Color Fundus Image of Convolutional Neural Networks for Diabetic Retinopathy Macular Edema

Kandasamy Sellamuthu[a], Kaviyarasu S[b], Naveen G[c], Rahul R[d]

[a] Assistant Professor(Sr.G), Department of Computer Science and Engineering, KPR Institute of Engineering and Technology, Coimbatore.
[b]Student, Department of Computer Science and Engineering, KPR Institute of Engineering and Technology, Coimbatore.
[c]Student, Department of Computer Science and Engineering, KPR Institute of Engineering and Technology, Coimbatore.
[d]Student, Department of Computer Science and Engineering, KPR Institute of Engineering and Technology, Coimbatore.

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Abstract: DME (diabetic macular edema) is a release of excess fluid in the macula region of the retina caused by diabetes.. Diabetic retinopathy is developed eventually leading to DME. Diabetic retinopathy damages retina's blood vessel that results in vision impartment. Two-stage methodology has been proposed DME severity can be detected and classified using colour fundus images. By supervised learning approach, DME is detected use standard fundus photos We can obtain the normal from DME images by capturing global characteristics and discriminating using an extraction technique. By measuring the symmetry, the rotational asymmetry metric is used to determine the magnitude of disease in the macular region. Color fundus image To determine the magnitude of Diabetes Macular Edema, this test is used. 'The specification of disease is easily identified due to this color change in the color fundus image'. With several datasets available publicly, the performance of the proposed idea evaluated. The detection performance has The diameter of an optic a sensitivity of 100 percent and a specificity of between 74 and 90 percent With a sensitivity of 100 percent and a specificity of 97 percent, cases that need immediate referral are identified. The mild case has an accuracy of 81 percent, while the extreme case has an accuracy of 100 percent case.

1. Introduction

Direct or indirect detection of DME is possible.. By the use of stereoscopy or optical computed tomography images, DME can be detected directly. Detecting the existence of hard exudates (HE) in the retina is an indirect process. Secretion of plasma from capillaries results in formation of HE which in turn results in retinal vasculature complications, which could result in retinal swelling. They appear as yellow–white deposits in colour fundus pictures. Using colour fundus images to detect the presence of hard exudates (HE) in various areas of the retina is now considered a standard technique for assessing DME. The magnitude of the risk of edoema is determined by the amount of HE in the macula, which is characterised as a circular region centred on the fovea and surrounded by blood vessels.It turned out to be nothing disc (OD) is one. The danger when HE locations enter the macula, the risk of DME increases, with the risk being greatest when they are inside the macula. This is a vital consideration in DME evaluation in order to refer patients to a specialist. Diabetic retinopathy is a term used to describe a group of retinal complications caused by diabetes (DR). Given the risk of vision loss and blindness from DR, screening programmes have been developed in a number of countries, and a colour fundus picture serves as the foundation for manual evaluation in screening. However, in a large-scale screening scenario, such manual assessment is not scalable, especially in developing countries, due to a lack of qualified manpower or the lack of high-end imaging equipment at the point of treatment. Tele screening using permanent and mobile units has been suggested as a way to test for retinal disorders in remote areas. In this situation, an automated disease detection system will greatly reduce the burden on experts by restricting referrals to cases that need urgent attention. Where the majority of patients screened for diseases do not use a supervised learning stage, the time and effort savings would be important. As a result, they don't out of the ordinary. The proportion of average to abnormal In DR screening, the ratio of patients with disease symptoms to those without can be as high as 9 to 1. Several attempts to develop an automated solution for DR detection have been published. We hope to create a solution for automatically assessing DME from colour fundus images as a result of these efforts. Such a solution will be a valuable addition to the current DR screening infrastructure. A decision module is needed to validate the presence or absence of HE in a given colour fundus image before developing a solution for automatic DME assessment. After their presence has been established, a second module must evaluate the macular region in order to determine the risk of DME. As a result, we suggest a two-stage methodology for detecting and assessing DME in this paper. The following section gives a summary of previous work done to detect the existence of HE, followed by a description of the proposed methodology.

2. Literature Survey:

L. Giancardo et al: Diabetic macular edoema (DME) is a vision-threatening complication of diabetic retinopathy that can be detected in fundus images by looking for exudates (a form of bright lesion). Two new methods for detecting exudates with a single image are available in this study, but they are vulnerable to error

when used with stereo fundus camera. We're still require marked lesion training sets, which take time to create, are difficult to procure, and are vulnerable to human error. We present a new dataset of fundus photos from different ethnic groups and DME levels that we have made public. We use this dataset to test our algorithm and compare it to two other recent exudate segmentation algorithms. Our algorithms perform better or equivalent in all of our studies, with an order of magnitude reduction in computational time.

Fabrice Meriaudeau and colleagues: Nonmydriatic optical fundus cameras can capture retinal fundus images that can be used to diagnose a variety of retinal diseases. These cameras can be used for telemedicine or point-of-care (PoC) applications by operators with minimal training due to the ease of use and low cost of newer camera models. We suggest a new method for analysing macula swelling that uses uncalibrated multiple-view fundus images. This breakthrough allows remote ophthalmologists to identify and quantify swollen areas. This capacity does not exist. Patients: 49 patients with diabetes or diabetic retinopathy and 25 patients with macular degeneration were included in the study.

present automatic algorithms for measuring features from the reconstructed image, which can be used in a proof-of-concept automated diagnosis of early macular edoema, such as before exudation appears. The technique is divided into three sections: First, a preprocessing technique improves the dark microstructures of the macula while also equalising the image; second, all available views are registered using non-morphological sparse features; and third, all available views are registered using non-morphological sparse features. Finally, for each image, a dense pyramidal optical flow is measured and statistically combined to create a naive macula height map. Three sets of synthetic images and two sets of real-world images are used to present the findings. These preliminary tests show that the reconstruction can be correlated with the swollen position and that a minimum swelling of 300 m can be inferred.

Michael Richard Hee et al: To see whether optical coherence tomography, a modern technique for high-resolution cross-sectional imaging of the retina, can be used to quantify retinal thickness in macular edoema patients. Design: Optical coherence tomography (OCT) was used to conduct a survey of patients with macular edoema. The location is a referral eye centre. Macular edoema is a condition that affects the retina. It may become a sensitive diagnostic tool for detecting macular edoema caused by a clogged retinal vein, uveitis, the development of an epiretinal membrane, or the removal of a cataract. Measures of the main outcomes: Slit-lamp biomicroscopy, fluorescein angiography, and visual acuity were used to correlate optical coherence tomograms. The results showed that cystoid macular edoema optical coherence tomograms closely matched known histopathologic characteristics. Because of the well-defined limits in optical reflectivity at the inner and outer margins of the neurosensory retina, quantitative measurements of retinal thickness are possible. Serial optical coherence tomographic examinations permitted the longitudinal progression of macular thickening as well as the resolution of macular edoema after laser photocoagulation to be followed. Measurements of central macular thickness with optical coherence tomography associated with visual acuity in diabetic retinopathy patients, and optical coherence tomography was more sensitive to minor variations in retinal thickness than slit-lamp biomicroscopy. Conclusions: Optical coherence tomography tends to be a valuable tool for objectively monitoring retinal thickness with high resolution in patients with computer vision problems.

thickening in patients in the future.

Nathan Silberman et al: Diabetes is the major cause for an eye disorder, Diabetic retinopathy which is the leading cause of blindness in the United States, accounting for over 99 percent of cases in India. India and China currently have over 90 million diabetic patients and are on the verge of having a diabetic population explosion. If diabetic retinopathy is not identified early enough, an unprecedented number of people can become blind. Eye of Aravind With over 2 million patients a year, Hospitals is the world's largest eye care centre. Throughout southern India, the A major effort is underway at the hospital to diagnose diabetic retinopathy at an early stage. A team of ten to fifteen doctors is in charge of manually diagnosing over two million retinal images each year in order to diagnose diabetic retinopathy. Although the process is time-consuming, a significant number of cases turn out to be normal, meaning that we spend the majority of our time diagnosing normal cases. This paper details our collaboration with Aravind Eye Hospitals in the creation of an automated system for detecting diabetic retinopathy in retinal photos. The algorithm for pure image splitting is proposed for the automated diabetic retinopathy problem. We summarise our initial efforts toward developing such a device using a variety of computer vision techniques and address the possible effect on early detection of diabetic retinopathy using a coarse segmentation.

S Philip et al: Anonymized photographs were collected from patients who attended a diabetic retinopathy screening programme run by a regional primary care clinic. To create automatic grading algorithms, a training set of 1067 images was used. A separate collection of 14 406 images from 6722 patients were used to evaluate the final programme. The sensitivity and specificity of manual and automated systems used as "disease/no disease" graders (detection of poor image quality and diabetic retinopathy) were compared to a clinical reference norm.

Hussain F et al: Diabetic retinopathy is a leading cause of blindness in people with diabetes. Damage to blood vessels in the eye is the first symptom of diabetic retinopathy, followed by the development of lesions in the retina. In this paper, an automated method for detecting bright lesions (exudates) in retinal images is presented Adaptive thresholding based on a novel was used to confirm the presence or absence of HE in a typical fundus

picture in this study. Once their existence is verified, a second module must analyse the macular area in order to determine the likelihood of macular degeneration.

All candidates with simple borders have their own boundaries. Based on the coarse segmentation data, a morphological operation is used to refine the adaptive thresholding results. Images with exudates were detected with 91.2 percent sensitivity, 99.3 percent precision, and 99.5 percent accuracy using a clinician reference level (ground truth). As a result of its findings, the proposed approach outperforms current methods and is resistant to picture quality variations.

3. Existing System:

SWELLING in the macular area of the retina, also known as macular edoema, is an eye complication that frequently results in vision loss.

Diabetes-related macular edoema (DME) is a high-risk condition that can result in permanent vision loss. DME can manifest itself without causing any external symptoms, so early detection of even the tiniest sign is critical. When found during a retinal test, it necessitates urgent care, which may include glycemic and blood pressure monitoring, as well as laser surgery. First, a decision module assessment of DME must be developed in order to create a solution for automated DME assessment. The following section gives an overview of previous work done to detect the existence of HE, followed by a description of the proposed method displaying DME As a result, we suggest a two-stage methodology for detecting and assessing DME in this paper. The following section gives a summary of previous work done to detect the existence of HE, followed by a description of the proposed methodology.

4. Proposed System:

However, in a large-scale screening scenario, such manual assessment is not scalable, especially in developing countries, due to a lack of qualified manpower or the lack of high-end imaging equipment at the point of treatment. Telescreening of permanent and mobile units, for example, has been suggested as a way to scan for retinal disorders in remote areas. Several attempts to develop an automated solution for DR detection have been published. We hope to create a solution for automatically assessing DME from colour fundus images as a result of these efforts. Such a solution will be a valuable addition to the current DR screening infrastructure. As a result, we suggest a two-stage detection and methodology methodology in this paper. Color fundus images have also been represented using features such as visual word/group using a dictionary to help identify them as normal or abnormal.

5. Conclusion:

We proposed and tested a system for detecting and assessing DME. This research makes three important contributions: 1) a hierarchical approach to the issue, 2) a novel representation for the first level, which determines whether an image is normal or abnormal, and 3) a rotational asymmetry test for the second stage, which determines the severity of DME danger. The novel depiction accurately depicts the picture's overall characteristics. Such global features had previously proven ineffective in detecting HE.

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