Diagnosis of Kidney Disease Through the Image of the Iris Eye Using the Method of Segmentation Edge Detection Techniques

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ABSTRACT

Iridology as a science is based on an analysis composition of iris. In particular organ rather iris have specific advantages, which can record all the conditions of the organs, body construction, as well as psychological conditions. Trace records related to the intensity levels or deviations organs caused by disease recorded in a systematic and patterned on the iris of the eye and surrounding area. It can be used as a practical guideline for the diagnosis of the various diseases. Therefore, further research needs to be done about the condition of the organ diagnosis by looking at image of the iris. In this research, the software is able to perform classification using edge detection and segmentation floating. Eye image to be processed first separated from the image of the eye and then changes to the gray level image and the image quality improvement using adaptive histogram. The next process is to change the image of iris into rectangular form and making the Region Of Interest eye image associated with the kidneys, the last step is to detect the edge of the iris image ROI, and turn it into a binary image for the calculated area of wounds on iris image ROI. From the test results, it can be concluded that the iris recognition system shows good recognition results. There are several factors that influence the recognition process Noise of the input image, color image of the iris of the eye, the lighting in the input image. Of 20 tested iris image, the program can recognize 19 of image, so the program can recognize of 95%.

Keyword :   Iridology, Digital Image Processing, Edge Detection.

1. Introduction

Iridology (English: Iridology) is the study of pattern and fiber arrangement of the iris. In particular the eye organ is more precisely iris (more commonly called the eye rainbow membrane) has specific advantages, which can record all the conditions of the organ, body construction, and psychological conditions. Record tracks relating to levels of intensity or irregularities of organs caused by illness are systematically recorded and patterned on the iris and surrounding areas. This can be a practical guide to make a diagnosis of various diseases.

Diagnosis of symptoms of a disease suffered by patients in general conducted laboratory tests, where the test is quite expensive and sometimes cause injuries and the results are sometimes long to be known. Diagnosis of human organ disorders in its development has led to various ways, one of them by utilizing human organs. One of the use of organs to diagnose is through the iris of the eye. The iris of the eye keeps the information of all the changes and imbalances of the human body.

In this study, software is expected to perform classification using edge detection and mining segmentation. Where the eye image will be processed first separated from the image of the eye for further changes to the gray-level image and image quality improvement using adaptive histogram. The next process is to transform the iris image into rectangular shape and take the Region Of Interest (ROI) on the eye image associated with the kidney organ. The last step is to detect the edge of the iris image ROI, and convert it into binary imagery to calculate the extent of the wound on the iris image ROI.

2. Research Method

a. Flowchart System
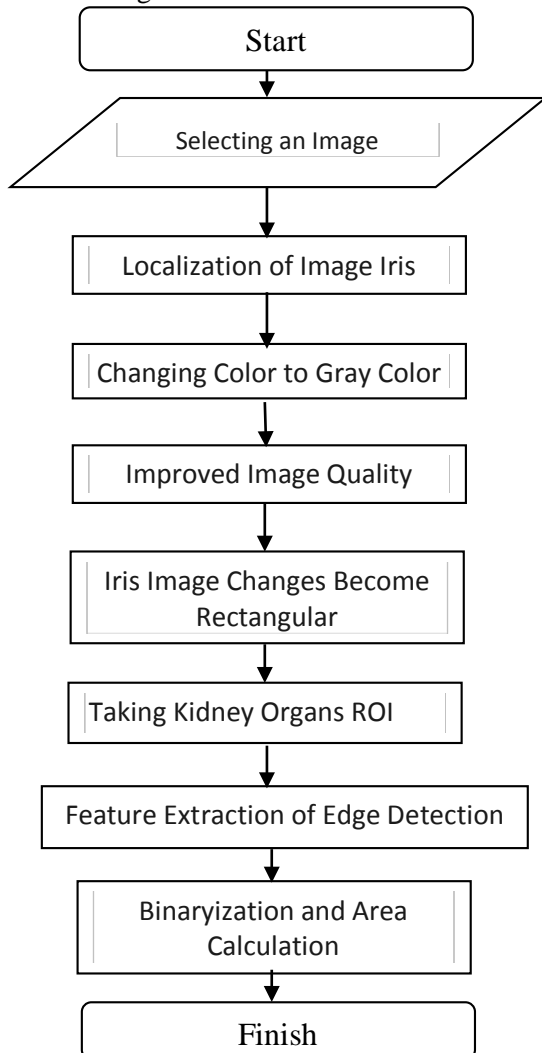The iris recognition scheme of the eye can be seen in the flowchart as shown in Figure 3.1 below:

```
        ┌─────────────────────┐
        │        Start        │
        └─────────────────────┘
                   │
          ╱─────────────────╲
         ╱  Selecting an Image ╲
         ╲                     ╱
          ╲───────────────────╱
                   │
        ┌─────────────────────┐
        │ Localization of Image Iris │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │ Changing Color to Gray Color │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │ Improved Image Quality │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │ Iris Image Changes Become │
        │      Rectangular     │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │ Taking Kidney Organs ROI │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │ Feature Extraction of Edge Detection │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │ Binaryization and Area │
        │     Calculation     │
        └─────────────────────┘
                   │
        ┌─────────────────────┐
        │        Finish       │
        └─────────────────────┘
```

Fig**ure 1. Main Program Flow Chart**

b. Taking Iris Eye Image
Before it can be used for further image processing, the iris part must be separated from the eye image first because the image to be processed is irisnya image only. The first step in localization of the iris is to find the midpoint and radius of the pupil and iris. To determine the midpoint and radius is done manually using the aid of the mouse pointer, by clicking on the center of the pupil, the pupil's edge, and the iris edge.
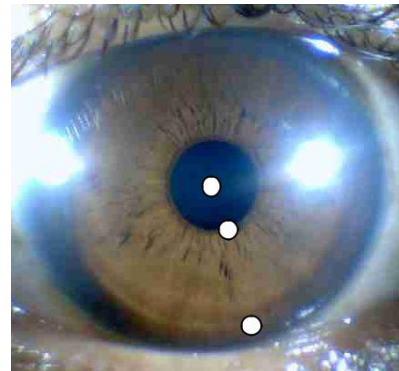

Figure 2. Example of determining three points for the radius of the eye, the outer edge of the pupil, and the outer edge of the iris.

c. Improve Image Quality

The result of gray artery image still has a low contrast and detail on the iris fiber is still less clear so that the accuracy is not good enough. Therefore the image must be enhanced by use *Adaptive Histogram Equalization* or the program matlab is CLAHE (*Contrast-Limited Adaptive Histogram Equalization*) using the command adapthisteq. This method aims to get the image results with better contrast but without reducing the quality of the image.

d. Iris Image Change to Exposed Polar Shape

To overcome this problem, the pupils and iris shaped images of a circle with a certain diameter are changed, converted into polar form with a size of 125x650 pixels. In addition, this alteration aims to facilitate the determination of ROI areas and calculations. This transformation process is shown in Figure below.
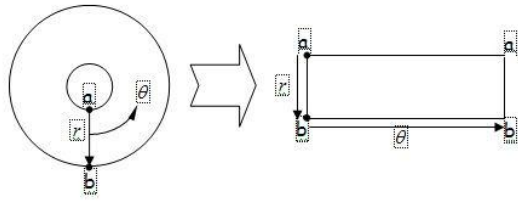
Figure 3. The Polar Transformation Process

e. Image Processing With Edge Detection

In this study, using feature extraction with edge detection. This feature extraction is used in order to mark the part that becomes detail in the image to be processed. In this case the image to be marked by this edge detection is the image of the iris of the iris of the kidney organs in which there are open wounds or closed wounds as described in iridological scholarship, by way of bordering on open wounds or closed wounds, to facilitate distinguishing which image regarded as information and images that are considered as noise.

f. Image Processing ROI Being Binary Image

After obtaining a segmented area and having a border around the wound, the next step is to calculate the extent of the wound by converting the image into a binary image.

g. Calculation of Wounds For Introduction

After obtaining the binary image from the segmented image then calculating the black image area, this black image shows the wound image on the iris of the kidney. And the size of this wound is a reference in the introduction of this program. After calculating the extent of some imagery, the upper limit of the normal iris image, this limit which will be used as the recognition limit (parameter of the threshold value) of an iris image is known as normal or abnormal iris image in the early detection of renal disease.

3. Results And Discussion

Test Result

Testing is done by using the iris image taken and then resized to 30x275piksel. From Table 4.1 can be analyzed and known success rate of this recognition program. the program is able to perform the process of classification of 19 data from 20 test data, so the percentage of success is 95% and the calculation as follows. Percentage of success 19/20 x 100% = 95%.

4. Conclusion

The conclusions can be drawn from the design stage to the tests performed on this system are as follows.

1. Based on the test data test results, the program can make a correct diagnosis of the incoming data with a percentage of success of 95%.
2. Parameter the best threshold value to be used in the introduction is 0.3, because at Parameter This threshold value of the treated image does not lose the information used for the classification and noise of the image can be minimized
3. The limit value of the width limit for abnormal data is more than 14.67% and for normal data less than 14.67%. this area value is used on the parameter of the threshold value 0.3
4. This method is a good enough method to diagnose kidney disease using iris image. Because it has a large percentage of success.