International Journal on Future Revolution in Computer Science & Communication Engineering
Volume: 3 Issue: 10
ISSN: 2454-4248
242 – 247

Image Segmentation and Morphological Process of Skin Dermis for Diagnosis in Anthropoid

Dr. V.Arulmozhi
Associate Professor, Dept Computer Applications
Tiruppur Kumaran College for Women, Tirupur
TamilNadu, India.
drarultkc@gmail.com

S.C Divya
M.Phil Research Scholar, Department of Computer Science
Tiruppur Kumaran College for Women, Tirupur
TamilNadu, Inadia
divi1061@gmail.com

***Abstract*—** Mammals and plants are affected by skin diseases due to infection of known and unknown bacteria or virus. These type of disease occurred in many forms in the skin and produce irritable sensations in the human or animal's body. There is need to diagnosis of skin infections and provide control measures are the important to the society. This paper focus towards different image processing techniques used for predicting various skin problems. Image processing techniques like segmentation, image pre-processing, edge detection and morphology are part of process for diagnosis of skin disease and are used to illustrate the part exaggerated by disease, the form of affected area. The segmentation performance is considered with dissimilar well known procedures and the consequences are significant. Morphology is used along with their combination for the detecting using the extracted features.These techniques are carried out with an experiment by using MATLAB software. The obtained results are promising.

Keywords- *Image Processing; Segmentation; Edge Detection; Morphology and Histogram.*

*****

I. INTRODUCTION

Skin dermis is mostly found in humans, animals and plants. A skin defects is a particular kind of infection caused by bacteria or virus. These diseases like alopecia, ringworm, yeast infection, brown spot, allergies, eczema etc. have various perilous effects on the skin and keep on spreading over time. It becomes imperative to diagnose these defects at their pioneer stage to control it from spreading. These diseases are sanctioned by using many technologies such as image processing, data mining, artificial neural network (ANN) etc. Recently, image processing has played a primary role in this area of research and has generally used for the detection of skin diseases. In this paper we investigate two methods for describing the contents of images. The first one characterizes images by segmentation, while the second is based on morphology and histogram approach and feature extraction etc. are part of image processing and are used to describe the part affected by disease, the form of affected area, its afflicted area color etc. An exhaustive learning of skin disease diagnosis systems are done in this paper, with different methods and their performances. These techniques are carried out with an experiment by using MATLAB software. It is found that further modifications are needed to produce better performance in searching images.

The image processing methods are to perform some operations on an image using statistical operations, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which the input is an image and the output may be image or a set of characteristics or features associated with that image. Image processing is closely related to computer graphics and computer vision. In modern sciences and technologies, images also increase much extensive scopes due to the ever growing importance of scientific revelation (of often large-scale complex scientific/tentative data). In the image processing and computer perception of intensity, aspect and structures are important. But the structure based study is most important in exterior analysis. Skin is the surface of the body having some texture; infected skin has different types in the texture of the skin. The infected skin is illustrious from dermatitis which is inflammation is called infective dermatitis.

The rest of the paper is organized as follows. Section 2 presents the literature survey. In section 3 the methodology is presented. Experimentation and Results are explained in Section 4. Finally, section 5 conclusions.

II. LITERATURE SURVEY

Literature survey gains an understanding of the fundamentals and learning the definitions of the concepts. The aim of the literature survey is accessing latest approaches, methods, theories and discovering a new research based on the existing research.

Many approaches have been proposed to analyze and recognize textures in an automated fashion. In [1] Y. P. Gowramma.et al. (2014) proposes an algorithmic representation for automatic classification of skin diseases using curvelet filter along with the k-nn classifier and it is segmented using a marker-controlled watershed segmentation method. In [2] A. A. L. C. Amarathunga.et al. (2015) proposes the skin disease diagnosis system which to uses the technologies such as image processing and data mining for the image is immediately segmentation of images using threshold values and to suggest the medical treatments. In [3] Valentin Lynbchenko. et al. (2016) proposes a computational approach for analyzing the fauna and flora, and the detection and diagnose of diseases by applying the methodology of color image segmentation. It makes to automate the process and reduce the time of diagnosis of infectious dangerous fish diseases. In [4] Nisha Yadav. et al. (2016) proposed a skin disease is caused by bacteria or an infection these diseases like alopecia, ringworm, yeast infection, brown spot, allergies, eczema, etc by using many technologies such as image processing, data mining, artificial neural network. The detection techniques like filtering, segmentation, feature extraction, image pre-processing and edge detection. In [5] R. Yogamangalam. et al. (2013) have been proposes a brief online on most common segmentation techniques like thresholding, model and edge based detection, clustering and so on. It uses the Markor Random Field (MRF) method of

 ISSN: 2454-4248
242 – 247

noise cancellation in images. In [6] R. Sumithra. et al. (2015) proposes the skin images are filtered to remove the unwanted hairs and noise for using the segmentation techniques and the classification of skin lesions for disease diagnosis the SVM, K-NN classifiers and Computer Aided Diagnosis (CAD). In [7] Damilola A. Okubayejo. et al. (2013) proposed the cancerous skin disease such as melanoma and nevi there have been high expectations for techniques such as Dermoscopy or Epiluminiscence Light Microscopy (ELM) and modeling a system that will collate past Pigmented Skin Lesion (PSL) by medical experts using prototyping methodology. It uses the computational intelligence techniques to analyze process and classify the image library data based on texture and phonological features of the medical images for remote health diagnosis in the skin disease. In [8] Jamils A. M. Saif. et al. (2016) proposed the image of edge detection in image analysis, object recognition used to detect the edges of object in the image. This paper address the problem of gradient based image edge detection to produced the binary images using the medical as well as natural images. In [9] Ms. Kabade Manarnika Manohar. et al. (2016) proposed the classic and visual issues in image processing it has been the hotspot for the researchers to makes the image more simple and meaningful. It covered a review on segmentation techniques such as thresholding, edge based, region based and clustering approaches. In [10] Sujata Saini. et al. (2014) proposes the image segmentation algorithms to segmented the complexity image used in the image processing applications, computer vision and so on. It provides the emphasized of edge based, region based techniques and watershed transformation. In [11] Peter. et al. have proposed morphology image pre-processing for thinning algorithms to briefly describe the binary morphological operation. This work proposes the use of binary morphology because of its versatility and relatively fast execution. In [12] Raid. et al. have described the morphological operations such as erosion, dilation, opening, closing, boundary extraction and region filling. In [13] Zahhad. et al. have exposed the Edge detection with a pre-processing approach. The proposed pre-processing approach involves computation of the histogram, finding out the total number of peaks and suppressing irrelevant peaks. In [14] Bartunek. et al. have described the adaptive fingerprint image enhancement with emphasis on the pre-processing of data. The four updated processing blocks are pre-processing, global analysis, and local analysis and matched filtering. The pre-processing yields an improved and new adaptive fingerprint image processing method. In [15] Muthukrishnan. et al**.** have described the edge detection techniques such as Sobel Edge detection, Prewitt Edge detection, Canny Edge detection and so on.

III. METHODOLOGY

The methodology of this research work is described in this section. It has two stages. In the first stage, the edges are detected by using the Prewitt and Sobel operators. In the second stage, the irrelevant parts are removed from the image by using the morphological operations. The block diagram of the proposed work is shown in fig. 1.

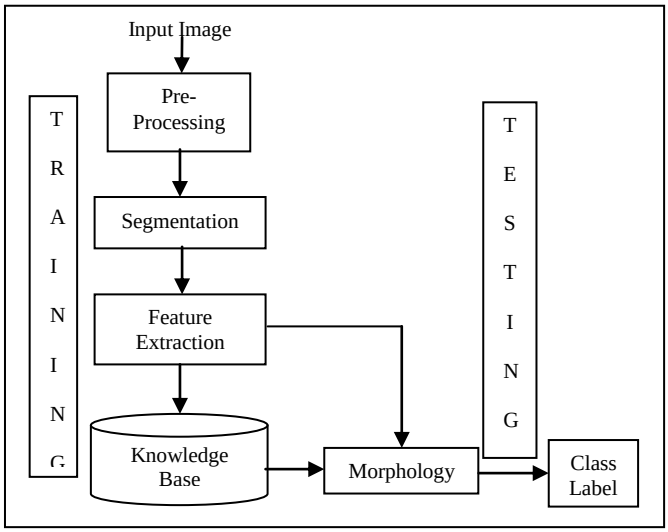

Fig. 1 Overview of Methodology for Skin Lesions Segmentation.

The morphological operations have two operations such as closing and opening. After finishing the pre-processing work the resultant image is applied as the input for second stage. In this stage, the Edge detection methods are used to detect the edges of the affected area in skin disease image. Edge detection is used for object detection. It is a fundamental process detects and outlines of an object and boundaries among objects and the background in the image. Edge detection is the most familiar approach for detecting significant discontinuities in intensity values. In Edge detection, the Prewitt edge detection and Sobel edge detection are used. In this proposed work, to detect the edges in an affected area in an image using the Prewitt edge detection and Sobel edge detection.

A. SEGMENTATION

Image segmentation is the separation of an image into regions or categories, which correspond to objects or parts of objects. Every pixel in an image is appropriated to one of a number of these categories. A superior segmentation is as a rule one in which: pixels in the same category have agnate grey scale of different values and form an associated region; adjoining pixels which are in various categories have unrelated values.

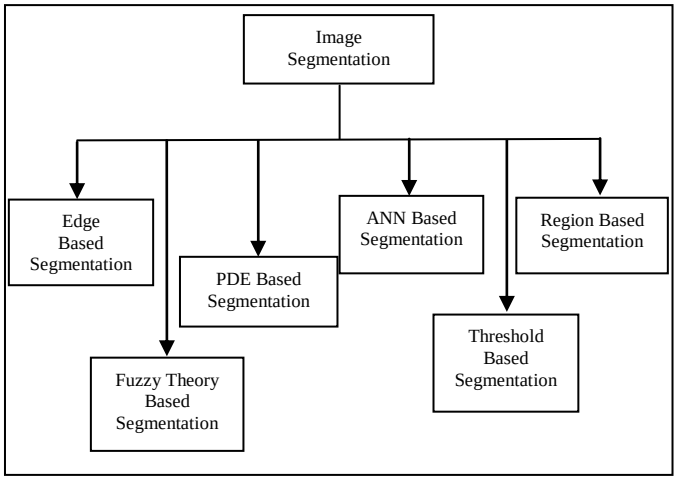

Fig. 2 Segmentation Techniques.

 ISSN: 2454-4248
242 – 247

1) Edge Based Segmentation

Edge detection is a process of digging an edge of an image. Detection of edges in an image is a considerable step towards accepting image features. Edges are composed of meaningful features and contained fecund information. It reduces drastically the amount of the image size and filters out info that may be attend as less relevant, defend the important structural properties of an image. Since edge detection is usually used in image segmentation while images are separated into areas corresponding to diverse objects.

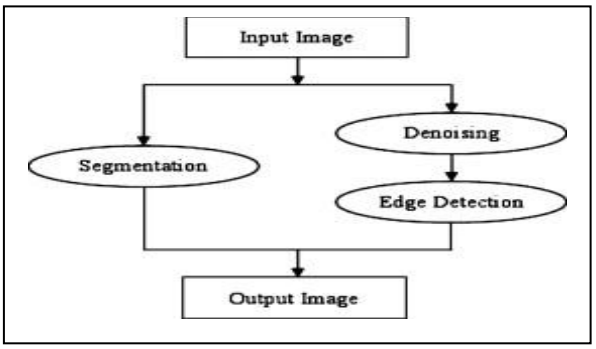

Fig. 3 Edge Based Process.

a) Prewitt Operator

Prewitt operator is approach of edge detection in image processing which determines the maximum response of a set of contortion kernels to find the local edge assimilation for each pixel. The Prewitt edge discoverer is adapt the way to estimate the magnitude and orientation of an edge. Although transmission gradient edge detection needs a rather time-consuming computation to estimation of the orientation from the eminence in the x- and y-directions.

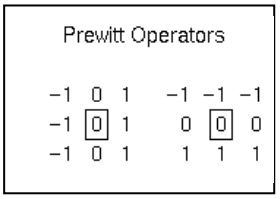

Fig. 4 Prewitt Operator

b) Sobel Edge Operator

The Sobel operator engaged in 2-D spatial slope amplitude on an image and so dramatize regions of high spatial constancy that synchronize to edges. Typically it is used to find the proximate entire gradient magnitude at each point in a caution gray scale image. In theory at least, the operator composed of a pair of 3x3 convolution kernels.

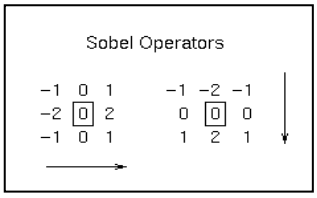

Fig. 5 Sobel Operator

c) Roberts Edge Detection

The Roberts edge detection is popularized by Lawrence Roberts (1965). It performs a simple, quick to compute, 2-D spatial gradient measurement on an image. This method emphasizes regions of high spatial iteration which often is identical to edges. The input to the operator is a gray scale image the same as to the operant is the most common usage for this technique. Pixel values in every point in the output appear as the predicted complete significant of the spatial gradient of the input image at that point.

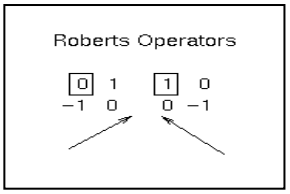

Fig. 6 Roberts Operator

B. MORPHOLOGICAL OPERATIONS

Binary image may contain countless defects. Morphology is the image processing operations that modifies the images and shapes. It has many applications. It follows the goal of eliminating all these defects and maintaining the structure of the image. Morphological operations are assured only on the associated ordering of pixel values, rather than their numerical values, so they focused more on binary image, but it can also be applied to gray scale images such that their light transfer functions are unknown and thus their absolute pixel values are not taken into consideration. The morphological operation explores an image with small form or template. This template is called structuring element. The structuring element applies to all potential locations of the input image and generates the same size output. The output image pixel is based on like input image with neighbours.

a) Erosion

The fundamental operation of mathematical morphology is erosion. All mathematical morphology depends on this notion. The erosion of an input figure A by a structuring aspect B is definite as follows:

$$A \Theta B = \{x : B + x \subseteq A\} \quad \ldots (1)$$

This means to facilitate in order to perform the erosion of A by B we translate B by x so that this lies inside A. The set of all points x pleasing this condition compose $A \Theta B$. Figure 7 illustrates the erosion of a triangle by a disk.

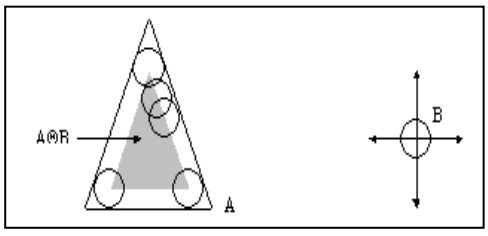

Fig4. $A \Theta B$ is the internal triangle, according to eqn (1)

b) Dilation

 ISSN: 2454-4248
242 – 247

The dual operation to erosion is dilation. Dilation of an input image A by a structuring element B is defined as follows:

$$A \oplus B = \bigcup\{B + a : a \in A\} \quad \ldots(2)$$

This means to facilitate in order to present the dilation of A by B we first convert B by all points of A. The unification of these conversions constitutes $A \oplus B$. Figure 9 shows the dilation of a triangle by a disk.

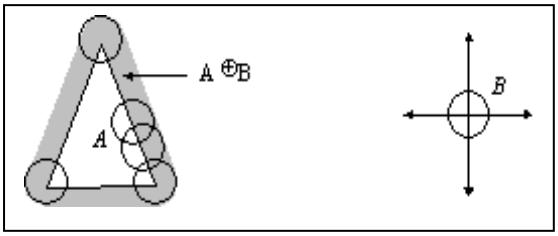

Fig5. $A \oplus B$ is the external triangle with rounded corners, according to eqn (2)

c) Opening

An inferior function of huge magnitude in statistical morphology is the opening process. Opening of an input image A by a structuring element B is defined as follows:

$$A \circ B = (A \ominus B) \oplus B \quad \ldots(3)$$

An equivalent definition for opening is:

$$A \circ B = \bigcup\{B + x : B + x \subseteq A\} \quad \ldots(3)$$

This means that in order to open A by B we first translate B by x so that this lies inside A. The union of these translations constitutes . Intended for occurrence of the opening of a triangle A by a disk B (the derivation of overlap with the midpoint of the disk) is the triangle A with rounded corners. During common opening by a disk around or removes every peaks of expand keen on the image background. If, $A \circ B$ then A is invariant under opening by B and it is called B-open.

d) Closing

The other important secondary operation is closing. Closing of an input picture A by a structuring aspect of B is definite as follows:

$$A \cdot B = (A \ominus B) \ominus B \quad \ldots(4)$$

Designed for example of closing a triangle A by a disk B (the source is on the middle of the disk) yields the same triangle A. In this case $A \bullet B$ and we say that A is B-close. In general, closing by a disk rounds or eliminates all cavities extending into the image foreground.

V. RESULTS AND DISCUSSIONS

The experiments have been done on online skin disease datasets and implemented in MATLAB. The Fig. 4 describes the original skin disease image with image segmented and histogram.

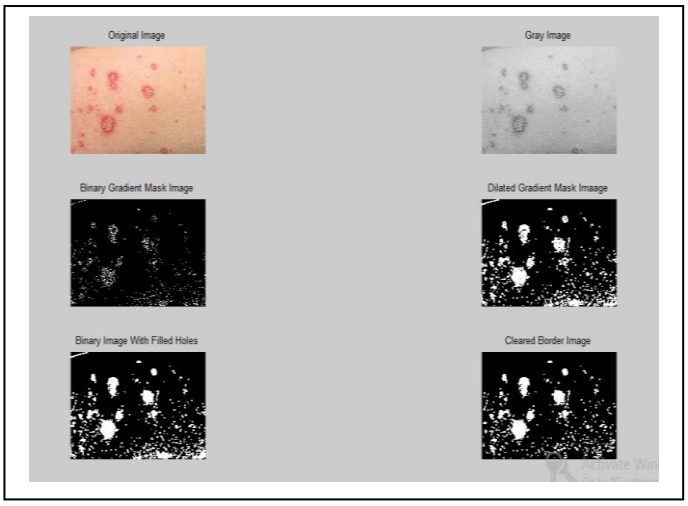

Fig. 4 Segmented Image of Chronic Dermatitis Skin Disease

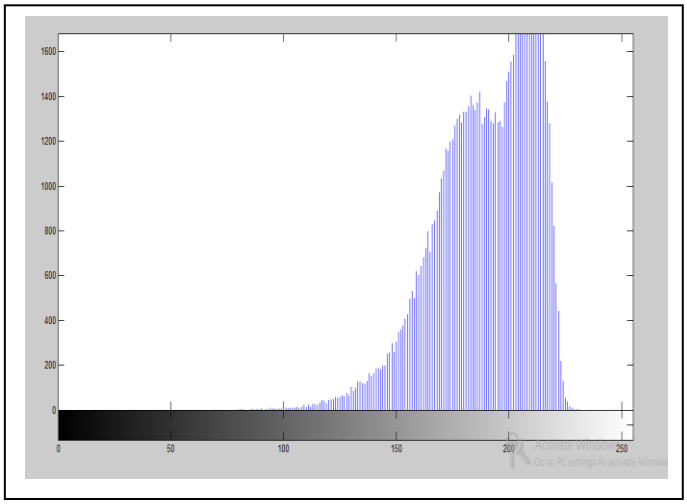

Fig. 5 Histogram of Chronic dermatitis Skin Disease

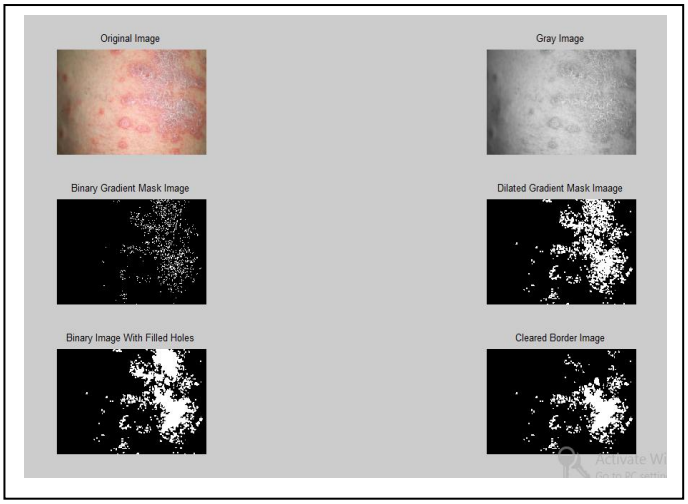

Fig. 6 Segmented Image of Lichen Plans Skin Disease

ISSN: 2454-4248
242 – 247

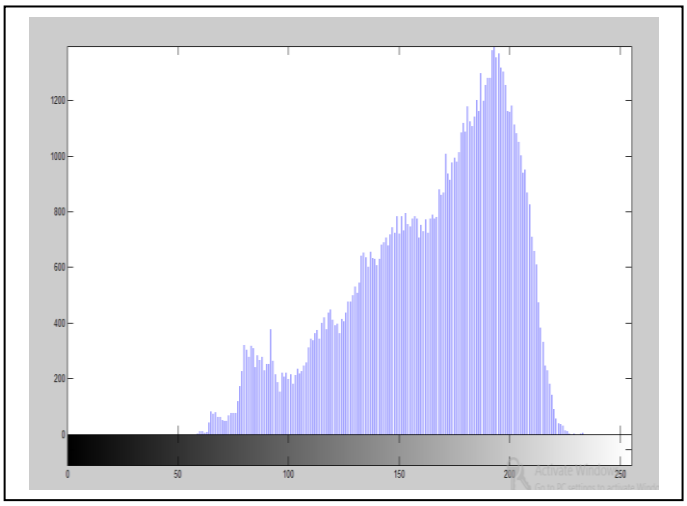

Fig. 7 Histogram of Lichen Plans Skin Disease

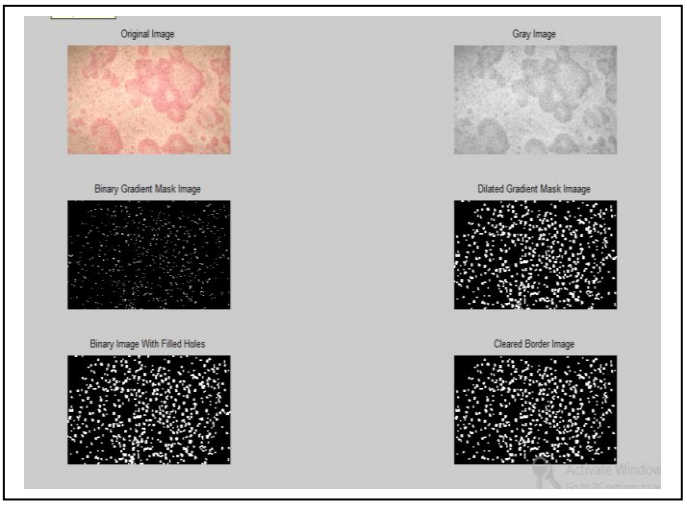

Fig. 10 Segmented Image of Psoriasis Skin Disease

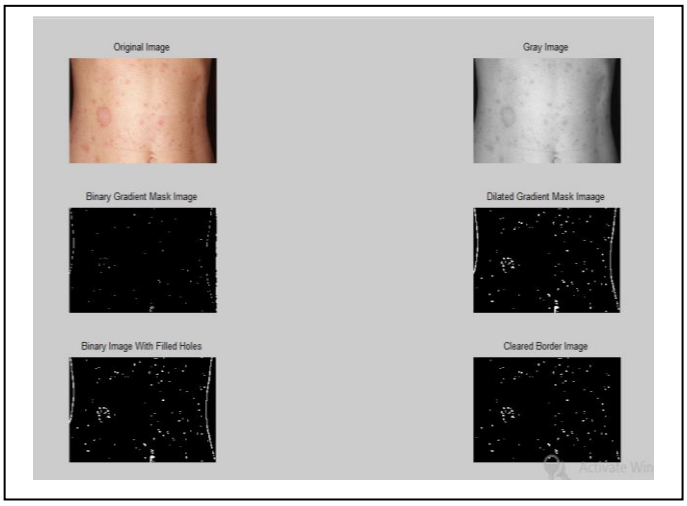

Fig. 8 Segmented Image of Pityriasis Rosacea Skin Disease

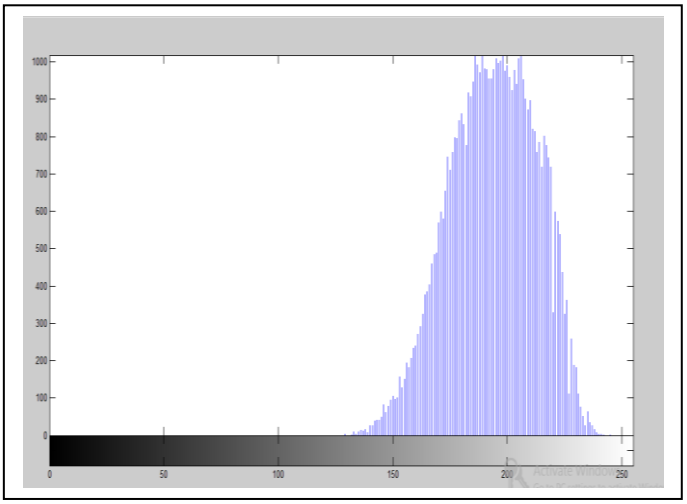

Fig. 11 Histogram of Psoriasis Skin Disease

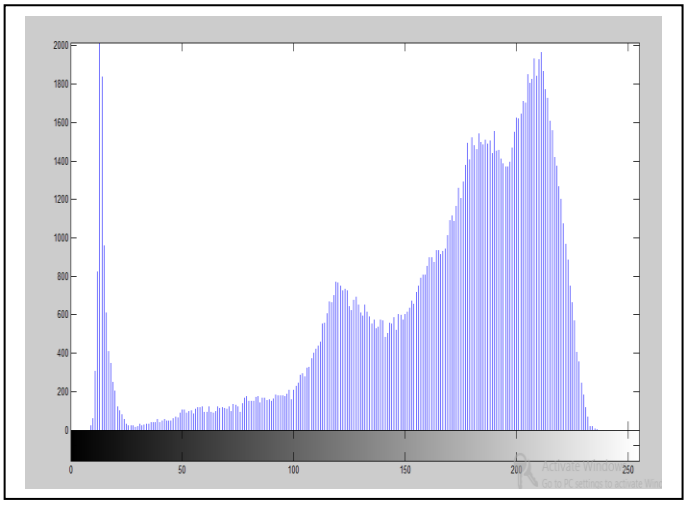

Fig. 9 Histogram of Pityriasis Rosacea Skin Disease

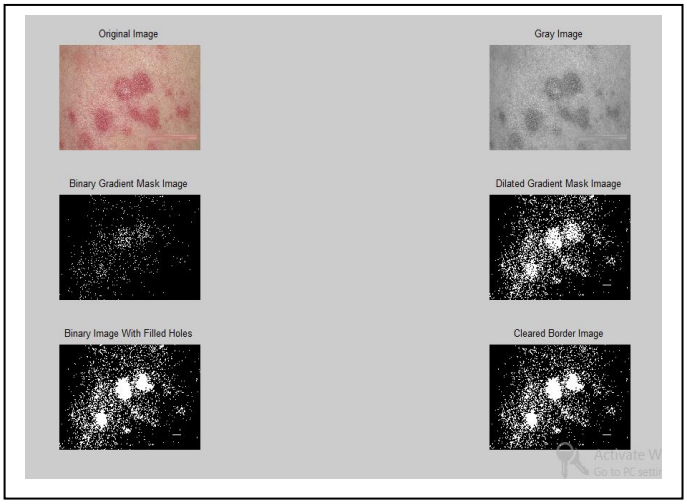

Fig. 12 Segmented Image of Seborreheic Dermatitis Skin Disease

ISSN: 2454-4248
242 – 247

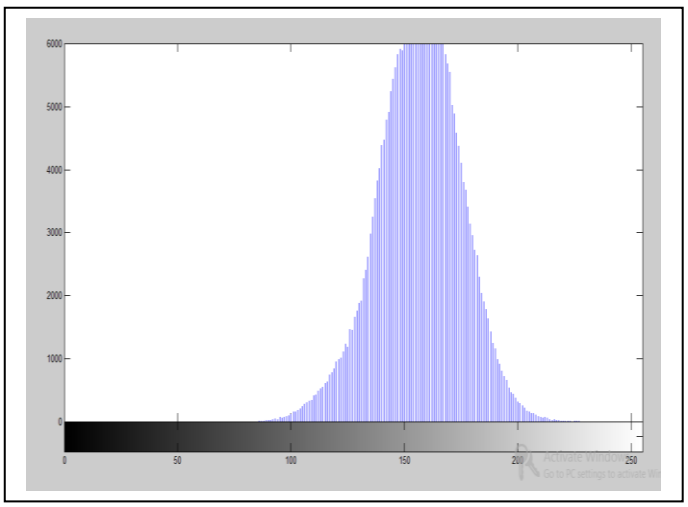

Fig. 13 Histogram of Seborreheic Dermatitis Skin Disease

V. CONCLUSION

This paper has implemented the morphological operations for segmented image. The foreground is removed in the first phase using erosion operation whereas in second phase, dilation operation removes the background. Morphological operation has given the open and closed operation image that helped in further processing. Finally, Edges are detected by using Prewitt edge detection and Sobel edge detection techniques. As this paper proved that morphological operation gives better PSNR and MSE values, Prewitt edge detection is better than Sobel edge detection based on the PSNR value.

ACKNOWLEDGMENT

First author would like to thank Dr.V.ARULMOZHI, Associate professor, Dept of Computer Applications, Tiruppur Kumaran College for Women, Tirupur, for her in valuable support and the Second author would like to thank Tiruppur Kumaran College for Women, Tirupur.

REFERENCES

[1] M. N. Do and M. Vetterli. Orthonormal niteridgelet transform for image compression. In Proc. of IEEE International Conference on Image Processing (ICIP), September 2000".

[2] E. J. Candues and D.L. Donoho. Edge-preserving denoising in linear inverse problems: Optimality of curvelet frames. Technical report, Department of Statistics, Stanford University, 2000".

[3] A. Averbuch, R.R. Coifman, D.L. Donoho, M. Israeli, and J. Walden. Polar fft, rectopolarfft, and applications. Technical report, Stanford University, 2000".

[4] Rubegni, P. et al. (2002): Automated Diagnosis on Pigmented Skin Lesions, International Journal on Cancer, 101, pp. 576-580".

[5] Kopec ,D.; Kabir, M. H.; Reinharth, D.; Rothschild ,O. and Castiglione ,J. A. (2003): Human errors in medical practice: systematic classification and reduction with automated information systems, Journal of Medical Systems, U K, 27(4), pp. 297-3".

[6] Bartunek, S.J. and Nilsson, M., " Adaptive FingerPrinst Image Enhancement with Emphasis on Preprocessing of data" IEEE, 2011, pp: 1- 13.

[7] Closing Operation in Morphological operation [Online]. Available http://homepages.inf.ed.ac.uk/rbf/HIPR2/close.htm.

[8] Hoshyar, A.N. and Hoshyar, A.N., "The Benefical Techniques in Preprocessing Steps of Skin Cancer Detection System Comparing" Procedia Computer Science, 2014, pp: 25-31.

[9] Jayachandra, N. and Kamal. A. R. N. B., " Detection of the Effect Of Sharpening of Color Image Sharpened by Frequency Domain Filters and Identification of Rio using Morphology Mathematical Property Image ", International Journal of Advanced Research in Computer Science, Volume 4, No 11, December 2013, pp: 17- 25.

[10] Muthukrishnan, M. and Radha. M., " Edge Detection Techniques For Image Segementation ", International Journal of Computer Science & Information Technology, Volume 3, No 6, December 2011, pp: 259-267..

[11] Opening Operation in Morphological operation [Online]. Available http://homepages.inf.ed.ac.uk/rbf/HIPR2/open.htm

[12] Peter.,"Morphology Image Pre – Processing for thinning Algorithms", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, Volume 5, No 1, 2007, pp: 131- 138.

[13] Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", 2nd ed., Beijing: Publishing House of Electronics Industry, 2007.

[14] R.C. Gonzalez and R.E. Woods, "Digital Image Processing", third edition, PHI publication, 2008.

[15] Raid, A.M, Khefr, W.M., " Image Restoration Based on Morphological Operations", International Journal of Computer Applications,Volume 4, June 2014, pp: 9- 21.

[16] Skin Cancer Foundation, "Skin Cancer Facts," [Online]. Available :http://www.skincancer.org/Skin-Cancer-Facts

[17] Zahhad, M., Gharieb, R.R., Ahamed, M.S., " Edge Detection with a Preprocessing Apporach", Journal of Signal and Information Processing, Volume 5, May 2014, pp: 123-134.