Research Paper Computer Science

A Comparison Between New Mask and Classical Models For Image Edge Detection of Psoriasis Skin

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ABSTRACT

In this paper we try to find a new mask in image edge detection and compare this mask with classical edge detectors and get determine the best of them . The case of study deals with observation of edge of medical images certainly, for Psoriasis skin by taken limited images for infections types of this disease. . detection The proposed approach exploits a number of ants, which move on the image driven by the local variation of the image's intensity values, to establish a pheromone matrix, which represents the edge information at each pixel location for Psoriasis Skin image Edge detection is proposed. The Skin image have been identified and the edges of the images used for each and every stages that the database consists of 24 images divided each stage of the Psoriasis disease Skin image 4 images. For each stage a novel algorithm which combines pixel and region based color segmentation techniques is used. The experimental results confirm the effectiveness of the proposed algorithms .

KEYWORDS Near complex Hadamard matrix, Edge detection , image detection, Segmentation, Image processing, Psoriasis Skin.

1. Introduction:

Edge detection is one of the important methods in the image processing and this importance appears clearly, in many field of information analysis for images especially medical images which is have the mean important in limited the boundaries of the treatment area of disease, like skin disease.[1],[2],[3]

first we review the properties of near complex Hadamard matrices which have two equivalent types of this matrix and show the general form of the eigenvalue for this matrix which help as to conclusion the our mask and then get best result in image edge detection of the Psoriasis Skin .

Psoriasis briefly," is a form of chronic inflammatory arthritis that has a highly variable clinical presentation"[4] and it appears in the different ages but the most occurs in less than 35 years , there are many ways to deal with the Psoriasis which is the most safe of this treatments and because of expense, as a side effects compare favorably with other systemic agents, especially, for the pregnancy comparing with general measurement in treatments , most Psoriasis treatment centers provides phototherapy with Ultraviolet(UV) rays, and used locally , types of phototherapy include, "narrowband (UVB), broadband (UVB), photochermotherapy (PUVA)"[4], the target phototherapy area , the certainly Determination of the infection area is very important to avoid other Uninfected area from Exposure to the phototherapy treatment For a long time, which is may be caused cancer .

There are various filters used in image edge detection all of them used the execution of crossing an N*N involution mask over an image (with N odd and in particular greater or equal to 3).

2. Methodology:

2-1 Roberts edge detector [13]

The Rodert edge detection is introduced by Lawrence Robert (1965). These filters have the less support, thus the local of the edges is more precision .On the other hand, the few support of the filters make it very prone to noise. The edge modality of this edge detector makes it critical in particular to edges with a decline around $\pi/4$. [5][6]

2-2 Sobel edge detector [19]

The Sobel edge detection is introduced by Sobel 1970(Rafael C. Gonzales(2004)). The edge modalities are similar to those of the Prewitt edge detector, These filters are same to the Prewitt edge detector, but the meanoperator is more same a Gaussian, which makes it better for removing some white noise.[6][7] .

2-3 Prewitt edge detector [18]

The Prewitt edge detection is introduced by Prewitt 1970(Rafael C.

Gonzales(2004)). similar to the Sobel, but with another mask coefficients. The mask are each convolved with the image. At each pixel position we find two numbers: p1, conformity to the result from the vertical edge mask, and p2, from the horizontal edge mask. they use these results to determine two metric, the edge enormity and the edge direction consider the orderliness of pixels about the pixel (i, j):

These filters have more support, They distinction in one direction and a mean in the other direction. So the edge detector is less susceptible to noise. However, the local of the edges may be a change due to the mean operation[8][12] .

2-4 Frei-Chen Edge Detector [22] [20]

It was introduced by W. Frei and C. Chen (1977), we could be see that from the masks, the sub images in the edge space are normative edge patterns with various directions; the other sub images corresponding lines and blank space. Therefore, the angle is small when the sub image contains edge-like elements, and it will be large otherwise.

2-5 Canny Edge Detection [9]

It created by Johon Canny 1n (1983). Canny edge detection[11] is an important way towards mathematically solving the problem of image edge detection. This edge detection way is the optimum step for edges damaged by white noise. Canny put three criterion to design his edge detector. The first condition was the quality of edges detection with low possibility of losing true edges, and a low possibility of detecting false edges. Second, the detected edges should be limited by the true location of the edge. finally, there should be only one consideration to a single edge.[21]

2-6 Laplace Operator(LoG) :[14][15]

The Laplacian of Gaussian (LoG) was interduced by Marr(1982).The three Laplacian masks presented various approximations of the Laplacian, which is the two dimensional version of the second derivative. Ont the same as the Sobel and Prewitt edge detection masks, the Laplacian masks are rotationally symmetric, which implies edges at all direction has the contribution to the output .

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3 Near Complex Hadmerd matrix

3.1 Definition: [16]

A near complex hadamard matrix is a square complex matrix with entry i or $-i$ satisfying :

1. $A^T.A = -nI_n$

2. Its rank ; $n = 2^k$; k is any positive integer

3. $\det(A) = n^{n/2}$; $n=2^k$; k is any positive integer

3.2 Notation:

We will denote to the near complex hadamard matrix by N.C.H. Matrix.

***3.3 Remark :*[16]**

We can write the N.C.H. Matrix A of rank 2^k as a block matrix of tensor +(kronker) product of $A_{2^{k-1}}$ as follows:

$$A_{2^k} = \begin{bmatrix} A_{2^{k-1}} & A_{2^{k-1}} \\ A_{2^{k-1}} & -A_{2^{k-1}} \end{bmatrix} \text{ or}$$

$$A_{2^k} = \begin{bmatrix} -A_{2^{k-1}} & A_{2^{k-1}} \\ A_{2^{k-1}} & A_{2^{k-1}} \end{bmatrix}$$

***3.4 Lemma:* [16]**

If A is near complex hadamard matrix and I_n is identity matrix of rank n then:

1. $A^2 = -nI_n$

2. $A^{2s} = -(n)^s I_n$

3. $A^{2s+1} = (-n)^s A$

Where s is any positive integer

3.5 Theorem: **[16]**

If A is N.C.H matrix of order 2^k and if λ is the eigen value of A then,

$$\lambda = \pm(\sqrt{2})^k i.$$

4.Experimental Results:

In this section a detailed experimental comparison of the above stated near complex Hadamard matrix has been presented. We have used Psoriasis Skin image databases from DermNet NZ web site [4] .

Experimental Results for Applying Edge Detection mask shown in figure (1). There are five different criteria that are typically used for testing the quality of an edge detector:

-The false positive probability (a sign somewhat as an edge which isn't an edge)

-The false negative probability (fruitless to the mark an edge which indeed exists)

-The error in estimating the edge angle

-The mean square distance of the edge estimate from the true edge

-The algorithm's tolerance to distorted edges and features such as corners and junctions (Criteria taken from [R. Owens]) However, in order to limit the third and fourth criteria, an actually map of the edges in an image must be defined, and in general this was not obtainable. It is also not reasonable to suppose that some "exact map" of all the edges can even be composed. Therefore, the third and fourth criteria are not very important. beside corners and intersection simply are not treated well by any edge detector and must be taken separately. Therefore the fifth criterion is not very helpful. Image edge detection can be thought of as a problem of distinguish the pixels in an image which is match to edges. A w × h two-dimensional digital image can be reformed as a two dimensional matrix with the image pixels as its elements.

The most important criteria are the first two, as it is much more useful which have the proper features labeled as edges than having each edge exactly follow what would be considered the "ideal" edge or being able to handle special features such as corners and junctions. So for our evaluation, we only considered the first two criterion . We use various image samples of six types of psoriasis for different stages of diseases four image for each type .see figures (2),(3),(4),(5),(6)and (7)

Figure (1) samples of different types of Psoriasis

1. Chronic plaque psoriasis images [5]

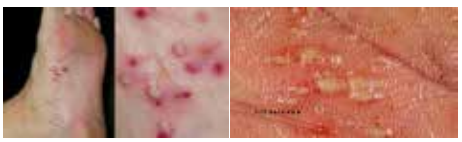
2. Psoriasis of the scalp images [5]

3. Guttate psoriasis images[5]

4. Palmoplantar psoriasis[5]

5. Nail psoriasis images[5]

6. Pustular psoriasis of the hands and feet images[5]



5. Conclusion :

New method called (near complex Hadamard matrix) and classical model for Psoriasis Skin image edge detector presented in this paper and compare between two method. The proposed comparison is decrease the computation time with gene mean high quality of edge detection. Experiment results have demonstrated that the proposed scheme for edge detection works satisfactorily for different levels digital images. Comparison for Psoriasis Skin images Edge detection are necessary to provide a robust solution that is adaptable to the varying noise levels of these images to help distinguish valid image contents from visual artifacts introduced by noise near complex Hadamard matrix -based image edge detection method that takes advantage of the improvements successfully implemented compare with classical method. The proposed method produced acceptable results within reasonable amounts of time. Subjective analysis reveals that the new approach using near complex Hadamard matrix of edge detection is effective in all the six types of the images selected

Figure (2) sample of Chronic plaque psoriasis images.

Figure (3) sample of Psoriasis of the

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scalp images

Original Image	Laplace Operator (LoG)	Frei-Chen	Sobel
			
Prewitt	Canny	Roberts	near complex Hadamard matrix
			

Figure (4) Guttate psoriasis images

Original Image	Laplace Operator (LoG)	Frei-Chen	Sobel

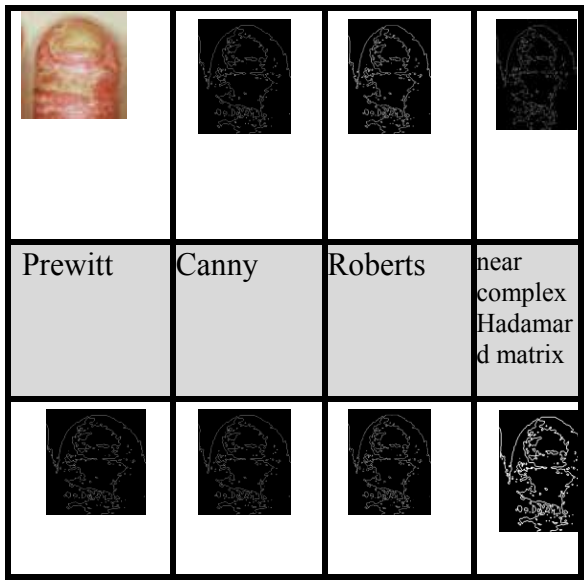


Figure (5) sample of Palmoplantar psoriasis

Original Image	Laplace Operator(LoG)	Frei-Chen	Sobel
			
Prewitt	Canny	Roberts	near complex Hadamard matrix
			

Figure (6) sample of Nail psoriasis images

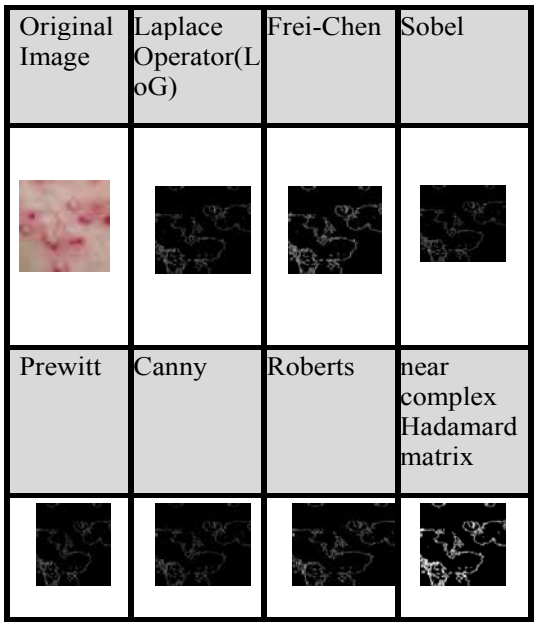
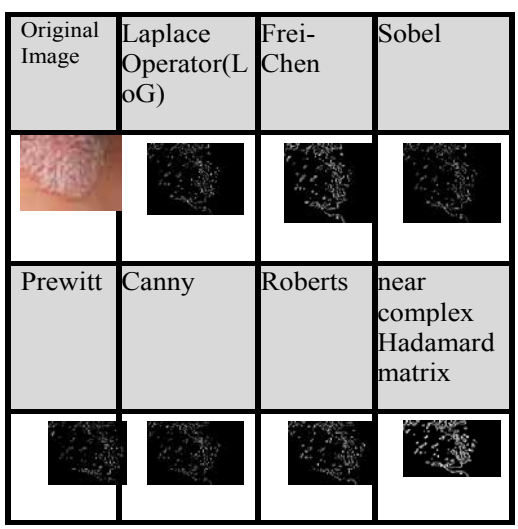


Figure (7) sample of Pustular psoriasis of the hands and feet images



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