IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 21, Issue 6, Ser. I (Nov - Dec 2019), PP 66-73
www.iosrjournals.org

Iridology Diagnostic Support System Using the Laplacian Filter Method

[1]Reksa Anugrah, [2]Winanti
Information System Departement, STMIK Insan Pembangunan, Tangerang, Indonesia 15810

Abstract: *Nowadays the use of traditional Iridology diagnostics is increasingly in demand, partly because of the high cost of conventional medicine. Iridology is a low-cost alternative diagnosis for estimating human health conditions through diagnosis of iris. Some researchers have developed iridology applications on PC-type computers to replace their manual methods, and others have developed iridology on smartphones, but have not yet led to specific detection of image masking for iridology that requires further observation. Health diagnosis system which is done by using iridology with sharpening method with Laplacian Filter is the solution. The proposed system uses Image Segmentation to detect certain areas of the digital iris image, in this study four iridological image models will be tested namely: alkalosis, acidosis, reflex syndrome and venous congestion.*

Keywords: *Laplacian Filter, Sharpening, Iridology, Natural Medicine, Image Segmentation*

Date of Submission: 10-12-2019 Date of Acceptance: 25-12-2019

I. Introduction

The spectacular development of biometric technological innovations, such as the introduction of the iris, is useful for new things such as tracking people or drugs. Because of its distinctive texture, color, accuracy, and simplicity compared to other biometric methods, iris has received much attention in recent years. Analysis of a person's iris can reveal information about an imbalance in the health of organs in his body. An alternative treatment method that uses an iris diagnosis, known in the literature as iridology. Iridologists look at the eyes and iris, which is a 'window' to see the health condition of the human body [6]. One useful tool for iridologists is iridology charts. Iridology charts, dividing the iris into several zones / segments, each zone / segment associated with an internal organ or system of the body. [7]

The iris surface texture area, which provides useful information, can be revealed using computer texture and color analysis. Some researchers have developed iridology applications on PC computers to replace their manual methods, and others have developed iridology on smartphones, but the diagnosis of iridology on specific images, which require high accuracy, is still difficult to be computerized..

The author proposes an Iridology Diagnosis Support System using the Laplacian filter method to help therapists approach a disease. The proposed system uses Image Segmentation to detect certain areas of the digital iris image, in this study four iridological image models will be tested namely: alkalosis, acidosis, reflex syndrome and venous congestion. With this method we can find data patterns and also make data compression by lowering dimensions without losing much information. The Laplacian Filter method is a masking model, image sharpening, which will be tested for an iridology image model.

II. Iridology For Natural Treatment

Radiology equipment is used as a standard medical tool to check a person's health condition through images of internal organs, such as ultrasonography (kidney, spleen, pancreas, cavity, muscles, and uterus), CT scan (brain, lungs, liver, cardiovascular, and stomach) and MRI (backbone of the brain and joints). The device used certainly costs a lot. There is an alternative method for detecting the functionality of internal organ disorders, called iridology. This method studies several markings on the iris structure of the eye as a reflection of various body organs and systems [8]. Some European countries such as Germany, Switzerland, and Sweden have known Iridology for a long time and more than 80 percent of Heilpractic (non-medical health practitioners) practice this method. The history of iridology began in 1800 when the Hungarian doctor, Dr. Ignatz observed changes in the iris of some patients who recovered from the disease. Then he became the first person to create the Iris Chart. Dr. Bernard Jensen revised the chart/diagram which was then used internationally. According to Iridology, certain regions of our iris represent the condition of certain organs. All specific areas are mapped on the Iris Chart [4].

Figure 1. *Iris Chart* [4]

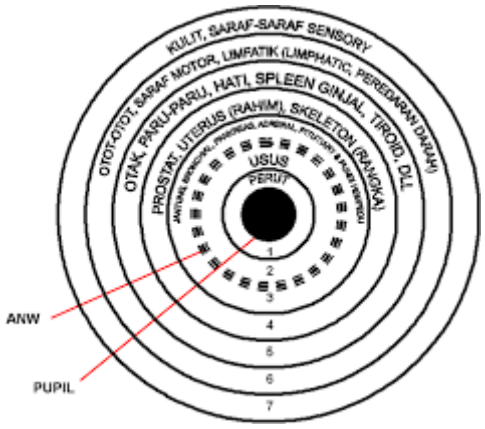

Figure 2. Diagram Iridologi [9]

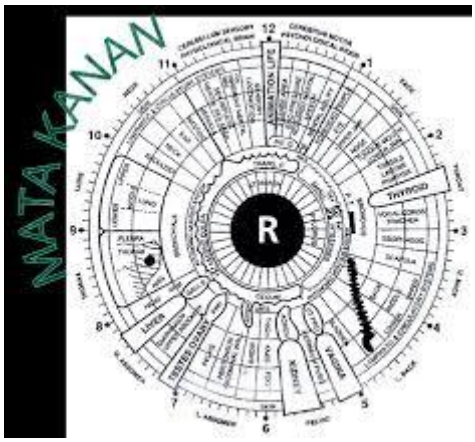

Figure 3. right side*Iris Chart* [4]

In addition, based on clockwise rotation in the iridology diagram above, iridology also has several forms of image models, the following are used in this study to be tested in 4 iridological image models namely: alkalosis, acidosis, reflex syndrome and venous congestion[9].

A. Alkalosis (Under Acid Stomach Ring)

It looks rather dark in the first zone of the iris, the stomach. Occurs when a little stomach acid. Lack of stomach acid and protein are not digested properly. The darker the less acidic and the less active the stomach. Symptoms that often arise due to alkalosis are no appetite, angina problems, do not want to eat.

B. Asidosis (Over Acid Stomach Ring)

Visible whitish / yellowish rings on brown eyes. This shows the condition of excess stomach acid. The main cause is stress on someone. Symptoms arising from acidosis are heartburn, desire to vomit or belch, acid and esophageal gas, gastritis.

C. Sindrom Reflex AtauLekukanNeurogenetik (Butterfly)

The condition of closed wounds on the inside and outside of ANW (AUTONOMIC NERVE WREATH) sometimes resembles a butterfly. Indicates a chronic (severe) state. The toxin content collected forces certain

organs that are shown to be continuously decreasing. Is a reflection of the relationship between the intestinal area that is poisoned and related organs.

D. Venous Congestion

Blockage of veins, shown by the circumference of the bluish color belt on the edge of the iris (circumference of the topographic zone no.6). Indications of irregularities in blood circulation, blood flowing with little oxygen causes chronic oxygen deprivation. The main cause is anemia and lack of exercise. The condition is worsened in old age where there are a lot of plaque on the walls of the vein which interfere with the smooth flow of blood.

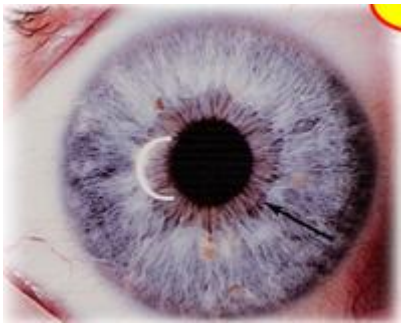

Figure 4. Example of Iris for Natural Treatment Alkalosis from HPA, Malaysia [9]

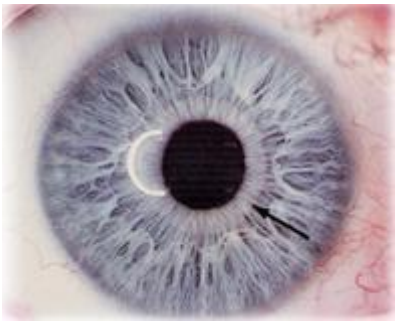

Figure 5. Example of Iris for Natural Treatment Acidosis from HPA, Malaysia [9]

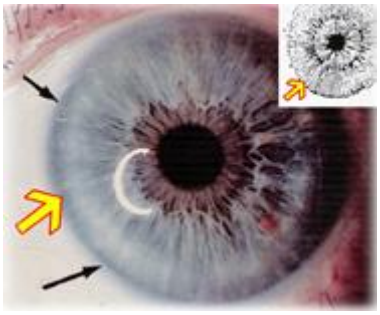

Figure 6. Example of Iris for Venous Congestion Natural Treatment from HPA, Malaysia [9]

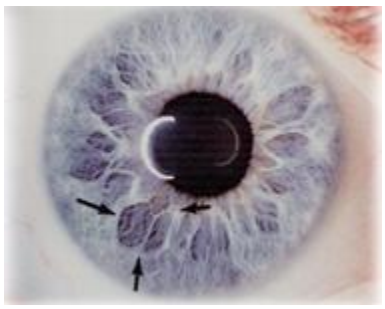

Figure 7. Example of Iris for Natural Treatment Reflex Syndrome from HPA, Malaysia [9]

III. Application Design

In this case the image sharpening is done which aims to highlight the good details of the image as well as to improve the blurred details due to natural effects when taking the image [17].
Sharpening RGB images can use Laplacian filters. To sharpen the image you can use the Laplacian filter mask [18] :

1 1 1
1 -8 1
1 1 1

With Laplacian Filters tend to produce images that highlight edges or details that are not continuous [17].
Edge detection and image sharpening, included in the category of neighboring processing (neighborhood processing), as the development of point processing, where a function can be applied to neighbors or around each pixel. The idea is to move a 'mask': a rectangle or square (usually of odd lengths). The combination of mask and function is called a filter[15].

A. Mask Processing

If at point processing we only perform operations on each pixel, then in mask processing we do operations on a neighbor window in the image. Then we apply (convolve) a mask to the window. Mask is often also called a filter. The use of spatial masks for image processing is called spatial filtering and these masks are called spatial filters. An example of the 3x3 neighbor window can be seen below. The pixel value at position x is affected by the value of its 8 neighbors.

1	2	3
8	X	4
7	6	5

The difference with point processing is in point processing, the value of a pixel is not influenced by the value of its neighbors.The following is an example of a 3x3 mask / filter. This filter will be applied / convolved in each 3x3 neighbor window in the image (assuming the filter is in reverse). [17]

W1	W2	W3
W4	W5	W6
W7	W8	W9

G11	G12	G13	G14	G15
G21	G22	G23	G24	G25
G31	G32	G33	G34	G35
G41	G42	G43	G44	G45
G51	G52	G53	G54	G55

G22’ = w1 G11 + w2 G12 + w3 G13 + w4 G21 + w5 G22 + w6 G23 + w7 G31 + w8 G32 + w9 G33

B. Sharpening Filter

The principle in sharpening is to highlight (highlight) the intensity of the image.The use of image sharpening is diverse, including applications ranging from electronic printing and medical imagery to industrial inspections and automated instructions in military systems.
The derivative of digital functions is defined by the terms differences. There are various ways to define differences. The definitions used in the first instance are:

1. Harusmenjadinol pada insentitas yang konstan
2. Harusmenjaditidaknol pada titikdatangnyaintensitas *step* (naik) dan *ramp* (turun).
3. Harusmenjaditidaknol pada daerahsepanjang*ramp.*

While the definition used in the second derivative is:

1. Must be zero at a constant incidence
2. Must be nonzero at the point of arrival of the step (up) and ramp (down).
3. Must maintain zero in the area along the ramp.[18]

Figure 8. Iris camera for image capture

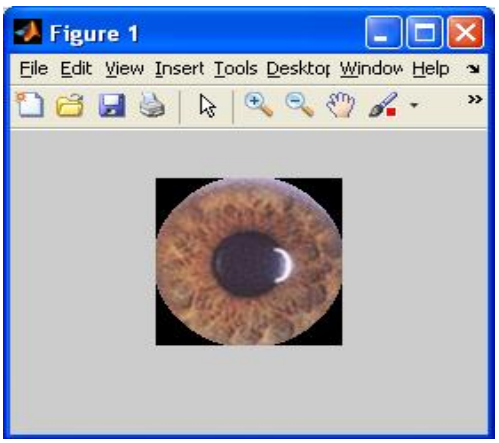

Figure 9. Initial image capture.

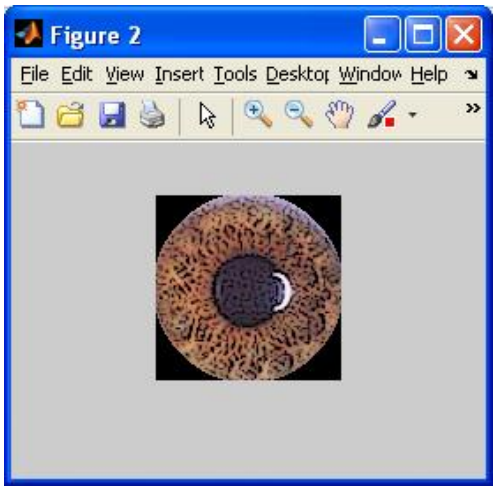

Figure 10. Image Sharpening Results.

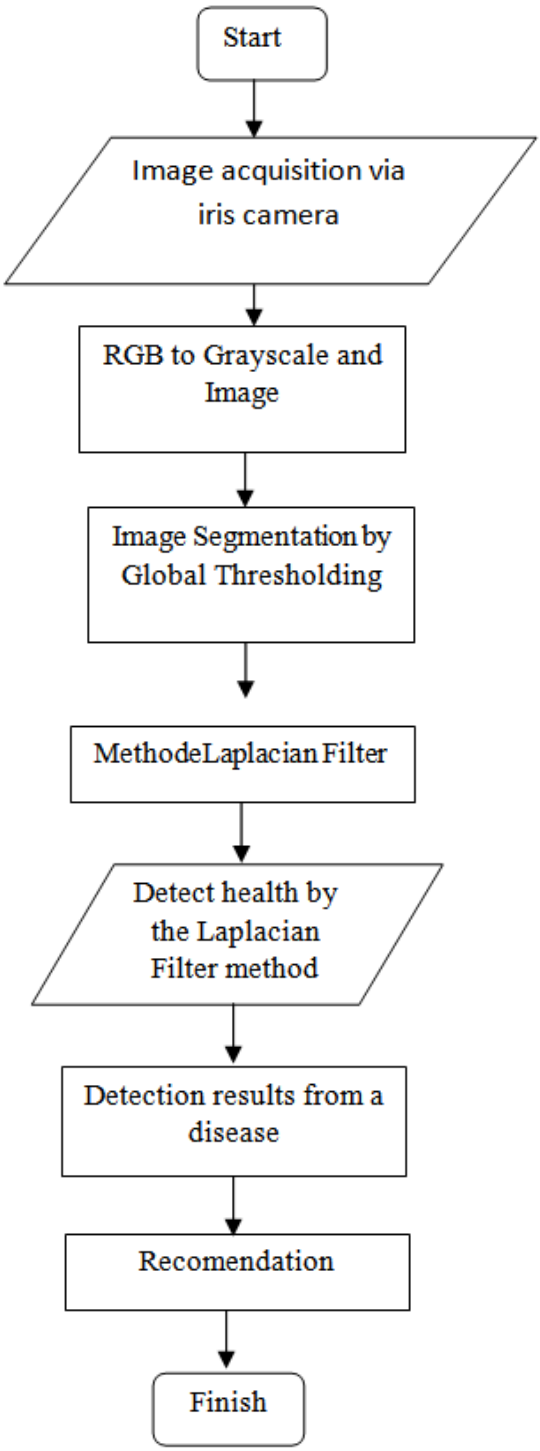

Figure 11. Application design diagram

In this case the author uses several threshold values to determine which is the best. The hole shows the weakness of the body pointed by clockwise on the graph. The idea of this research is to assume the hole or wound is a dark (black) area after the pupil.

Thresholding is an image processing technique where the input image (grayscale) is requested to the two gray levels, which are converted to binary images. Each pixel in the original image is compared to a threshold.The results of the comparison will determine whether the pixel will be converted to black or white. The simplest thresholding algorithm (global thresholding, im2bw in MATLAB) uses one value for the whole image [13]

Determination of the edges of an object in an image is one of the earliest and most investigated areas of digital image processing. This process is often placed as the first step in the application of image segmentation, which aims to recognize the objects contained in the image or the overall image context..

IV. Experimental Results

The proposed system was developed using Matlab, Technical Computing Language. As input, the system will receive a pair of images containing the left and right eyes. The results are presented as a means of health detection and natural medicine. To run this application, users must enter eye images to be analyzed. There are two ways, taking pictures of the eyes directly using the mobile device's camera or taking image files that have been stored in memory.

The results of the experiment part 1:

This is done by converting RGB to Grayscale, Grayscale images whose values are 0-255 are converted to binary images with threshold values, values close to black (0), black (0), which are close to white (255) to white (1).

Table I. Accuracy Of Results Part 1 (Alkalosis) Compared To Iridological Examination

No.	Experimental Result	
	Alkalosis	
	Threshold	*Accuracy (%)*
1.	0.10	85
2.	0.09	90
3.	0.08	95
4.	0.07	90
5.	0.06	80
6.	0.05	70

Source: data and experiments that have been processed

The mathematical model the global thresholding is defined:

$$g(x,y) = \begin{cases} 1 & if\ f(x,y) \geq T \\ 0 & if\ f(x,y) < T \end{cases}$$

g (x, y) is the output image of a binary image, f (x, y) is an input image in the form of a grayscale image. T is the threshold value. If T is constant, this approach is called global thresholding. [13]

Table 2. Accuracy Of Results Part 2 (Asidosis) Compared To Iridological Examination

No.	Experimental Result	
	Asidosis	
	Threshold	*Accuracy (%)*
1.	0.10	80
2.	0.09	90
3.	0.08	95
4.	0.07	90
5.	0.06	80
6.	0.05	75

Source: data and experiments that have been processed

Table 3. Accuracy Results Part 3 (Venous Congestion) Compared To Iridology Examination

No.	Experimental Result	
	Venous Congestion	
	Threshold	*Accuracy (%)*
1.	0.10	80
2.	0.09	85
3.	0.08	90
4.	0.07	95
5.	0.06	80
6.	0.05	70

Source: data and experiments that have been processed

Table 4. Accuracy Of Results Part 4 (Reflex Syndrome) Compared To Iridological Examination

No.	Experimental Result	
	Sindrom Reflex	
	Threshold	***Accuracy (%)***
1.	0.10	70
2.	0.09	80
3.	0.08	85
4.	0.07	95
5.	0.06	90
6.	0.05	80

Source: data and experiments that have been processed

Experimental results from acidosis show the accuracy of each threshold shows the lowest accuracyvalue of 70% and the highest value of 95% so that this methodis considered suitable for use as an alternative method in the health field

V. Conclusion

Medical diagnostic systems based on iris analysis (iridology) for natural medicine can be computerized. Iridology support systems that require advanced high accuracy can use the laplacian filter method at a threshold value of 0.08 for iridological images of alkalosis and acidosis, and a threshold value of 0.07 for good accuracy in the Iridology, Venous Congestion and Reflex Syndrome models. Can be applied to PC type computers, obviously can be applied to mobile devices, everywhere, and can be used for natural treatment solutions. The system can provide predictions with good accuracy. But there are still many problems with accuracy regarding the level of light in image capture, threshold values may be different for brightness levels in different environments. Therefore, the elaboration of this research to solve the problems mentioned above is needed to enrich the functionality of the Iridology application.

The hope of the authors in this experiment is that users can diagnose their health, prevent, treat with natural medicines that can be obtained easily anywhere, anytime (anywhere), without the need to see a doctor, hospitals for medical diagnosis also no longer need to go to the pharmacy to buy drugs synthetic chemistry.

References

[1] National Health Statistics Report 18: *Costs of Complementary and Alternative Medicine (CAM) and Frequency of Visits to CAM Practitioners: United States, 2007*. 15 pp. (PHS) 2009-1250. July 30, 2009. http://www.cdc.gov/NCHS/data/nhsr/nhsr018.pdf

[2] National Health Statistics Report 12: *Complementary and Alternative Medicine Use Among Adults and Children: United States, 2007*. 24 pp. (PHS) 2009-1250. December 10, 2008. http://www.cdc.gov/nchs/data/nhsr/nhsr012.pdf

[3] Holley AP, Gorawara-Bhat R, Dale W,Hemmerich J, Cox-Hayley D, PalliativeAccess Through Care at Home: experienceswith an urban, geriatric home palliative careprogram; J Am Geriatr Soc. 2009, 57(10):1925-31.

[4] David Habsara Hareva, "Implementation of Iridology Application on Smartphone," The Proceedings of The 7th ICTS, Bali, May 15th-16th, 2013 (ISSN: 9772338185001).

[5] Ridza Azri Ramlee, Khairul Azha and Ranjit Singh Sarban Singh (2011). "Detecting Cholesterol Presence with Iris Recognition Algorithm," Biometric Systems, Design and Applications, Mr Zahid Riaz (Ed.), ISBN: 978-953-307-542-6

[6] Bernard Jensen, Science and Practice of Iridology. 2005

[7] Adrianlodin, **"**Medical Diagnosis System based on Iris Analysis," Acta Technica Napocensis Electronics and Telecommunications Volume 50, Number 4, 2009

[8] Frank Navratil, "For Your Eyes Only: A Fascinating Look at the Art and Science of Iris Diagnosis, the Diagnostic Method of the New Millennium;" published by Frank Navratil, 2001.

[9] Tuan Haji Ismail bin Ahmad, "Panduan Intibah,"Institut Latihan Herba Al Wahida sdn.bhd, 2007.

[10] Joonyoung Jung, "Wireless Body Area Network in a Ubiquitous Healthcare System for Physiological Signal Monitoring and Health Consulting," International Journal of Signal Processing, Image Processing and Pattern Recognition.

[11] Abderrahim Bourouis," Ubiquitous Mobile Health Monitoring System for Elderly (UMHMSE)," International Journal of Computer Science & Information Technology (IJCSIT), Vol 3, No 3, June 2011

[12] Yvette E. Gelogo, "Unified Ubiquitous Healthcare System Architecture with Collaborative Model,"International Journal of Multimedia and Ubiquitous Engineering Vol. 8, No. 3, May, 2013

[13] Marques, Oge, *PracticalImage and Video Processing Using Matlab*, John Wiley & Sons, Inc, New Jersey, 2011

[14] Nazori AZ, *Komputasi Terapan Lanjutan*, Universitas Budi Luhur, Jakarta, 2014.

[15] Sianipar, *Matlab Untuk pemrosesan citra digital*, Informatika Bandung, 2015.

[16] Wijaya, *Pengolahan Citra Digital menggunakan Matlab image processing toolbox*, Informatika Bandung, 2017.

[17] Hermawati, *Pengolahan Citra Digital Konsep & Teori*, ANDI, 2013.

[18] Prasetyo, *Pengolahan Citra Digital dan Aplikasinya menggunakan Matlab*, ANDI 2011.

Reksa Anugrah. " Iridology Diagnostic Support System Using the Laplacian Filter Method." IOSR Journal of Computer Engineering (IOSR-JCE) 21.6 (2019): 66-73.