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A Technical Study on Sensitive Mirror Analyzer and Retina Tracker System Using Image Processing Technique

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ABSTRACT: The medical field requires precise and on-time diagnosis to preserve the lives of patients. Early detection is the key to preventing various diseases from spreading. Ideally, a mirror should be placed in front of the utilizer to read our health condition. It should also be able to identify our individual ocular perceiver's changes. The goal of this project is to develop a system that can detect the abnormal function of the eyes using a sensitive mirror. The system is designed to improve the accuracy of the data collected by the device.

KEYWORDS: Sensitive Mirror Analyzer and Retina Tracker (SMART) system, Image processing technique, Glaucoma disease, Ocular Perceiver Care (OPC).

I. INTRODUCTION

A conventional eye care system [1] is commonly utilized to improve the health outcomes of people with chronic diseases. Through a system known as SMART, it aims to detect and diagnose disease before it occurs. The objective of this study was to collect scientific evidence on the effectiveness of perspicacious mirror in terms of improving the management of chronic diseases and health information.With the development of continuous eye analyzers, it is hoped that they will enable individuals to actively participate in the care of their eyes. However, such devices should be designed to collect data that can be used for long-term monitoring. The astute mirror is a tool that can be utilized to study a person's health position over a period of time. This can help identify patterns of health disputes and provide recommendations on how to improve one's health.

Raspberry Pi is a type of electronic board that's commonly used to make various electronic devices [3]. It is typically housed inside a smallish device or laptop. SOCs are typically focused on developing perspicacious systems. They can be triggered by events that are not natural to a browser.This paper presents an overview of the various Image processing techniques that are used in the diagnosis and treatment of Glaucoma.

The concept of the SMART system position is to identify visual perceptions. When discussing the mirror geologies, the utilizer will be able to create a meeting with an eye master that's legitimate using the mirror geologies.These devices are used to collect and process physiological data. The main objective of these gadgets is to provide accurate readings and interpret the data.This paper aims to provide an investigation on the SMART system and its various components. It will also explain how it may be revised in the future.

A smart mirror is a device that has a screen that's behind it. It can be a tablet or a computer monitor. The Pi is a credit card-sized computer that runs Linux. Its community of developers make it a great alternative to other tech

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gadgets.Since the two-way mirror doesn't have a built-in touchscreen, it instead built an IR frame to allow the user to control the mirror with their finger. The Raspberry Pi camera module can now be used to identify the user through the face detection module.
The Wize Mirror is a device that aims to stimulate initial adoption and usage by helping people to develop new habits. The goal of the Wize Mirror is to provide continuous monitoring of eye health and to promote long-term wellness goals.

II. LITERATURE SURVEY

This specific examination investigates the degree and occupation of self-noticing and diagnostic self-estimations in the investigation locale.

Colantonio et al., [4] offered the canny mirror was a phase of the evaluation of the cardio-metabolic danger posed by facial records. It was focused on the analysis of the data collection and the movement of utilized bearing toward way of life change.
Biljana et al., [5] expected model with apperception check and position problems.Sethukkarasi, et al., [6] the concept of the perspicacious mirror was clarified. It shows that the mirror utilizes apperception system to make it look like a person has a lot of assets and is getting taller.
Derrick et al., in their Smart Reflect programming stage, presented their ideas and strategies for developing perspicacious mirror applications.

Amir et al., [8] proposed mishandle Haze Processing in an IoT system by making a geo-coursed layer of keenness between cloud and human administrations. Divyashree et al., [9] made that time withal magnificent and reinforcement to the individuals utilizing the mirror.

Kumar et al., [10] talked about various physiological conditions that can be utilized with the Raspberry Pi 3 board. Rok et al., [11] presented a proof-of-concept web-predicated data system that allows users to access hypothetically sensitive data.

Riccco et al., [12] approached for detecting reach visual perceiver images is based on a faint scale gathering, which is performed after a fitting contrast has been computed.

Miotto et al. [13] examined the likely employments of a perspicacious mirror for constitution care and how it can help customers in various clinical scenarios. They also talked about the advantages of the Internet of Things for people.

Through literature review, this procedure alters the image's pre-planning estimations to improve its image's upgrade area probability. It does so by surveying the area of the pixel through real data collected by its neighbors. The planning stage is the first step in the development of the code. The second stage is the testing stage. It addresses the topographies of the image.

III. TECHNICAL STUDY

A divider will be utilized as a single sided mirror to make utilization of the data presented by the individual. This assessment will give a rundown of the development of the helpful visual perception care (OPC) procedure and how it might be revised with the help of various advancements.
In the writing study, the main point of this study was to introduce the concept of the Internet of Things, which is a framework that enables various devices to work together to gather data about a person. The main component of this system is the remote sensor hub [14].

The concept of the Internet of Things (IoT) has gained widespread acceptance due to its ability to monitor a variety of conditions, such as a patient.The combination of the Internet of Things and electrical eye care systems can help improve the efficiency and minimize the cost of delivering eye care. This paper aims to introduce the concept of inter-operability and the ability to collect valuable information from the human body.

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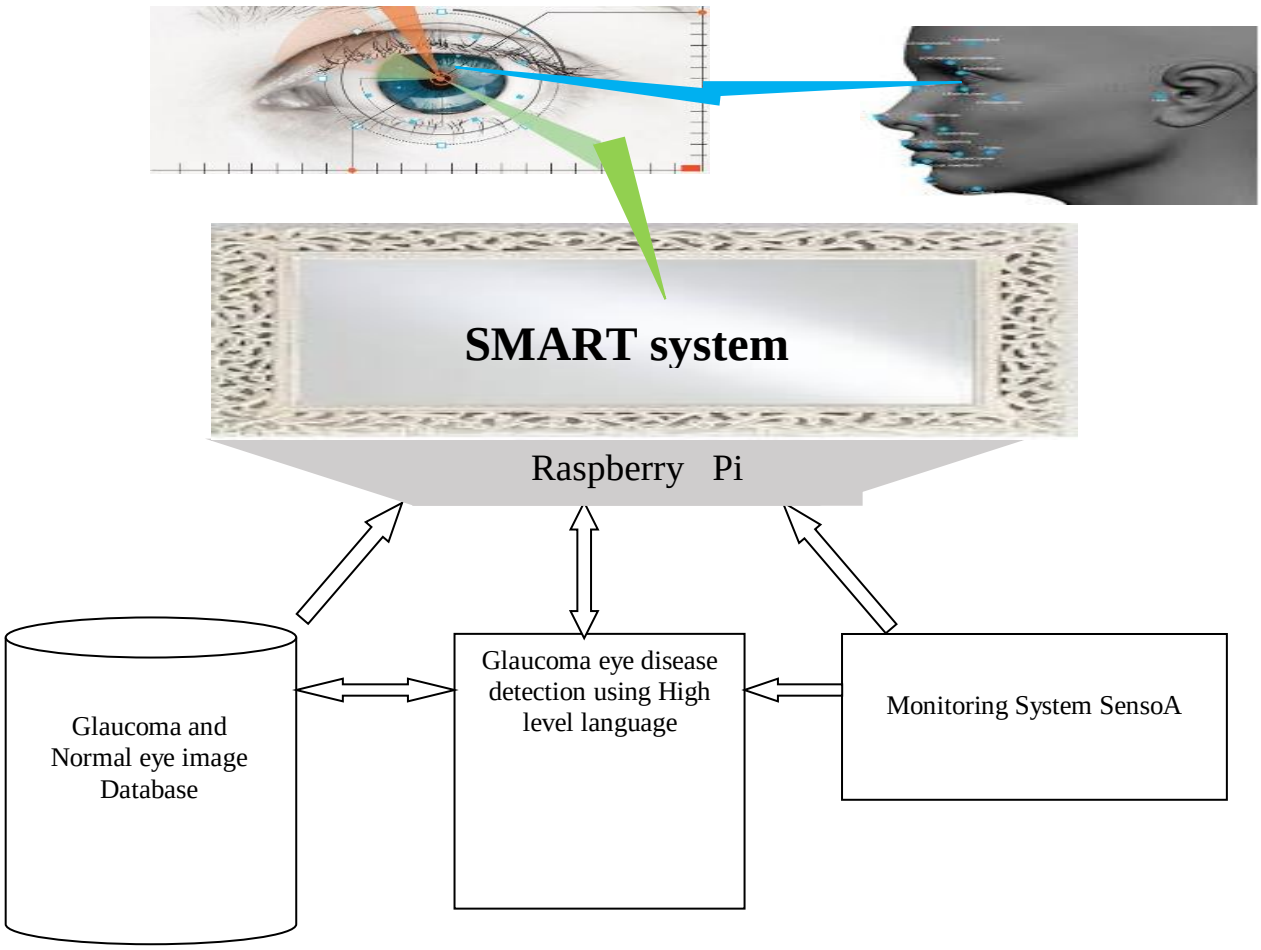

Fig 1. General Framework for SMART system

This contrivances proposes a way to convey the quantified data of physiological measurements through a communications platform. As sensors are equipped with low-power capabilities, controlling their energy needs becomes a major challenge. This paper proposes an effective way to address this issue through the use of a SMART system.A clinical mirror helps people follow their distinction in eyes. It does so by capturing an optical sign that's reflected in their eyes. This article breaks down and distinguishes microscopic deviations in the ideal representation of visual perception. These components could be utilized to help with the tending to difficulties in OPC. A mirror could be utilized to record and evaluate changes in the eyes, just as offer criticism for performing restorative activities.

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S. No	Proposed Image Processing Approach	Year	Developed By	Purpose of Development
1	Semi Supervised - Deep Convolutional Generative Adversarial Networks (SS-DCGAN)	2018	Yanwu Xu et al.,[22]	A glaucoma synthesizer could be used to generate an illuminate number of cropped images with dataset for patients with catatonic glaucoma.
2	Support Vector Machine(SVM) classifier and Level set algorithm	2018	Apurv Joshi et.al., [23]	Glaucoma can be identified spontaneously using retinal fundus images.
3	Generic algorithm and Simple Linear Iterative Clustering (SLIC) superpixel algorithm	2018	Y. Zhao et al., [24]	The approach for the detection of lesions with unusual features is proposed.
4	Mask R-CNN (Region based Convolutional Neural Network)	2019	Jie Xue et al.,[25]	Developed an automatic and complex multi-channel segmentation method for a dynamic membrane system.
5	Deep Learning Interpretable Classifier and fully Convolutional Neural Network	2019	Jordi et.al., [26]	Exploit the properties of high local pixel correlations in images.

Table I .Image Processing Techniques for Review

IV. COMPARATIVE RESULTS

This section aims to present the various picture preparing techniques that are offered in the market. The exhibition includes datasets and outcomes that are related to the techniques.

4.1Semi Supervised Deep Convolutional Generative Adversarial Networks (SS-DCGAN):
The strategy was prepared by means of eighty six thousands of edited retinal images. The GAN auxiliary structure was utilized to study the technique.The SS-DCGAN model was utilized to discover glaucoma. It is a procedure that could be utilized for PC profited glaucoma discovering.

4.2. SVM classifier and Level set algorithm:
On the basis of the level set method, the overlay score of OD separating was obtained as 78.57%.Using SVM classifier, transfer was simulated.

4.3. Deep Learning algorithm:
The development of deep learning algorithms was performed in two test datasets: one in-house and one external. The receiver operating characteristic curve ranges were computed with the 95% sureness intervals indicated by the Clopper Pearson method.

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4.4. Mask R-CNN:
Mask R435 is a Convolutional Neural Network that is utilized in the pixel-erudite divisions of Micro Aneurysms and Hard Exudates. The normal technique for AUC is 6.7%.

4.5. Deep Learning Interpretable Classifier and fully CNN:
The process of separating the optic plate using MESSIDOR dataset was performed. The procedure was carried out with a level set method. After performing surface examination using a neighbourhood parallel example, it was transferred using SVM classifier.

V. COMPARISON OF ACCURACY

This section covers the various steps involved in the processing of images. The procedures are presented in the following table 2.The exactness result of the assignment is analyzed based on the various techniques presented in Figure 2.

Performance of image processing approach		
S. No	**Algorithms**	**Accuracy**
1	SS-DCGAN algorithm	90.17%
2	SVM classifier and Level set algorithm	78.57%
3	Deep learning algorithm	95.00%
4	Mask R-CNN algorithm	96.70%
5	Deep Learning Interpretable Classifier and fully Convolutional Neural Network	91.00%

Table 2. Comparison of Accuracy for Messidor Dataset

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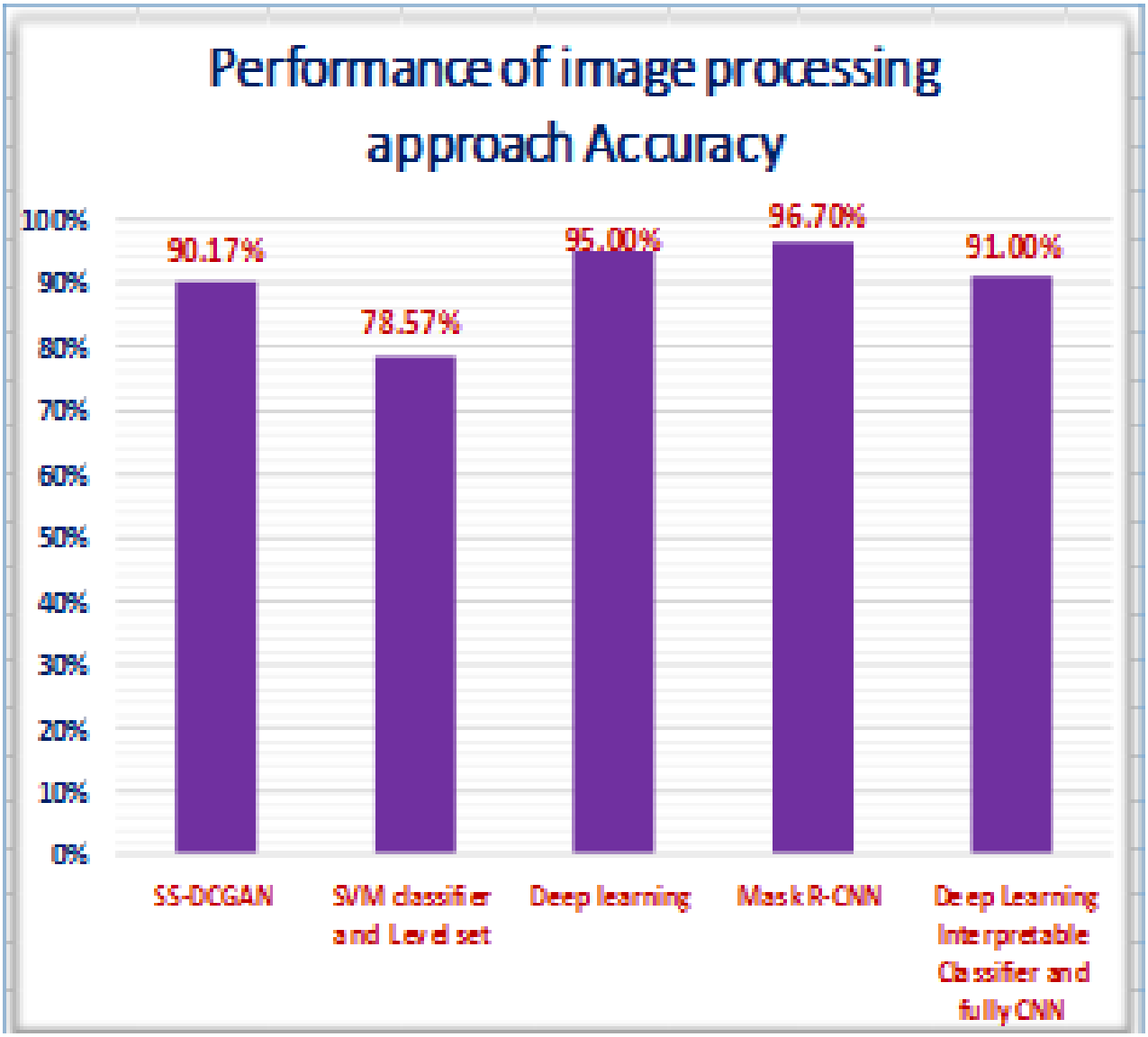

Fig. 2. Classification Accuracy of Image Processing

The smart system is switched on. It scans the environment. Then it focus on Eyelid. Next it checks for blink rate which is compared with healthy and Glaucoma image data base. If it is healthy there is no problem, else it Focus on Sclera Feature. Here optic nerve area (ONH) image is evaluated. If it is normal there is minor problem, else Intra Ocular Pressure (IOP) is evaluated. If IOP is normal then there is other issues, else the eyes are affected by Glaucoma shows in figure 3.

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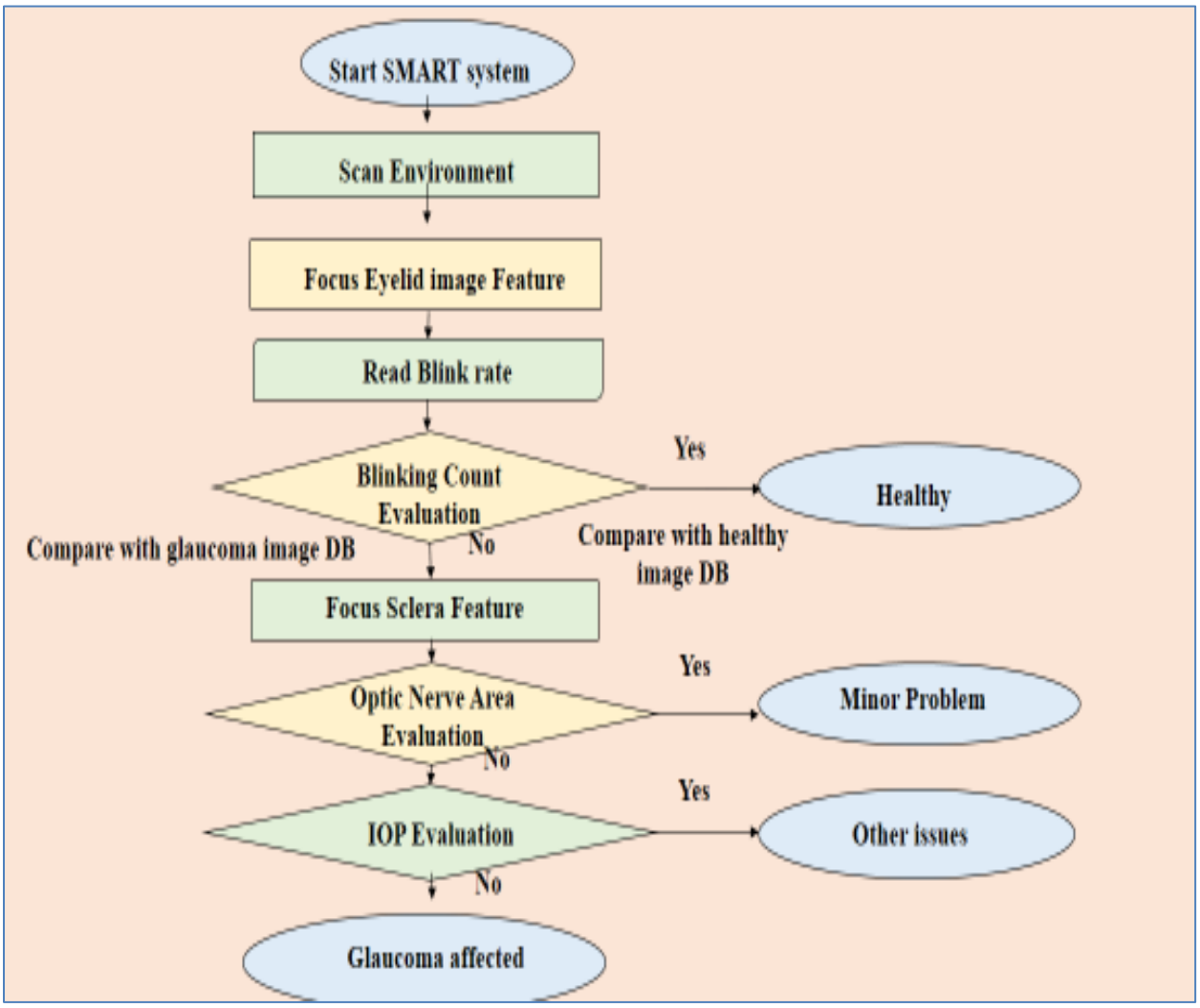
Fig 3. Flowchart for overall SMART system process



We look at the mirror every day to see where we are in terms of our physical view. Imagine if this mirror scans our eyes and gives us an idea of how healthy they are. This is the main goal of our research, which is developing an algorithm that will allow us to monitor our eyes. Viewing our reflection in the mirror may no longer be limited to just looking at our clothes. It could also be used to improve our health shows in figure 4.The green, red rectangle box indicates right and left eye.

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Fig 4. Sample Real-time Sensitive Mirror Analyzer and Retina Tracker System

VI. CONCLUSION

Convolutional Neural Networks and Profound Learning calculation can help minimize effort cameras to achieve picture procurement exhibitions that are commensurably done at home. The SMART framework is a set of tools that can be utilized to collect information from various sources in the home. It can be utilized to gather details about the observed individual condition, their physical make-up, and the choices that they make in the home. The framework should have the option to allow people to make their own decisions regarding an issue, and should limit the expense associated with human contribution.

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BIOGRAPHY

Mrs. S.Sathiya Priya[1] is a teacher who got her master's degree in 2010 from Tamil Nadu Teacher's University. She also got her B.Ed. degree in Computer Science from the same university.She is currently pursuing a Ph.D., in Image Processing. Her research interests include the study of image processing and artificial intelligence.

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