Analysis of Unreadable Fundus Images Obtained in a Telemedicine Screening Program for Glaucoma Detection

N. Harshitha
MCA III YEAR
Dept of Computer Science
SVU CM&CS, Tirupati

Dr . E. Kesavulu Reddy
Assistant Professor
Dept of Computer Science
SVU CM&CS, Tirupati

Abstract: **Glaucoma is one of the prevalent resources of irreversible unmistakable hindrance in individuals over forty years old. In Colombia there might be an exorbitant inescapability of the disorder, being extra awful the way that there isn't sufficient ophthalmologists for the nation's populace. Fundus imaging is the greatest used screening framework for glaucoma character for its exchange off among smallness, size and expenses. In this paper we present a computational gadget for modified glaucoma acknowledgment. We report updates for plate division in connection with exceptional tackles the composition, an extraordinary way to deal with piece the cup with the guide of thresholding and another measure between the size of the cup and the size of the circle. Results were gained from loads of fundus photos in a joint exertion with the Centre of Prevention and Attention of Glaucoma in Bucaramanga, Colombia, wherein the degree of satisfaction of glaucoma prevalence changed into of 88.5%.**

Keywords: Glaucoma detection, disc segmentation, veins segmentation, cup segmentation, image processing.

I. INTRODUCTION

Glaucoma is the fundamental inventory of irreversible unmistakable disability since it impacts the eye's optic nerve. In the across the board lion's share of the occasions patients don't heaps of vision disaster till cutting side reaches. As demonstrated by Mohammadi and Jeyaraman, its miles assessed that in made worldwide areas, in any occasion half of glaucoma sufferers experience no indication of the sullying, which is required to be more noteworthy dreadful in creating universal areas. In an examination of glaucoma ordinariness from worldwide dispensed insights found that by 2020, over 11.1 million people will be proportionally outwardly disabled from significant glaucoma. In was in addition discovered the extending reasonable expense of cure of glaucoma in cutting edge levels. In Colombia, the Ministry of Health and Social Security assesses that there is around 296,000 outwardly impeded individuals for a couple of reasons, having glaucoma a power of 3.9% in people over forty years old in Bucaramanga. This decays through the way that in the nation, in perspective on the populace in 2011, there are 2 ophthalmologists for a hundred, 000 sufferers. The harm in the optic nerve is because of brought weight up in the consideration, that is carried around with the guide of either overproduction of liquid amusingness or by method for the blockage of the leakage course of action of this liquid. There is in like manner proof of the cost of genetic family premise inside the nearness of the sickness. There are a few evaluations that might be done in a patient with suspected glaucoma, as an occasion, tonometry to measure the eye's weight, gonioscopy to test whether territory is open or close, optical coherence tomography (OCT) and fundus imitation or fundus imaging to look the retina and the optic nerve as demonstrated The retinal fundus photograph is applied to check the thickness of the retinal nerve fiber layer (RNFL) to explore glaucoma. It is one of the non-meddlesome strategies usually utilized by ophthalmologists. Its enormous smidgen of slack is that photographs might be taken usefully for either solid and non-sound retinas, it's far also advantageous and no longer extreme to use for any prosperity talented, particularly in screening endeavours among people without access to social protection organizations. The thickness of the RNFL is chosen by utilizing evaluating the amount a portion of the length of the optic nerve (named circle) and the size of the uncovering inside the optic nerve made with the guide of the expanding eye's weight (named cup). This parameter is known as the Cup-to-Disk ratio (CDR). The Cup-to-Disk ratio (CDR). A couple of works has been accomplished for programmed glaucoma personality subject to concealing fundus pictures, in which the crucial issue is to offer a genuine estimation of the CDR. Anusorn et al proposes a system for plate division using edges acknowledgment. This strategy has issues if the eye has as per papillary rot that is a contamination that trades the edges of the plate. For isolating the cup it uses as point of confinement 33% of the most extreme improved grayscale power, be that as it can, the partition between the circle pixels and the cup pixels isn't in every case as a rule the equivalent, which makes intense the division among pictures taken from various individuals. Another trouble is to catch the cup edges when it's far beginning to extend inside the beginning interims of the disease.

II. RELATIVE STUDY

A. Retinal Fundus Image for Glaucoma Detection: A Review and Study

Glaucoma is one of the extraordinary noticeable diseases that reason hurt the eyes irreversibly by means of impacting the optic nerve strands and astrocytes. Therefore, the early

Special Issue - 2019

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
NCISIOT - 2019 Conference Proceedings

area of glaucoma accept a virtual undertaking inside the helpful field. The composing gives elite strategies for the early personality of glaucoma. Among the particular strategies, retinal picture based absolutely notoriety accept an immense activity as it goes underneath non-intrusive methodologies for distinguishing proof. While perceiving glaucoma trouble utilizing retinal pictures, exceptional helpful features of the eyes, as an example, retinal nerve fiber layer, cup-to-circle proportion, summit point, optic plate, and optic nerve head, and picture features, for example, Haralick surface, better-demand spectra, and wavelet imperativeness, are used. In this paper, a study and watch had been coordinated for the various techniques of glaucoma notoriety utilizing retinal fundus photographs. In like way, 45 investigations papers had been appeared into and the exploration transformed into given reliant on the isolated features, request precision, and the usage of different instructive files, as a case, DIARETDB1 educational assortment, MESSIDOR enlightening assortment, IPN enlightening arrangement, ZEISS instructive arrangement, network instructive arrangement, and true instructive arrangement. Finally, we blessing the exceptional research issues and arrangements that might be loved for the investigators to accomplish comparably contemplates on glaucoma area.

B. Review of automated glaucoma detection techniques

Glaucoma, an eye fixed infection, is regularly alluded to because the quiet criminal of sight. The damage accomplished with the aid of glaucoma is irreversible. Early region and remedy of glaucoma is the primary arrangement. Till date several works had been carried out towards programmed glaucoma identity using Colour Fundus Images (CFI) and Optical Coherence Tomography (OCT) images by getting rid of simple highlights. Auxiliary highlights can be extricated from optic nerve head (ONH) investigation if there need to arise an occurrence of CFI and Retinal Layers (RL) exam in OCT pix for glaucoma evaluation. Be that as it can, shockingly, the works until date leave out the mark regarding anticipated exactness in such way. A survey of mechanized glaucoma discovery tactics is displayed on this paper. The paper likewise examines one of a kind auxiliary highlights that are sizable to CFI and OCT pix one at a time for robotized glaucoma identification. The paper infers that becoming a member of auxiliary highlights from both CFI and OCT pix might result in more and more genuine glaucoma assessment.

Fully automated method for glaucoma screening using robust optic nerve head detection and unsupervised segmentation based cup-to-disc ratio computation in retinal fundus images

C. Background and Objective

 Visual impedance influences a noteworthy piece of the population around the world. Glaucoma is the sort of fundamental motive force, an incessant eye illness prompting dynamic imaginative and prescient misfortune. Early glaucoma screening is a good sized challenge, allowing a backing off of the pathology spreading and

evasion of irreversible imaginative and prescient harms. At the point while guide assessment by means of professionals reviews inconveniences, abusing the vast Cup-to-Disk Ratio (CDR) consist of as a simple marker to survey the harm to the optic nerve head (ONH) is a talented path for early glaucoma screening and analysis.

D. The Effectiveness of TELEGLAUCOMA versus In-Patient Examination for Glaucoma Screening: A Systematic Review and Meta-Analysis

Glaucoma is the principle source of irreversible visual debilitation on the earth influencing 60.5 million people global in 2010, which is relied upon to increment to more or less seventy nine.6 million by means of 2020. Along those strains, glaucoma screening is important to differentiate, examine, and deal with patients at the preceding levels to preclude illness movement and vision misfortune. Teleglaucoma makes use of stereoscopic superior imaging to take visual pics, which can be transmitted electronically to a visual professional. The cause for current is to include writing to evaluate teleglaucoma, its indicative exactness, medicinal services framework advantages, and fee-viability.

E. Glaucoma detection from fundus images using MATLAB GUI

An inconvenient contamination in which harms of the optic nerve of eye's is simplest the glaucoma, which causes hopeless lack of vision. Glaucoma is wherein if treatment is get overdue, the man or woman can daze. Ordinarily glaucoma distinguishes when there's a variety in the liquid inside the front of eye. At the factor whilst that additional liquid is expanded, the load in your eye is also getting extended. In like way, the dimensions of the optic plate and optic cup is expanded finally breadth likewise extended. The proportion of the cup and circle breadth is called cup-to-plate percentage (CDR). Limit kind department approach is applied in this framework for confining the optic circle and optic cup. Another area identity and oval becoming calculation are moreover applied. The proposed framework for optic plate and optic cup challenge and CDR computation is MATLAB GUI programming.

III. EXISTING SYSTEM

In this paper we present a computational instrument for programmed glaucoma revelation. We report updates for plate division in relationship with various arrangements with the composition, a novel procedure to parcel the cup by threshold and another measure between the size of the cup and the size of the circle.

A. Proposed System

Results have been acquired from numerous fundus photos in collaboration with the Centre of Prevention and Attention of Glaucoma in Bucaramanga, Colombia, wherein the extent of achievement of glaucoma identification become of 88.Five%.

Special Issue - 2019

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
NCISIOT - 2019 Conference Proceedings

B.   ALGORITHM : CNN Algorithm

Steps:

step 1	Load the Dataset
step 2	Perform Exploratory data analysis
step 3	Perform Data pre-processing
step 4	Building the model
step 5	Compiling the model takes three parameters: optimizer, loss and metrics.
step 6	Training the model
step 7	Find the summery of the model
step 8	Using our model to make predictions

IV.   CONCLUSION

The closeness of the cup in the plate is a steady pointer of glaucoma, a procedure to comprehend glaucoma changed into showed directly here by method for as it ought to recognize the region of the cup. The plate division changed into finished through thresholding, the vessel division changed into completed the process of using edge area, and for the cup office it was shown a methodology that uses the vessels and the cup powers. Future work stresses to get a more noteworthy dataset of fundus depictions to make a more prominent significant preliminary of the figuring. The vessels division requires an improvement because of a couple of failures in different pictures and waiting disturbance after the office. The utilization of convolutional neural structures is a touch of things to come works of art to improve the gathering.

REFERENCES

[1] A. Martinez-del-Rincon, J. Miller, and A. Azuara-Blanco, "Automatic Analysis of Digital Images for Glaucoma Detection", Proceedings of International Conference on Irish Machine Vision and Image, pp. 223-229, 2014.

[2] Anum Abdul Salam, M. Usman Akram, Kamran Wazir, Syed Muhammad Anwar and Muhammad Majid, "Autonomous Glaucoma Detection from Fundus Image using Cup to Disc Ration and Hybrid Features", Proceedings of IEEE International Symposium on Signal Processing and Information Technology, pp. 370-374, 2015.

[3] Debjit Bhowmik, K.P. Sampath Kumar, Lokesh Deb, Shravan Paswan and A.S. Dutta, "Glaucoma-A Eye Disorder Its Causes, Risk Factor, Prevention and Medication", The Pharma Innovation, Vol. 1, No. 1, pp. 66- 81, 2012.

[4] Jun Cheng, Fengshou Yin and Damon Wing Kee Wong, "Sparse Dissimilarity-Constrained Coding for Glaucoma Screening", IEEE Transactions on Biomedical Engineering, Vol. 62, No. 5, pp. 1359-1403, 2015.

[5] Jiwanpreet Kaur Virk, Mooninder Singh and Mandeep Singh, "Cup-to-Disk Ratio (CDR) Determination for Glaucoma Screening", Proceedings of 1 st International Conference on Next Generation Computing Technologies, pp. 504-507, 2015.

[6] Suman Sedai, Pallab K. Roy, Dwarikanath Mahapatra and Rahil Garnavi, "Segmentation of Optic Disc and Optic Cup in Retinal Fundus Images Using Shape Regression", Proceedings of 38th Annual International Conference of the IEEE Engineering in Medicine and Biology, pp. 3260-3264, 2016.

[7] Sobia Naz and Sheela N Rao, "Glaucoma Detection in Color Fundus Images Using cup to Disc Ratio", International Journal of Engineering and Science, Vol. 3, No. 6, pp. 51- 58, 2014.

[8] Maila Claro, Leonardo Santos, Wallinson Silva, Flavio Araujo and Nayara Moura "Automatic Glaucoma Detection based on Optic Disc Segmentation and Texture Feature Extraction", CLEI Electronic Journal, Vol. 19, No. 2, pp. 1- 10, 2016.

[9] P.Y. Shruti and A. Sharangouda, "Automatic Retina Feature Analysis for Glaucoma Detection using Cup to Disk Ratio Based on Morphology and Hough Circle Based Techniques", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 4, No. 6, pp. 163-166, 2015.

[10] Imran Qureshi, "Glaucoma Detection in Retinal Images Using Image Processing Techniques: A Survey", International Journal Advanced Networking and Applications, Vol. 7, No. 2, pp. 2705-2718, 2015.

[11] Andrea Giachetti, Lucia Ballerini and Emanuele Trucco, "Accurate and Reliable Segmentation of the Optic Disc in Digital Fundus Images", Journal of Medical Imaging, Vol. 1, No. 2, pp. 1-11, 2014.

[12] Georg Michelson, Joachim Hornegger, Simone Wärntges and Berthold Lausen, "The Papilla as Screening Parameter for Early Diagnosis of Glaucoma", Deutsches Arzteblatt International, Vol. 105, pp. 583-590, 2008.

[13] Rudiger Bock, Jorg Meier, Laszlo G. Nyul, Joachim Hornegger and Georg Michelson, "Glaucoma Risk index:Automated Glaucoma Detection from Colour Fundus Images", Medical Image Analysis, Vol. 14, No. 3, pp. 471- 481, 2010.

[14] Javeria Ayub, Jamil Ahmad, Jan Muhammad Lubna Aziz, Sara Ayub, Usman Akram and Imran Basit, "Glaucoma Detection through Optic Disc and Cup Segmentation using K-mean Clustering", Proceedings of International Conference on Computing, Electronic and Electrical Engineering, pp. 1-5, 2016.

[15] Thresiamma Devasia, Poulose Jacob and Tessamma Thomas, "Automatic Optic Disc Localization and Segmentation using Swarm Intelligence", World of Computer Science and Information Technology Journal, Vol. 5, No. 6, pp. 92-97, 2015.

[16] Chuang Wang, Djibril Kaba and Yongmin Li, "Level Set Segmentation of Optic Discs from Retinal Images", Journal of Medical and Bioengineering, Vol. 4, No. 3, pp. 1-8, 2015.

[17] Gopal Datt Joshi, Jayanthi Sivaswamy, and S.R. Krishnadas, "Optic Disk and Cup Segmentation from Monocular Colour Retinal Images for Glaucoma Assessment", IEEE Transactions on Medical Imaging, Vol. 30, No. 6, pp. 1-14, 2015.