Image Processing Intelligent System Iris Eye Real-Time Compound Distribution Planning At Eye Center Sultan Agung Hospital

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Abstract—**By observing iris, someone's body condition can be known, such as his/her status is weak or strong, health stage, and the changes to illness or curing process. Therefore, a research is required to develop a computerized identification system for iris image in order that the condition of someone can be known. In this research, cholesterol excess that will be examine in the body which is identified by existing of white circle/sodium circle in iris. In this research, after the technician take the patient iris image, this information then saved to the database technician and transmitted to the doctor application program. The doctor application program, identify cholesterol excess based on iris image observation. The process stages are data acquisition, preprocessing, if needed, to reduce noise or control the image intensity, and feature extraction. The algorithm used for feature extraction is threshold which is continued with transformation to polar coordinates. The test is performed using Matlab 7.0 and mySql software. After passed several repeated test, a conclusion can be taken that is the program will recognize patient eyes which have cholesterol excess in his/her body if threshold of amount of post processing white pixel is more than 1000. If the threshold is less than 1000 will be identify have normality cholesterol.**

Keywords-intelligent system; realtime; system compound distribution; iridology; thresholding; polar coordinate

I. INTRODUCTION

Through the eyes, one can reveal all the events around him. Iris Specific advantages, which can Record the condition of all organs of the body, and Psychological conditions. Trace records related to the intensity levels or changes Diversion organs caused by disease were systematically recorded and plotted on the iris and surrounding areas. This can be a practical guide to conduct detection of various diseases, especially those that are latent / hidden, or cumulative. Such diseases are usually no symptoms of Specific.

Many scientists and doctors studied iridology shave, no repair revising and chart. Iridology is based on scientific observations. This is the kind of knowledge that can not be connected through scientific tests, because it does not provide clinical information. State of the art in Western medicine can not reveal all the answers either. It is difficult to test a scientific system to another when the two types of data to be provided. Iridology is the science and practice that reveals inflammation, where located and in what stage it manifests. There was revealed the body constitution, inherent weaknesses, health levels and transitions that occur in a person's body in accordance with the way he lived. Iridology is the science of analyzing the complex structure of the iris. Iris is a part of the eye that carries the color. Iris is the goddess of the rainbow in Greek mythology, he was also the messenger of the gods in the Iliad. Under magnification, the iris reveals itself to be world-minute details, many features of land. Iris represents a communication system capable of handling an amazing quantity of information. Code reveals itself in the character of the individual fiber slices. There is countless number of these fibers present. The combination of various fiber characters, make unlimited variety. Presently, as in the past, many primary care doctors who use this form of shear analysis along with other diagnostic techniques to facilitate a more complete understanding of their patients' health care needs.

To prevent cost (pitfall) that can occur in PDT, the strategy used iris data compound distributed processing. The goal is to create a framework where the distribution process can be expanded quickly by involving many users, with high application development productivity, and without danger in the PPT.

Pattern of organization often has multiple management patterns. Management pattern look at the diagram PDT.

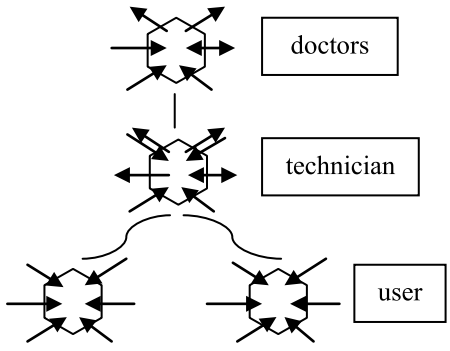

Figure 1. Software Architecture of Compound Distribution Planning at Eye Center Sultan Agung Hospital

In this research program will be created for real-time systems distributed compound. People have excess cholesterol in the body in the iris eyes. There is a white circle on the Blur outer layer. This circle is a circle of sodium.

A. Objectives

The purpose of this research is to create a diverse program distributed systems in real time to see the excess cholesterol on the basis of observations iris image.

B. Limitation Problem

Limitation problem in this research are:

1. Input level of the system is in the eye image RGB (Red, Green, Blue). Making processes, image processing and shots Used before not discussed in this study.
2. An image format of the original image of 24-bit color in Windows Bitmap Graphics format (extension *. bmp).
3. Using the image quality improvement only median filter and histogram equalization automatically.
4. Feature extraction techniques used are floating method (threshold) and the transformation into polar coordinates.
5. Selected forms of the eye are an adult form of the eye and captured iris is the eye iris People Indonesia.
6. The device used in this final task is Matlab 7.0
7. Type of image processing is used for gray level image.

C. Basic Theory of Iridologi

Iris is the most complex problems meeting the outside world body. This is an extension of the brain, which is owed this year by hundreds of thousands of nerve endings, microscopic blood vessels, muscle and other tissues. Iris is connected to every organ and tissue in a way the brain and nervous system. Then the fiber has received impulse by way of their connection to the optic nerve, optic thalami and spinal cord. They are formed embryologically from the mesoderm and neuroectoderm issues. Both sympathetic and nervous systems are in parasympathic slices. In this way, Nature has provided us with a miniature television screen showing the most remote parts of the body by way of nerve reflex responses. We found that the eye works in two ways, not only did it allow us to take pictures of the outside world in, it also shows a picture of what is inside out. Nerve fibers there is a response to changes in body tissue by the manifest is flex related physiology specific problem and location changes. Scientific explanation of exactly how this process works is still forth coming neurological disorders. Many studies were aimed at a clearer understanding of this phenomenon. In theme one time, we can rest with confidence in over 150 years of empirical data collected to find out that what we have learned to date is very accurate and reliable for most people is usually organized.

Iris reveals the individual strengths and weaknesses and what has been one to the body through incorrect living habits. This also reveals the magic that has a good live life in accordance with the laws of the universe.

Over the years, careful clinical observation of the environment has allowed us to uncover the mysterious language of the iris. Today we have a topographic map of iris that guides us very accurate over the surface. In this way, it is possible to "read" the network conditions associated with "whole" person being viewed. We see the "whole" body at once. Chart developed by Jensen Dr.Bernard Is the fruit of 50 years of research and intense study. Spent many years as an iridology student masters the past, he has brought to the ward and included aspects and details proved to be accurate verification un clinical practice.

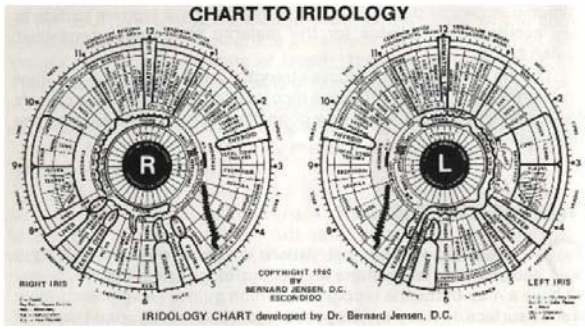

Figure 2. Chart Iridology by Dr. Bernard Jensen, DC

Each organ were identified and described very important so that they can be easily located, there are graphs representing the arrangement of a suitable location as that found un a normally organized body. You might find an exceptionally, realize that there are individual differences. Basically, the table represents the placement of organs and tissues as would a map. There are signs and existing features and next plain able known at this time. Utilizing transparent overlay graphics with the words removed, it is possible to project from the iris area. An image projected onto the screen. In this way, both are placed on the do each other. This procedure allows the analysis of individual slices, which is very accurate. By recording the main landmark, the thick line layout not he charter, the possibility to direct the grid to fit with individual differences. Observations obtained from a lot of time and cost of collecting empirical data has made the most accurate map of iris available. It is used by iridologists around the world and is a testament to the reliability.

TABLE I. INDICATIONS CHOLESTEROL LEVELS.

No	Measure of Colesterol (mmol)	Indication
1	***Less of 5***	***normal***
2	*6-7*	*middle*
3	*8-9*	*high*
4	*More then 9*	*very high*

Cholesterol is actually one component of fat. Cholesterol is a fat yellow and shaped like a candle that is produced by the liver organ. Cholesterol is found in

between fat flowing in the bloodstream and also in all the cells of our bodies. Cholesterol and fats can not dissolve in blood. To be able to drive into and out of cells, cholesterol and fats need to be carriers specifically called lipoproteins. Carrier to note is the Low-Density Lipoprotein (LDL) and High-Density Lipoprotein (HDL).

Sample identification based on the observed excess cholesterol iris image is shown in Figure 3.

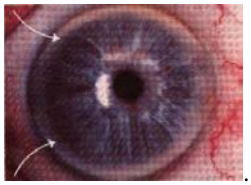

Figure 3. Photo of Iris Circle Sodium or Cholesterol

In Figure 3, can be seen a circle of sodium or cholesterol circle. Circles indicate sodium biochemistry imbalance in the body, associated with eating too much salt containing potassium and sodium salt. As a result, this an organs salt deposits formed in the blood and become precursor the plaque on blood vessels, joint disorders, incidence of cataracts on the eye cornea, as well as calcium metabolism disorders (affect the heart and blood pressure).

Cholesterol circle indicates the occurrence of health problems caused by excess cholesterol and triglycerides in the circulation system and its impact on other systems in the body.

D. Digital Image Processing

Digital image processing is a process that aims to manipulate and analyze images with the help of computers. Digital image processing can generally be categorized into two types of activities, namely:

1. Improve the quality of an image that can be more easily interpreted by the human eye.
2. Managing the information contained in an image for automatic object recognition.

In this study the identification process of the excess cholesterol based on the observation of this iris image, the stages of digital image processing carried out consist of:

1. image Acquisition
2. image enhancement
3. image segmentation and Feature extraction

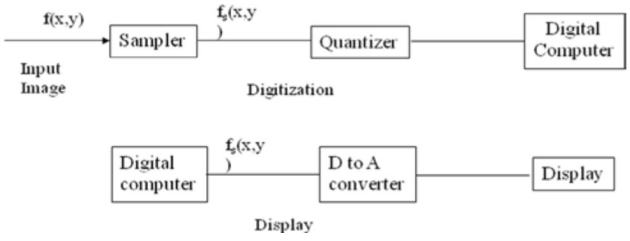

Figure 4. The Digital Image Processing.

Digital image can be obtained automatically from a digital image capture systems (digital image acquisition system or digitizer) such as digital cameras, camcorders, scanner, optical readers and so on, which made the exploration of image and form a matrix with element - elements declared value of light intensity at a discrete set of points. In figure.3 shown, digital image processing.

The histogram equalization technique is image quality (image enhancement) through modeling the histogram. Histogram equalization aims to obtain images with a uniform histogram of intensity values, the darkest point in the image reaches the black and the brightest point in the image reaches a brilliant white, so it can improve color contrast.

Segmentation of image aims to select and isolate an object and the whole image. In this study the use of segmentation which is the median filtering.

70	**70**	**63**	**23**
70	**70**	**63**	**23**
56	**56**	**55**	**75**
100	**100**	**102**	**105**

Figure 5. Example of a digital image matrix on the median filter process

Thresholds is the conversion from black and white image into a binary image is done by operating segments floating Operation gray degree value of each pixel into 2 classes, black and white. Contrast light distribution and darkness states in a picture. The image can be grouped into three categories of contrast, namely: the image of low contrast (low contrast), the image of good contrast (good contrast, or normal contrast), and high contrast images (high contrast, or normal contrast), and high contrast images (high contrast).

II. DESIGN AND IMPLEMENTATION

The identify software design the iris texture, which consists of the early processing stage, and feature extraction process with the floating and the transformation into polar coordinates. At the end of this task used the image file with the extension *.bmp. This is done with the consideration that with such specifications scanner obtained a clear image to be analyzed with the file size relatively small. In this design because it is used Matlab 7.0 functions are complete and easy in making graphical user interface (GUI). Broadly speaking, the software will be designed to have flow diagram, shown in figure.6.

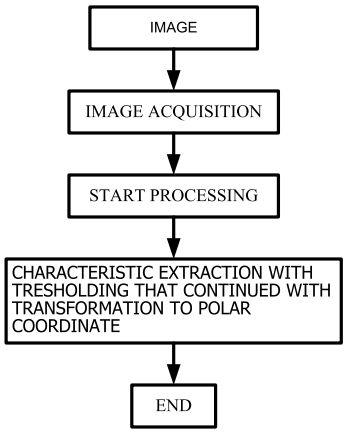

Figure 6. The main program flow chart iris identification process

Iris image used in this final task consists of the iris image of Indonesia. Iris image of Indonesia comes from the digital camera output in the format *. jpg extension, with size 640 × 480 pixels. The parts of the image is not used are eliminated with the help of software Adobe Photoshop 7.0 and stored in the form of colored images with the extension *. bmp format, with a size of 200 × 200 pixels.

Initial processing aims to cultivate an image in order to take the characteristics of the iris texture. At this stage expected to be obtained information from an optimal image. Initial processing stage in this final task consists of:

1) Reading Image Files. The first step is to design a reading of the image file will be processed in the extension *. bmp format.

2) Changing the image of gray levels. After reading the image file made, followed by changing the level of RGB image to gray level image.

3) Contrast image gray levels with Histogram equalization. Iris image is obtained directly from the image acquisition process can't be processed because the difference in color between the iris and the pupil is too small. This is especially true in the iris image of Asians, who generally brown or dark brown. This color is sometimes difficult to distinguish from the general pupil color is black. In this final task, the techniques use to improve the contrast of colors is with a histogram equalization, so that the image obtained with a uniform histogram of color intensity values at each level of gray level. So that later will increase the contrast of colors.

4) Median filter. Median filter is used to reduce the influence of noise on the image. In screening with the median filter, image gray level at each pixel is replaced with the median value of the pixel gray level under the guise of the default window filter size 3 x 3.

5) Floating (Thresholding). Floating is used to convert black and white image into binary image. Floating operations classify the degree of gray values of each pixel into 2 classes, namely black and white.

6) Image transformation to Polar Coordinates. The next process is to change the image of the iris into polar coordinates. Because of the circular shape, iris image database analyzed in polar coordinates. Figure.6 shows examples of slices that have been transformed into polar coordinates.

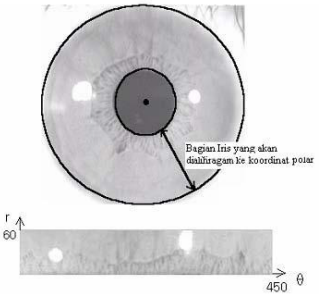

Figure 7. The transformation of the iris image into polar coordinates

In Figure 7, can be seen the distance between the inner circle and outer circle normalized on [0, 60] based on the radius r. With the angle θ of 0.8 ° at a distance of radius r, obtained 450 values. So from this process the image obtained with polar coordinates measuring 60 × 450 pixels. Image Transformation into polar coordinates is like changing the circle into a straight line, with the equation:

$$r2=(x-a)^2+(y-b)^2$$
$$x=r\cos\theta+a \quad (1)$$
$$y=\sin\theta+b$$

By: r = radius of the circle
θ = orientation angle
a = center of the circle in the coordinate x
b = center of the circle in the coordinates y

III. Research Results And Discussion

The results of research and discussion of the identification program based on the observed excess cholesterol iris image is shown in Figure.7. Before the acquired image of the output, input image processing through several processes, commonly referred to as image processing. Image processing consists of initial processing and feature extraction. In this feature extraction process, the input image in the form of iris image has been processed and will be recognized if the image has a slice of excess cholesterol or have normal cholesterol in the body.

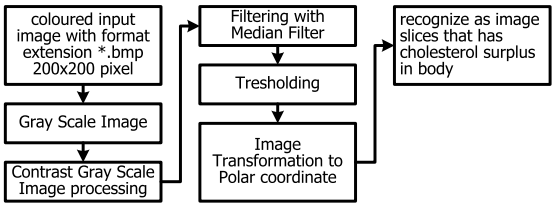

Figure 8. Diagram block

A. Normal / Ideal Condition

Inputting the image of the iris image, which consists of 10 images, each image has a pixel size, in shape and color images stored in the extension *.bmp format. Testing is done by taking the iris image of people who have excess cholesterol in the body. Ten iris images is composed of five iris who have excess cholesterol in the body and the iris five people who have normal cholesterol in the body. Figure.9 shows the test display to the normal input image 200x200.

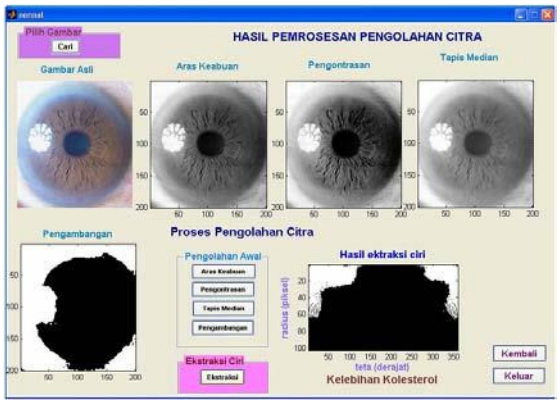

Figure 9. Display the test for the normal input image

From the results of this feature extraction can be known of the thick white circle is the circle of sodium in the eye. Circle of sodium is an indication of the health

problems caused by excess cholesterol in the circulatory system and its impact on other systems in the body.

Table.2 shows the results of the identification of excess cholesterol on the iris image. Obtained from Table.2 that the software works have been appropriate and reached 100%. This means that the results have been obtained in accordance with the theory of Iridologi. There is a possibility that the results of the introduction of the test results indicate differences using the software with testing with direct observation. This may be caused by several errors as follows:

Error cut the iris image. Before the processed iris image, iris image first cut using Adobe Photoshop 7.0. This aims to get the image of the iris image sesuai.Sebaiknya cut to the edge of the iris because it allows the software to recognize the input iris image. When the cutting is too out of the image, those cause false image of the iris recognition.

Capture iris image has to be right / appropriate. At the time of capture iris image, iris position to right in the center of the image (center). This allows the image of the iris to be analyzed and can be recognized. To obtain the appropriate results, as required iris image capture enough light.

Table.3 is an example of the introduction of the iris image that does not fit between the results with direct observe. From Table.3, can be seen that the input image of the iris image recognized by the software have excess cholesterol in the body. Whereas viewed directly iris image has normal cholesterol in the body. This is because when cut the image slices are too out of the iris image. Image of the iris should be cut to the edge of the iris.

TABLE II. RESULTS OF IDENTIFICATION TESTS BASED ON THE OBSERVED EXCESS CHOLESTEROL IRIS IMAGE.

Input Image	Testing		Explanation
	Based on Software	Based on direct observation	
	*Normal colesterol in body*	*Normal colesterol in body*	*appropriate*
	*surplus colesterol in body*	*surplus colesterol in body*	*appropriate*

TABLE III. EXAMPLES OF IRIS IMAGES THAT DO NOT FIT THE TEST RESULTS WITH DIRECT OBSERVATION.

Input Image	Testing		Explanation
	Based on Software	Based on direct observation	
	*surplus colesterol in body*	*Normal colesterol in body*	*appropriate*
	*surplus colesterol in body*	*Normal colesterol in body*	*appropriate*

B. *Image with Contrast Reduction*

The iris image input, which consists of 10 images of the iris with each having the size of pixels, in the form of colorful images and saved in *.bmp extension. 200x 200. The process of changing the contrast is done by shifting the image histogram with the default parameters from Matlab, namely:

low: 0.2, high: 0.5, bottom: 0.4, and top: 0.7.

Figure.9 shows the view of testing with the input image contrasting dark.

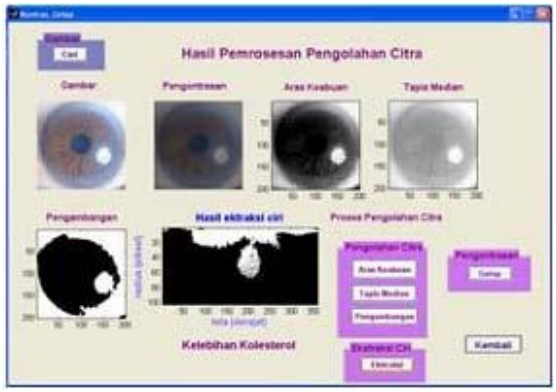

Figure 10. Display the test with the input image contrasting dark

From Figure.10, feature extraction results obtained in accordance with the medical examination cholesterol. Test result for the reduced image contrast is shown in Table 4.

TABLE IV. THE RESULTS OF TESTING THE SOFTWARE WITH THE IRIS IMAGE CONTRAST IS REDUCED.

Original Image	Image after contrast reduction	Testing		Explanation
		Based on Software	Based on direct observation	
		*Normal colesterol in body*	*Normal colesterol in body*	*appropriate*
		*surplus colesterol in body*	*surplus colesterol in body*	*appropriate*

C. *The addition of Contrast Image*

The iris image input, which consists of 10 images of the iris with each having the size of pixels, in the form of colorful images and saved in *.bmp extension. The process of changing the contrast is done by shifting the image histogram with the default parameters from Matlab, namely: 200x 200. Low: 0.3, high: 0.6, bottom: 0 and top: 1. Figure 11 shows the view of testing with the input image contrast light.

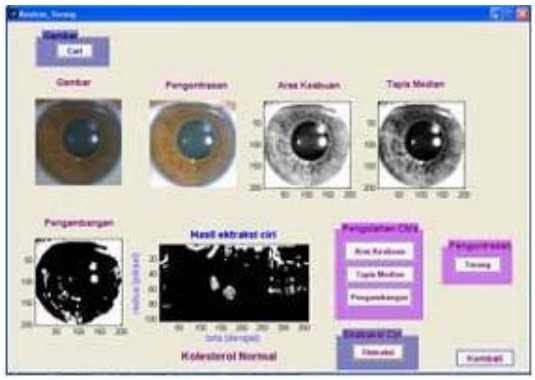

Figure 11. Display the test with the input image contrast of light

From Table 5, the test results obtained with the software input iris image 10 (5 iris images that have normal cholesterol and 5 iris images that have excess cholesterol in the body) 9 the results obtained in

accordance with the detection of medical and 1 that is not appropriate, is 1 iris image that has cholesterol in the body normally detected by the software have excess cholesterol in the body. This is because the contrast was too bright so as recognizable feature extraction have excess cholesterol in the body.

TABLE V. THE RESULTS OF TESTING THE SOFTWARE WITH A CONTRASTING IMAGE OF THE IRIS PLUS.

Original Image	Image after contrasting image iris plus	Testing		Explanation
		Based on Software	Based on direct observation	
		*Normal colesterol in body*	*surplus colesterol in body*	*Not appropriate*
		*surplus colesterol in body*	*surplus colesterol in body*	*appropriate*

D. *The image with the addition of Noise SaltT-and-Pepper (10%)*

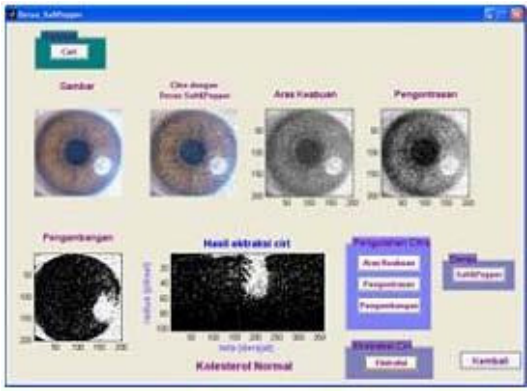

Figure 12. Display the test with the input image plus noise-and salt-pepper

TABLE 6. THE SOFTWARE RESULTED WITH INPUT IMAGE PLUS NOISE AND SALT-PEPPER.

Original Image	Image after add salt & papper noise	Testing		Explanation
		Based on Software	Based on direct observation	
		*Normal colesterol in body*	*Normal colesterol in body*	*appropriate*
		*surplus colesterol in body*	*surplus colesterol in body*	*appropriate*

Input image of the iris image, which consists of the iris image 10 with which each has a size of 200×200 pixels, in the form of colorful images and stored in a format extension *. bmp. Figure 12 shows the view of testing with the added input image noise, salt and pepper.

From Figure 12, feature extraction results obtained in accordance with the medical examination cholesterol. Test results for the image plus the noise is salt-and-pepper shown in Table 6.

E. *Image with Gaussian Noise Addition (10%)*

input image of the iris image, which consists of 10 images of the iris with each having the size of pixels, in the form of colorful images and stored in the extension *.bmp format. Figure 13, shows the view with the image of testing the addition of noise Gaussian input 200×200. From Figure 13, feature extraction results obtained in accordance with the medical examination cholesterol. Test result for the image plus Gaussian noise is shown in Table 7.

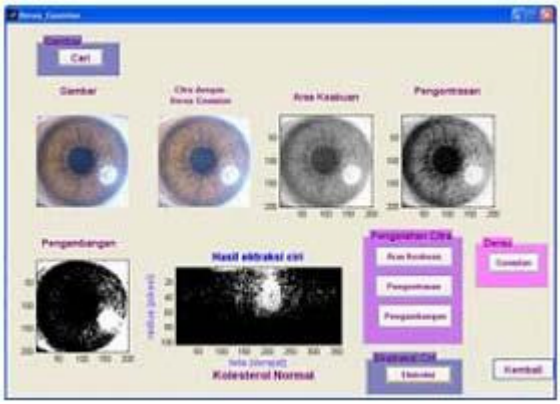

Figure 13. Display the image of testing with the addition of noise Gaussian input

TABLE 7. THE RESULTS OF TESTING THE SOFTWARE WITH THE INPUT IMAGE PLUS GAUSSIAN NOISE.

Original Image	Image after add gaussian noise	Testing		Explanation
		Based on Software	Based on direct observation	
		*Normal colesterol in body*	*Normal colesterol in body*	*appropriate*
		*surplus colesterol in body*	*surplus colesterol in body*	*appropriate*

CONCLUSION

The conclusion to be drawn from the design stage to testing done on the introduction of disease identification system based on iris image observations are as follows. The success of the identification system is affected by the iris image acquisition and initial processing of images. Image acquisition is not appropriate, and processing to a bad start does not cause the system to process the image and the image recognition errors occur. Threshold value obtains by trial and error. Trial and error is done by inserting the threshold values of all sorts, and then selected the threshold value most likely to classify the iris that have excess cholesterol in the body or have normal cholesterol in the body. The results of identified excess cholesterol testing with a reduced image contrast in accordance with the medical examination. The parameter value of the other contrasts not yet been discussed. The results of identified excess cholesterol testing with the added contrast image obtained 9 of the iris image according to a medical examination and 1 iris image is not in accordance with the medical examination. The parameter value of the other contrasts not yet been discussed. To change the image contrast, both dark and

light contrast, the introduction to the changing phase of the appropriate threshold value, a value different from the original image. The results of identified excess cholesterol testing with the added image noise (salt-and-pepper and Gaussian, respectively by 10%) was in accordance with the medical examination. For noise values have not discussed other.

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