G. Yashaswini SreeNeha, L. Rajani, B. Santosh

Abstract: Glaucoma is a autistic eye disease and major causes of firm blindness worldwide. For this we are trying to design a tool for early detection of glaucoma. In this paper glaucoma detection is based on the algorithm of retinal fundus images[1]. A supervised techniques for the detection of glaucoma is used. For the extraction of the features of the images we used PCA (principal component analysis). And for the classification support vectors are used. It shows mainly an artificial intelligent system for the segmentation of optic disk and cup. The accuracy of this model is comparatively much more greater than previously designed neural architectures.

Keywords: optic disk, cup ratio, svm, pca.

I. INTRODUCTION

Glaucoma is an eye ailment that harm the optic nerve. The wellbeing state of the human harms and gets visually impaired totally in the event that it increments. This harm is regularly brought about by high weight in the eye. Glaucoma is the main sources of visual deficiency for individuals beyond 60 years old. In the course of the most recent decade the pervasiveness of glaucoma has been accounted for by Vellore Eye review, Andhra Pradesh Eye Disease study, AravindComprehensice[1]. Eye Survey, Chennai Glaucoma Study, and west Bengal Glaucoma study.It is accounted for that while anybody has about 2.3% life time danger of glaucoma, first degree relatives (fdr) of glaucoma quiet have a ten times increment in danger of glaucoma. Along these lines, making FDRs mindful of the requirement for glaucoma examinations including assessment of optic nerve may spare visual impairment in huge number of individuals. As indicated by WHO 4.5 million individuals are visually impaired because of glaucoma. In India, glaucoma is the main source of irreversible visual impairment with at any rate 12 million influenced and about 1.2 million individuals dazzle from the malady. This is the reason we utilized svm classifier to realize precise infection rate[5]. The quantity of individuals with glaucoma is relied upon to ascend from 64 million to 76 million of every 2020 and 111 million in 2040.[2] and principally Africa and Asia are being influenced intensely with this glaucoma than the remainder of world. Glaucoma is a mind boggling illness which harms the optic nerve and prompts dynamic, irreversible vision misfortune. Glaucoma is the fundamental driver for visual impairment. Intraocular pressure which is pressure[15] when it expands, it can make harm the optic nerve, which transmits pictures to your mind. On the off chance that the glaucoma proceeds, it can prompt perpetual vision misfortune.

Many studies have been conducted to improve this glaucoma disease and reduce it in the worldwide based on extracting optic cup and disk ratio. Nazmul Alam Diptu used fuzzy logic[2] which is very most compatible decision making method and using fewer parameters into consideration. Andres Diaz used stochastic watershed transformation to analyse different color spaces by cup segmentation method. Mamtauneja used deep learning convolution network (g-net) to set 50 fundus images and achieved an accuracy of 95.8%. Fauzia Khan used novel technique which is implemented on 50 images and achieved an accuracy of 94%.

II. RELATED WORK

Informational index comprises of 20 pictures isolated into preparing pictures and testing pictures. Preparing pictures are furnished with ground facts for optic disc, optic cup and noting information. Testing pictures for which ground truth is likewise accessible for approval. These data sets are of age 40-80 years[3]. With almost at that age glaucoma severely occurs for people. The fundus images are extracted from the original image by eliminating non fundus mask region to obtain a accurate image. Optic disc is the anatomical location of the eye's blind spot, the area where the optic nerve and blood vessels enter the retina. The white cup is a pit with no nerve fibers.
As the glaucoma advances cup size increases till the disk. So that cup to disk (CDR) is calculated. From the CDR value, we have 3 cases. One is CDR value < 0.3, which concludes the image is from normal eye indicating no glaucoma. Second case is CDR value > 0.5[7], which concludes the image from glaucoma eye. Third case is CDR value >= 0.3 and <=0.5 is ambiguity case. In this case we are using Support Vector Machine (SVM) algorithm for the ambiguity cases. The tool we are using is MATLAB.

III. ALGORITHM
To localize and detect optic disk. To segment and extract the optic cup and optic disk. To find cup to disk ratio. To classify the images based on the features extracted using SVM classifier.

IV. METHODOLOGY
A. Cup Boundary
Normally, the yield of the level set based division will have unpredictable limits. We regularly realized that the limit of both cup and circle are looking like ellipse[12]. In oval fitting, we propose a streamlining issue that limits the mathematical separation between focuses that frames a circle curved structure based oval development for cup is done. Curved structure type oval development of the cup. The union is relies upon the underlying condition that has been picked. Along these lines, there requires a decent conjecture or strategy can be received for deciding the underlying parameter esteemed.

B. Disk Boundary
In optic cup boundary detection, the first step extracting the optic disk part which can done by using directional matched filter[8]. The optic cup boundary is detected by using Gaussian threshold method.

C. Smoothening
In next step, smoothening is done by using eclipse least square fitting method because the segmented regions are irregular in shape which is difficult to find the radius. Cup to Disk ratio (CDR) = radius of cup / radius of disk
Also, the evaluated coefficients parameter gives the ideal circle that has smooth limit and that will be utilized for the estimation of CDR esteem.

E. Feature Extraction
Rule Component Analysis (PCA) is the most widely recognized element extraction technique in information science. Actually, PCA finds the eigenvectors of a covariance grid with the most elevated eigen esteem and afterward utilizes those to extend the information into another subspace of equivalent or less dimensions[18]. After pre-handling steps, we get pre-prepared information pictures with size 256 x 256. These pictures are essentially 256 x 256 networks with standardized. Pixel esteems where lines compare to perceptions and segments relate to tests or information measurements.

The other primary favorable position of PCA is when distinguishing designs in the decreased information (or by lessening the quantity of measurement) the data misfortune is low.

- Subtract the mean
- Calculate the covariance grid
- Calculate the Eigen esteems and Eigen vectors of covariance lattice
- Choosing segments and framing a component vector.

F. SVM Classifier
A Support Vector Machine (SVM) is a classifier officially characterized by an isolating hyper plane. As it were, named preparing information (managed learning), the calculation yields an ideal hyper plane which arranges some new models[18]. In two dimensional space this hyper plane is a line partitioning a plane in two sections where in each class lay in either side. A characterization task for the most part includes isolating the information into preparing sets and testing sets. Each occurrence in the preparation set contains one indicated target esteem. We have utilized help vector machine (SVM) classifier, a managed learning model, for grouping typical eye fundus from glaucoma influenced eye fundus. The information picture lattices adjusted in the wake of applying pre-preparing procedures and PCA in the past advances fill in as test information[10]. SVM is intended to separate a lot of preparing pictures into two distinct classes, d-dimensional component space, and in [-1,+1], the class mark, with i=1..n. SVM constructs the ideal isolating hyper planes dependent on a portion work (K). All pictures, of which highlight vector lies on one side of the hyper plane, have a place with class -1 and the others are have a place with class +1[1].If the information of different classes can be isolated the direct SVM is utilized. In any case on the off chance that the information of the classes can't be isolated, at that point the non-straight SVM classifier is utilized.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>No of images</th>
<th>Glaucoma detected images</th>
<th>No of Glaucoma detected images</th>
<th>Missed detection</th>
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</thead>
<tbody>
<tr>
<td>Male subjects</td>
<td>19</td>
<td>8</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Female subjects</td>
<td>23</td>
<td>9</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Total subjects</td>
<td>42</td>
<td>17</td>
<td>22</td>
<td>3</td>
</tr>
</tbody>
</table>

V. RESULTS
Right now retina pictures are downloaded from databases like DRIONS DB, RIM ONE and STARK PROJECT to test the unusual and ordinary pictures.
Specificity - 94.28%
Sensitivity - 95%
Accuracy - 94.61%

VI. CONCLUSION
Our point is to build up a model which can group glaucomatous eye fundus pictures from sound eye fundus with high exactness. We have utilized Support Vector Machine classifier for this reason. Just a couple of moments of runtime are important for training the SVM classifier. Hence, the computational proficiency of SVM is incredible. SVM is beneficial as just a little preparing set is expected to give generally excellent outcomes in light of the fact that solitary the help vectors are of significance during preparing. Hence, SVM will in general perform superior to other managed learning technique.

A. Future Direction
In future, algorithm has to remove more noise from images without eliminating important features from the image and improve the accuracy in classification by testing with different algorithms

REFERENCES


AUTHORS PROFILE

G. yashaswini Sree Neha pursuing BTech, ECE department in KONERU LAKSHMAIAH EDUCATIONAL FOUNDATION. I am very interested in signal and image processing. With that I learned artificial intelligence and machine learning.

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