Automatic Cataract Detection of Optical Image using Histogram of Gradient

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Abstract - **Early detection of cataract is considered as an important solution to prevent the vision loss. An automatic detection of cataract is proposed in this work with the help of histogram of gradient algorithm. The main focus is to examine the optical images to detect whether an eye is healthy or affect with cataract.[1] Histogram of gradient makes the job easy as it directly identify the white layer present in an eye, which is responsible for cataract. The cataract identification is carried out with image processing as a tool in mat lab software.**

Key Words: Cataract Detection, Image processing, Pre-processing, Retinal disease.

1.INTRODUCTION

A Cataract is a clouding of lens in the eye that affects vision. Most of the cataract is related to aging. A Cataract can occur either in one or both the eyes. It don't spread from one eye to other. The cataract is an eye disorder, which is basically detected by looking at the lens of the human eye, automatically changes occurred in the lens due to the abnormality is one of the decision factors for the detection of cataract. Computer processing of a medical image such as optical eye image can provide us with objective measure of the symptoms of the cataract. Cataract is one of the common diseases which may causes sightlessness. Previous analysis shows that cataract occupies virtually five hundredth in severe visually impairments. Considering the fact that retinal image is one of the most important medical references that help to diagnose the cataract, this paper proposes to use a neural network classifier for automatic cataract detection based on the classification of retinal image. The classifier building procedure includes three parts pre-processing, feature extraction, and classifier construction. In the pre-processing part, an improved top-bottom hat transformation is proposed to enhance the contrast between the foreground and the object, and a trilateral filter is used to decrease the noise in the image. The classifier is constructed by back propagation (BP) neural network which has two layers. Based on the clearness degree of the retinal image, the patients' cataracts are classified into normal, mild, medium or severe ones.

1. SEGMENTATION

1 .1 Image acquisition:
Taking a photograph from iris is that the initial stage of iris primarily based recognition system. Success of different recognition stages is dependent on the standard of the photographs taken from iris throughout image acquisition stage, pictures accessible in CASIA info lack reflection in pupil and iris areas as a result of infrared was used for imaging. To boot if visible radiation is employed throughout imaging for those people whose iris is dark, a small distinction involves existence between iris and pupil that makes it arduous to separate these two areas.

2. PRE-PROCESSING

Pre-processing could be a common name for operations with pictures at all-time low level of the abstraction each input and output square measure intensity pictures. The aim of the pre-processing is an improvement of image knowledge that suppresses unwanted distortions or enhances some image options necessary for any process.

3. SEGMENTATION

Segmentation is the computer version, it's the method of digital image into multiple segments and its set of pixels, additional referred to as super pixels. The most purpose of segmentation stage is to localize the two iris boundaries specifically, inner boundary of iris-pupil and outer one among iris-sclera and to localize eyelids. Because it might be seen during this figure.
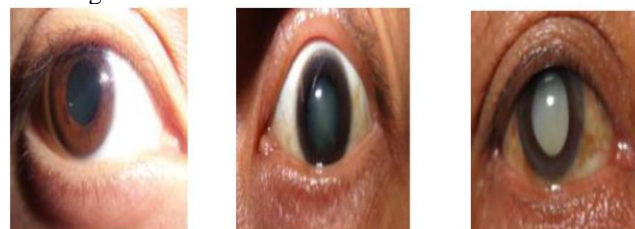
Data Images

Fig 1: (a) Normal (b) Cataract Imature   (c) Cataract Mature

4. FEATURE EXTRACTION:

A cataract condition consists of a whitish color that appears inside the pupil. This condition can be distinguished from normal condition that has not a whitish color inside the pupil, the feature extraction method uses statistical texture analysis from [2,3] will be distinguished normal and cataract condition affected by the exhibit of a whitish color inside the pupil. The feature extraction method that is proposed in this research uses GLCM (Gray Level Co-occurrence Matrix) method in getting the features. The second order of statistical texture uses GLCM to get the contrast, dissimilarity and uniformity as the features of eye image.

5. IMAGE-INTERVAL DATABASE:

Localization of boundary between eyelids and iris one will contemplate the boundary between eyelids and iris as 2 lines with initial order estimate. To localize them, once detection edges and by the utilization of linear Hough remodel, the properties of the road can be obtained. To do this, initially eyelids boundary should be detected by using of canny edge detection. There are only pupillary edge points between the two eyelids and since pupillary boundary has been already obtained, these points are eliminated. Few boundaries localized through this methodology for a few eye pictures. This methodology might end in a false outcome just for some pictures that have too several patterns in iris tissue once the sides of those patterns area unit detected by cagy edge detection.

6. SUPPORT VECTOR MACHINE:

A SVM classifier learns a separating hyper plane between two classes which maximizes the `margin' - the distance between the hyper plane and the nearest data point of each class. The appeal of SVMs is twofold. First they do not require any complex tuning of parameters, and second they exhibit a great ability to generalize give a small training corpora. They are particularly amenable for learning in high dimensional spaces. Appendix A gives a short description of these classifiers. A SVM with high capacity will classify all training samples correctly but will not be able to generalize well for testing samples. The only parameters needed to tune a SVM are the `capacity' and the choice of kernel. The capacity allows us to control how much tolerance for errors in the classification of training samples we allow and therefore the generalization ability of the SVM. Conversely, a very low capacity will produce a classifier that does not fit the data sufficiently accurately. It will allow many training and testing samples to be classified incorrectly.
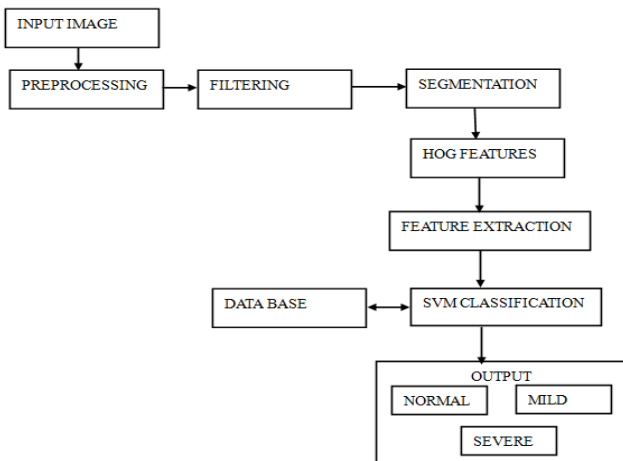
7. BLOCK DIAGRAM:

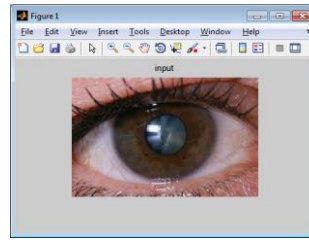Figure 2: Block Diagram of Cataract Detection
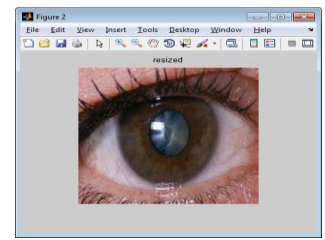
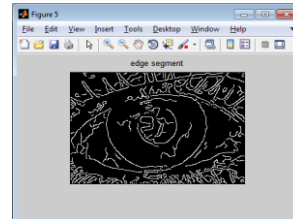## 8. RESULTS AND DISCUSSION:
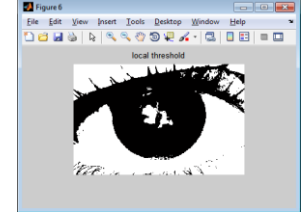

Fig 3: Input

Fig 3.1: Resized

Fig 3.3: Edge segment

Fig 3.4: Local threshold

9. EXPLANATION:

Cataract is clouding of the lens in the eye which is painless and developed gradually over a long period. Cataract is an eye disorder which occurs when some of protein at lens clumped together that makes it dull and increases opacity of the lens, causing some loss of vision. Most of the cataract is related to aging. A Cataract can occur in either or both eyes. It cannot spread from one eye to other. Cataract is an eye disorder, which is basically detected by looking at the lens of the human eye.[16] automatically changes occurred in the lens due to the abnormality is one of the decision factors for the detection of cataract. The early cataract detection in a non-common discussed topic for on-going research, considering that is one of the most common eye diseases, and is the leading cause of blindness globally. A Cataract is a clouding of lens in the eye that affects vision. Most of the cataract is related to aging. A Cataract can occur in either or both eyes. It cannot spread from one eye to other Medical images are a particular and significant type of non-text information.

10. CONCLUSIONS

From the obtained results it is clear that histogram of gradient provides better result in cataract detection as it directly identify the white layer responsible for cataract in an eye. It is less complexity and less time consuming when compared to exiting methods like support machine vector. This work can also further applied for traffic sign detection.

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