar deep literacy models for the opinion and grading of the complaint as well as the localization of the complaint's lesions. We also bandy certain models that have been applied in real clinical settings. Eventually, we conclude with some important perceptivity and give unborn exploration directions.

The pathology associated with diabetic retinopathy

Author: Alan W. Stitt & Judith Lechner

Year: 2017

This review summarizes the pathological features of diabetic retinopathy. The lesions being in the diabetic retina have been described over numerous decades using descriptive and experimental approaches grounded on clinical studies on cases, mortal posthumous material, beast models and colorful in vitro systems. We've also accumulated a wealth of knowledge about introductory molecular mechanisms and crucial pathogenic processes that drive these abnormalities in diabetic retina. Despite these advances, there are still limited remedial options for diabetic retinopathy with those presently available only addressing late- stage complaint. With a particular focus on the earlier stages of diabetes, there's growing appreciation the complex neuronal, glial and microvascular abnormalities which precipitously disrupt retinal function. Grounded on a strong appreciation of cellular and molecular pathology that underpins diabetic retinopathy, farther advances are anticipated as we drive towards development of efficient remedial options that can address all stages of complaint.

Deep learning based computer-aided diagnosis systems for diabetic retinopathy: A survey

Author: Fadwa Al Adel

Year: 2019

Diabetic retinopathy (DR) results in vision loss if not treated beforehand. A computer- backed opinion (CAD) system predicated on retinal fundus images is an effective and effective system for early DR opinion and abetting experts. A computer- backed opinion (CAD) system involves various stages like discovery, segmentation and type of lesions in fundus images. multitudinous traditional machine knowledge (ML) ways predicated on hand finagled features have been introduced. The recent emergence of deep knowledge (DL) and its decisive win over traditional ML styles for various operations motivated the researchers to employ it for DR opinion, and multitudinous deep- knowledge- predicated styles have been introduced. In this paper, we review these styles, pressing their pros and cons. In addition, we point out the challenges to be addressed in designing and learning about effective, effective and robust deep- knowledge algorithms for various problems in DR opinion and draw attention to directions for future disquisition.

Detection of Diabetic Retinopathy using Deep Learning

Author: Anushree Vartak & Sagar Kataria

Year: 2021

Diabetic Retinopathy (DR) is a common complication of diabetes mellitus, which causes lesions on the retina that effect vision. However, it can lead to blindness, If it isn't detected beforehand. Unfortunately, DR isn't a reversible process, and treatment only sustains vision. DR beforehand discovery and treatment can significantly reduce the threat of vision loss. The homemade opinion process of DR retina fundus images by ophthalmologists is time trouble and cost consuming and prone to misdiagnosis unlike computer backed opinion systems. lately, deep literacy has come one of the most common ways that has achieved better performance in numerous areas, especially in medical image analysis and bracket. Convolutional neural networks are more extensively used as a deep literacy system in medical image analysis and they're largely effective. For this composition, the recent state of the art styles of DR colour fundus images discovery and bracket using deep literacy ways have been reviewed and anatomized. likewise, the DR available datasets for the colour fundus retina have been reviewed. Difference gruelling issues that bear further disquisition are also bandied.

A Deep Learning Method for the detection of Diabetic Retinopathy

Author: Navoneel Chakrabarty

Year: 2018

Numerous Diabetic cases suffer from a medical condition in the retina of the eye known as Diabetic Retinopathy. The main cause of Diabetic Retinopathy is high blood sugar situations over a long period of time in the retina known as Diabetes Mellitus. The primary thing is to automatically classify cases having diabetic retinopathy and not having the same, given any High- Resolution Fundus Image of the Retina. For that an original image processing has been done on the images which includes substantially, conversion of coloured (RGB) images into perfect greyscale and resizing it. also, a Deep Learning Approach is applied in which the reused image is fed into a Convolutional Neural Network to prognosticate whether the case is diabetic or not. This methodology is applied on a dataset of 30 High Resolution Fundus Images of the retina. The results, so attained are a 100 prophetic delicacy and a perceptivity of 100 also. Such an Automated System can fluently classify images of the retina among Diabetic and Healthy cases, reducing the number of reviews of croakers

Early detection of diabetic retinopathy from digital retinal fundus images

Author: Deepthi K. Prasad, L. Vibha, K.R. Venugopal

Year: 2016

Diabetic retinopathy is the impairment of the retinal blood vessels due to complications of diabetes, which can latterly lead to loss of vision. The only result for this problem is through the use of a retinal webbing system that would diagnose the retinal damage at an early stage. This paper proposes the use of morphological operations and segmentation ways for the discovery of blood vessels, exudates and microaneurysms. The retinal fundus image is partitioned into four sub images. colorful features are uprooted from the retinal fundus image. Haar sea metamorphoses are applied on the features uprooted. star element analysis fashion is also applied for better point selection. Back propagation neural network and one rule classifier ways are used for the classifying the images as diabetic or non-diabetic. trials are performed on a publicly available diabetic retinopathy data set DIARETDB1. Performance is estimated with criteria like perceptivity, particularity and delicacy, the results attained are encouraging.

LITERATURE SURVEY:

YEAR	TITLE	AUTHOR NAME	KEYWORDS	CONCLUSION
2017	The pathology associated with diabetic retinopathy	Alan W. Stitt & Judith Lechner	Diabetic retinopathy, Pathology, Neurovascular unit & Microvascular	Most current therapies are focused on late-stage PDR and DME, but widening appreciation of the diabetes-associated pathophysiology could provide opportunities to prevent disease at a much earlier stage.
2019	Deep learning based computer-aided diagnosis systems for diabetic retinopathy: A survey	Fadwa Al Adel	Diabetic Retinopathy, Lesion, Exudate, CNN, Autoencoder, RNN & DBN	Diabetic retinopathy (DR) is a complication of diabetes that damages the retina. To avoid vision loss, early detection is important. Conventional methods for detecting DR biomarkers and lesions are based on hand-engineered features. In general, the deep-learning approach outperforms the traditional approach.

2021	Detection of Diabetic Retinopathy using Deep Learning	Anushree Vartak & Sagar Kataria	CNN & DR	We have tried to construct an ensemble to predict if a patient as diabetic retinopathy using features from retinal photos. After training and testing the model the accuracy we get is quite similar. For both sets of data CNN is providing higher accuracy rate for predicting DR
2018	A Deep Learning Method for the detection of Diabetic Retinopathy	Navoneel Chakrabarty	Diabetes Mellitus, High Resolution Fundus, Deep Learning & Convolutional Neural Network	The research done in this paper is intended to help diabetic patients to remain cautious about their medical condition. 100% Validation Accuracy is obtained which is, by the best of our knowledge, the highest ever numeric accuracy reached by any Automated Diabetic Retinopathy.
2016	Early detection of diabetic retinopathy from digital retinal fundus images	Deepthi K. Prasad, L. Vibha, K.R. Venugopal	Back propagation neural networks, Classification, Diabetic retinopathy, Haar wavelet transform & Microaneurysm	Diabetic retinopathy causes fluid leaking from the blood vessels, haemorrhages and texture changes. Discussed detection of Diabetic Retinopathy and highlight various technologies used for detecting diabetic eye disease.