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THE EFFECT OF COMPOUND NOISE ON MEDICAL IMAGES

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ABSTRACT

The use of quality standards in digital image enhancement applications is very important in understanding the effects of improvement achieved, and one of the most important processes on the image is the removal of noise from them. In the current research, 30% and 70% noise was added to the medical images by developing a noise removal filter based on the candidate for the idea of improving the sites, analyzing the main components and assembling the elements of the medical images. Because the noise in the image is generally high frequencies, so when it is removed. Vehicles will affect the edges and this causes gouache in the details of the image. In this research, a technique was used to reduce noise in the image, local heterogeneity, and edge analysis. In the wake of the concentration of each conventional strategy in order to identify the edges and then divide them and another ideal calculation is required. Another method of calculation was proposed to improve medical images: the use of an effective candidate. The performance of the method compares to other methods and two different levels. It is noted that the algorithm proposed using the fractional redundant function showed superior noise flexibility and reduced calculation time. The method was implemented using MATLAB.

Keywords: standard normal, noise, medical image, edge detection.

1. INTRODUCTION

The analysis and treatment of medical images has developed widely as problems of a special nature have led to the development of a wide range of businesses it dealt with various issues such as 3D data and mobile models [1]. Therefore, methodologies have been developed. It includes a variety of techniques that have made advances in image analysis

Tissue is important in the visual processing of many applications and in various sciences medicine is the foundation or important visual marker in the automatic differentiation and definition of areas homogeneous. Since the discovery of X-ray (Ray-X), radiology is developing rapidly, and has been [2]. The discovery of rays has great impact in the areas of medical diagnosis; various uses of radiation have developed and have become used in the therapeutic field as well, about the field of diagnosis. There are types of diagnostic radiographs not used in them X-rays, but other types, such as ultrasound. Magnetic Resonance Imaging Magnetic Resonance Imaging Ultrasound, (MRI) and include some types of different devices of diagnostic radiology:

a) X-ray or ionizing devices:

b) Endoscopy devices Fluoroscopy

c) Computed Tomography (CT).

d) Ultrasonic Imaging Equipment.

e) Intravenous and angiographic imaging equipment

f) Magnetic Resonance Imaging (MRI)[3].

2. IMAGE TEXTURE

Texture refers to the pattern of color, shading, or changes Material on the surface. Some tissues are geometrically organized and some are first where tissues are made up. Regular geometrical and statistical component coarse texture [4]. In image analysis, the word tissue refers to image areas with estimates distributed in an entity. In most image processing algorithms and mechanisms, assumptions about unification of intensity. Colour in the sections of the visuals, as the images of real things do not show areas of intensity of colour

For example, a wood surface image is not regular but contains degrees of equal colour intensity, which forms repeated patterns called texture visual [5].This type of model may result from the characteristics of natural surfaces such as coarseness, and coils, which have a characteristic, or which may be formed due to reflective differences such as the colours on a surface and shape[6], Figure-1 show an image containing a different set of the tissues.

Figure-1. Image containing a different set of the tissues.

3. NOISE

The noise in images is generally known as undesirable information that can distort the image and reduce its clarity. The first process that results in the emergence of noise is the process of acquisition or

recording of digital image Digital Image Acquisition, in which the visual image is converted to a continuous electrical signal subject to the process of division (Digitization) later. At each step of processing there are fluctuations that occur because of natural phenomena adding random values to the true values of brightness for each image element [7]Noise Models Noise Models
Noise models are divided into the following:

A. Noise assembly additive noise

Noise is one of the simplest types of noise that affects digital images that are characterized by random white noise (static intensity across the image) and linear where the observed image (x, y) I consists of the original image element (x, y) and noise x, y) N, which are usually not dependent on the signal (that is, external factors have no relation to the real signal) and are characterized by a zero rate and variability that can take specific values depending on the adopted imaging system and the nature of the target. The group noise can be represented as follows [8].

$$(x,y)N + (x,y)R = (X,Y)I \tag{1}$$

B. Gaussian noise

This noise is often caused by wave dispersion and emission in different directions because particles, minutes or impurities of relatively small diameters exist in the perimeter and devices of the imaging system itself or may result from heat noise in the signal transmission or recording system. The shape of the bell is called the koussin distribution. The natural or koussin curve equation was derived by Caus-Laplace when studying the error in repeated measurements. The distribution is described by a density function Probability Density Function (PDF) with the following formula [9].

C. Regular noise

This type of noise is due to the presence of distorted signals with random values of frequencies and has an equal probability distribution for each of the incoming noise values.

D. Serbian noise (multiplexing) multiplicative noise

The increased noise can be classified as signal dependent noise, the bright areas of the image are highly noisy, and the lower the optical intensity, the less the noise. This means that the relationship between the amount of noise and the optical intensity is a direct relationship [10].

E. Replacement noise replacement noise

This type of noise is different from its predecessor; in that case some of the image points are replaced with new values, which are white and salt noise. This noise does not depend on the original values in terms of intensity and location [11].

4. STANDARD (NORMATIVE) DISTRIBUTION

As you know, the normal distribution curve is known as the mean μ and the standard deviation σ. The average may take any value and the standard deviation takes any positive value. The Standard Normal Distribution curve is a natural distribution with an average of zero and a standard deviation of one,Figure-2.[12]

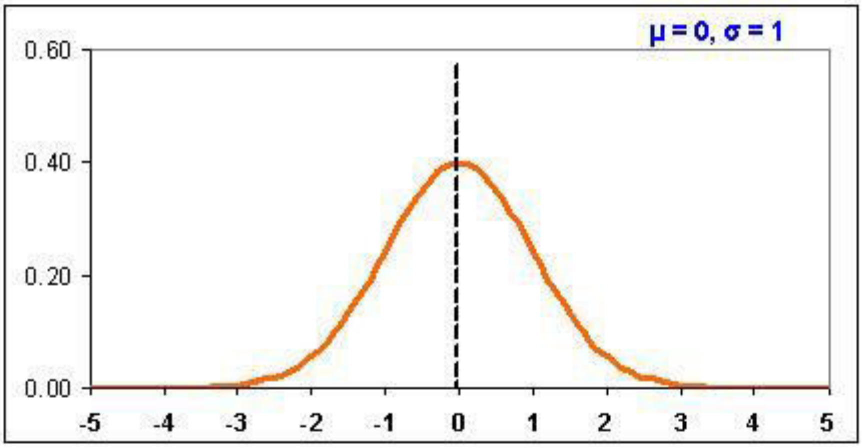

Figure-2. Standard normal distribution curve.

5. TEXTURE ANALYSIS

Texture is an important feature of medical image analysis. Despite its importance it does not there is a common and convincing definition of texture. The researchers tried to formulate many definitions texture: The idea of texture appears on the basis of three component:

a) The replication of some local organization over a large area compared to the size of the organization.

b) Regulation is included in a non-random order of primary parts.

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c) The parts of uniformity entities of roughness have almost the same dimensions everywhere within an area.

Textureanalysis is important in many image analysis applications,for sorting, detecting, or segmentation images based on the local location patterns of the edge orthe color[13]. Fabrics can be seen as a mixture of different basic patterns or functionsLocal with some random diversity. The tissues have an implicit power because they are based on ideas the choice of tissue analysis method to extract properties is very important for success.Classification of tissue. Several methods have been proposed to derive tissue features from them based on fractal features [14].The specifications of tissue are produced by human understanding or by research of a simple model orThrough a statistical process to generate tissue [15].

6. ITERATED FRACTALS SYSTEM

Iterated Function System (IFS) fractals are made based on straightforward plane changes: scaling, separation and the plane tomahawks pivot. Making an IFS fractal comprises of following advances:

a) characterizing an arrangement of plane changes

b) drawing an underlying example on the plane (any example)

c) changing the underlying example utilizing the changes characterized in initial step

d) changing the new picture (mix of introductory and changed examples) utilizing a similar arrangement of changesrehashing the fourth step however many circumstances as could be expected under the circumstances (in principle, this strategy can be rehashed an unending number of time.The most well known IFS fractals are the Sierpinski Triangle and the Koch Snowflake as shown in Figure-3[16].

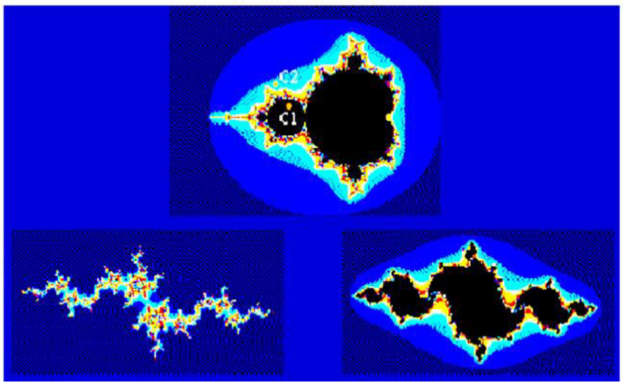

Figure-3. Sample of iterated fractals system.

$$T[x, y] = A[x\ y]T + [e\ f]T \tag{2}$$

Where xn ∊ { w1(xn-1),w2(xn-1),....,wN(xn-1) } for n = 1,2,3....

$$A == \begin{pmatrix} a & b & g \\ c & d & h \\ e & f & k \end{pmatrix}$$

Pi means the probability

7. ADAPTIVE CONTRAST ENHANCEMENT FILTER

One of the most common methods used in image processing is the use of filters. The filter applies either to all elements of the image which is considered as one unit image and is called this method In some applications, however, general processing does not meet the desired result, (Global Enhancement)(Sub Images) so local processing is used as the image is divided into small parts [17].The algorithm is then applied to each window, this is called local improvement (ACE) we applied the improved contrast filter, [Local Enhancement]

Overall and local optimization, in general this method optimizes the image depending on variables(Mean general and especially applied to the image, where the total rate of the image is found Calculated by combining the value of each element in the image and then dividing the result by the value of the value)Standard Deviation calculates the total elements, and then the standard deviation of the image is found each box calculates the difference between the value of the element and the image rate and then divides the number of elements minus One is taken as the square root of the output, and the equation of optimization depends on two(variables) 0.1and then apply the optimization equation on all the image points to obtain (k1, k2) On the new image we list the following algorithm filter method[18]:

$$Mg = 1\backslash m * n \sum_{(r,c)}^{X} g(r,c) \tag{3}$$

$$ACE = K1[Mg\backslash Gg](g(r,c) - Mg) + k2Mg \tag{4}$$

$$\text{MSE} = 1\backslash N^2 \sum_{x=0}^{n-1} \sum_{y=0}^{n-1} f(x,y) - f\text{^}(x,y) \tag{5}$$

$$\text{SNR} = 10\ \log_{10} 255^2/MSE \tag{6}$$

8. RESEARCH PROCEDURE

In this study, 30 samples of medical images were used for the purpose of distinguishing these images using the effective filter, the fracture filter, the noise 30% and 70% of the images and comparing the filters in the spatial field. The main function is to force the light, which has a very special light intensity, to be more similar to the adjacent values. Thus, we effectively remove the intensity of the noise, which appears isolated in the filter window as shown in Figure-4,5. The filter technique reduces noise in medical images by increasing the light on the images. In

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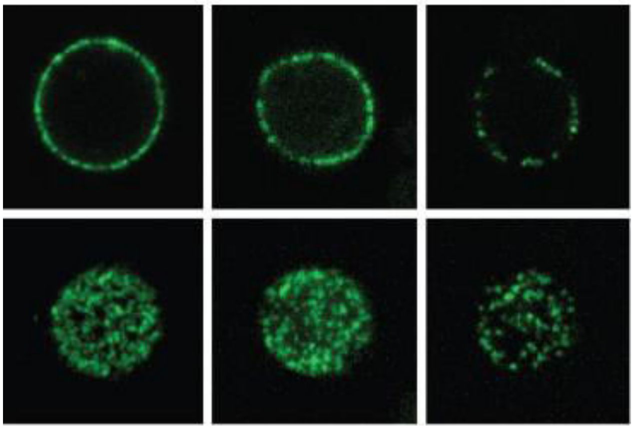
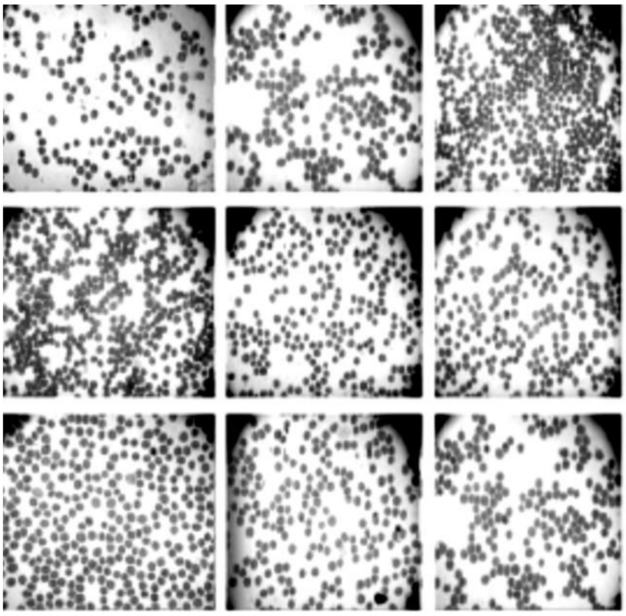
applying equations 2, 3, and 4; we obtain a method (IFS) for improving medical images as shown in Figure-6:



(a) (b) (c)

Figure-4. Sample method of medical images (a)Application of IFS filter, (b) edge detection of filter.



(a) (b) (c)

Figure-5. Sample method of medical images (a)Application of adaptive filter, (b)Application edge detection.

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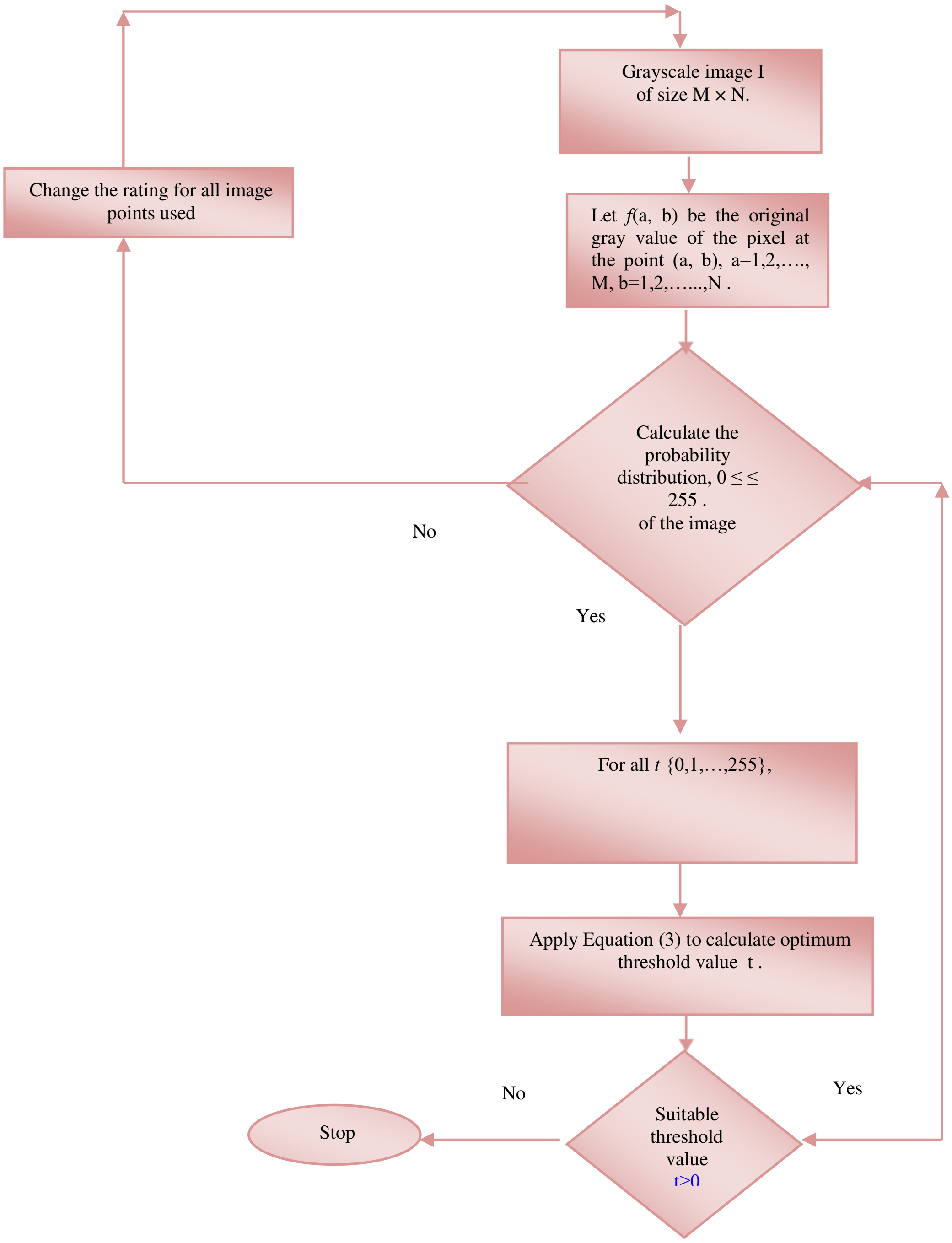

Figure-6. The function demonstrates steps to execute a method(IFS)

In order to obtain better results in the separation of the medical images used, the fuzzy method was compared to determine the accuracy between the two methods.

This method shows the high accuracy in the separation of the medical images used and the Figure-7 shows the steps of the method.

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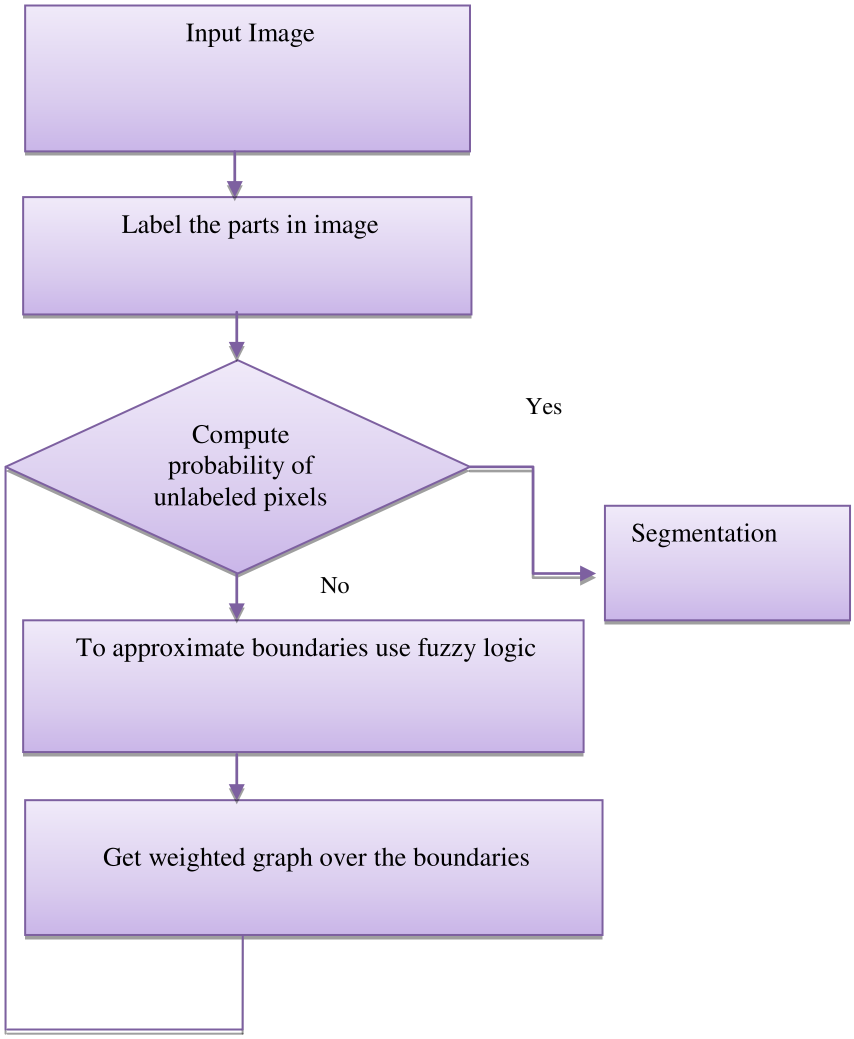

Figure-7. Fuzzy system.

Framework inputs: These are fresh qualities. These are changed into fluffy sets in the fuzzification step.

Framework outputs: These are the consequences of defuzzification step, i.e. change over yield fluffy sets back to fresh esteem.

Fuzzification: In this, fresh qualities are changed into the level of participation for semantic qualities, for example, far, close, little, huge; of fluffy sets.

Learning base square: This Square performs conglomeration of recommendations having etymological factors; standards can be indicated as :

If(x is an) and (y is b)…..at that point z is) c)

Fluffy interface engine: It consolidates actualities of fuzzification and information base and lead fluffy thinking process .

Defuzzification: This procedure changes over the outcomes back to certifiable qualities.

Yes

Th Yes ı of the physic system is shown in Figure-8.

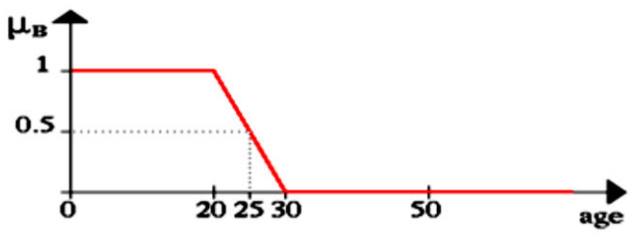

Figure-8. The membership function.

9. RESULT AND DISSECTIONS

The results were compared with other edge detection devices in the image by noise %30and a 50% noise ratio as shown in Figure-9.The proposed schema performance is evaluated through simulation results. Using MATLAB without pretreatment. The proposed algorithm

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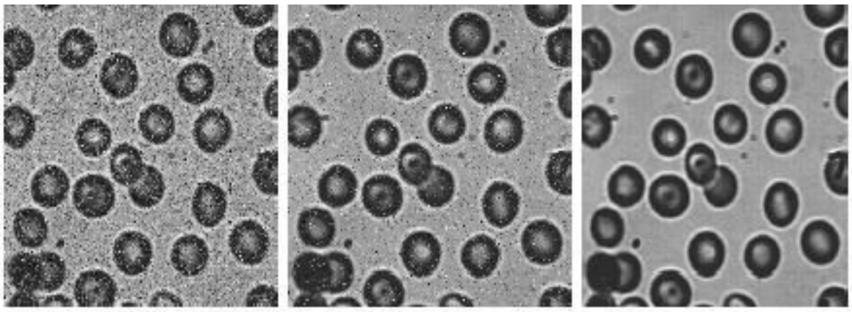
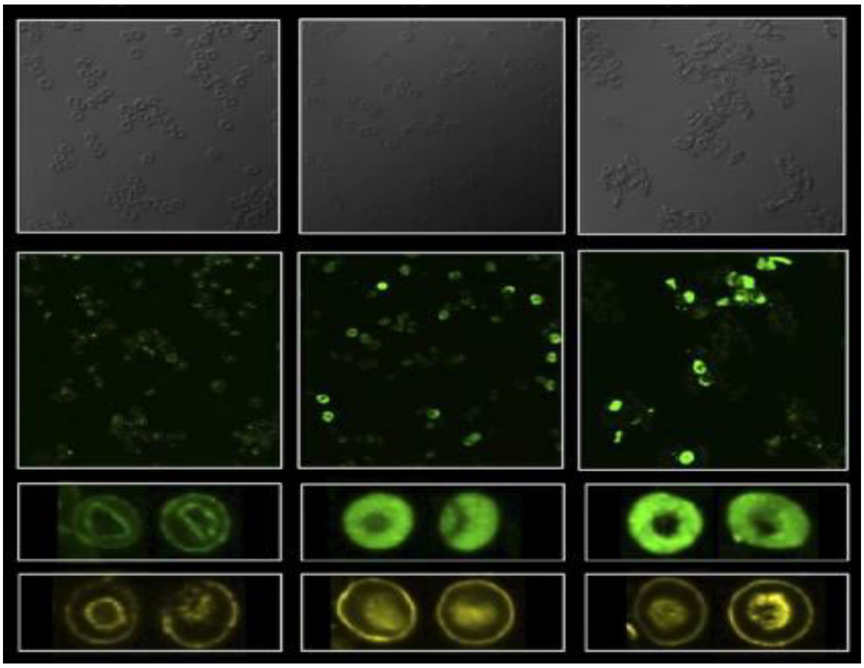
of applying the IFS filter as an application to the randomized duplicate function of the image was also tested and calculated .Average run-time of the air conditioner filter and proposed method.That the proposed algorithm works effectively compared to the operating time of the traditional method as shown in Figure-10, the algorithm shows greater flexibility for a high level of noise.

Performed improvement of a picture can be by improving its edge structures. In this work, a versatile quick lifting wavelet thresholding in light of neighbourhood difference and edge examination was created for picture clamour improvement.To show this approach, standard therapeutic pictures were utilized. The nature of the demising can be unbiasedly by utilizing the mean squared blunder (MSE), and pinnacle motion to-noise ratio (SNR) as delineated in Equation (5).



(a) (b) (c)

Figure-9.(a) Medical images with 70% noise (b) Application of fuzzy method of images,(c) Application of the iterated function (IFS) method of images.

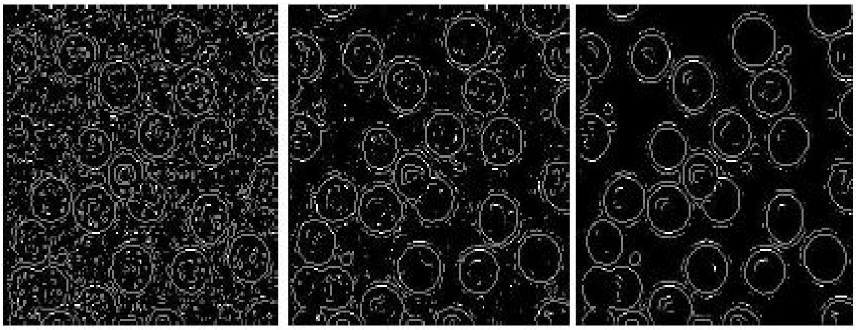


(a) (b) (c)

Figure-10. (a) Medical images with 30% noise (b)Application of fuzzy method of images,(c)Application of the iterated function (IFS) method.

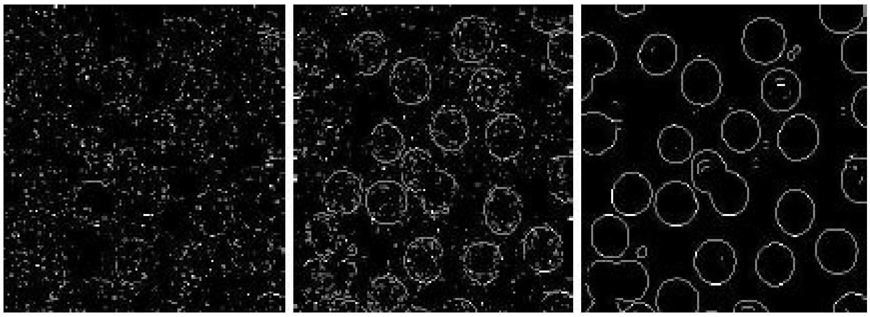
The edges of the medical images used in the search were exposed using the adaptive filter and Figure-11 shows the method. Figure-12 shows the edges of the medical images using the IFS filter and equation number (2).These filters are important applications of fractional geometry and are based on the enhancement of the image parameters by using the high frequency optimization filter. It enhances all edges with focus on the edge to be displayed using the fractal parameter of all the images used and compared with the fractal laboratory of the image containing noise and image the optimization process was carried out by applying the work box (5 * 5), (7 * 7) to the dimensional images (32 * 32) and applying the equation below but for the division of medical images using the fractional method, it gave better results.

From the results of edge detection techniques this leads to more division well on all medical images.



(a) (b) (c)

Figure-11.(a)Original medical images with 30% noise (b)Application of adaptive filter method of images, (c)Application of the iterated function (IFS) method of images.



(a) (b) (c)

Figure-12.(a) Original medical images with 70% noise (b) Application of adaptive filter method of images, (c)Application of the iterated function (IFS) method of images.

Through the study of textile images resulting from the application of algorithms and dependent methods. It turns out that windows with small dimensions are more useful when applied to images contain soft tissues and windows with large dimensions are more useful when applied to images containing rough tissues. As shown in the Figure-13. Use of quantitative standards the noise-to-noise ratio (SNR), which depends on the error box, the mean (μ) and the standard deviation (the measure of the quality of the performance of the techniques for processing and improving the images. In application of Equation (1) it is possible to calculate or apply the statistical method the results showed the importance of using the repeated fractional function, Table-1Comparison of the standard distribution in FUZZY and purposed method based on IFC and Table-2 illation scale factor and time taken. The results showed that the adaptive filter had a significant effect in the time of implementation of the candidate, tests also showed that the fractional algorithm for the capacity in reducing the signal to noise ratio.

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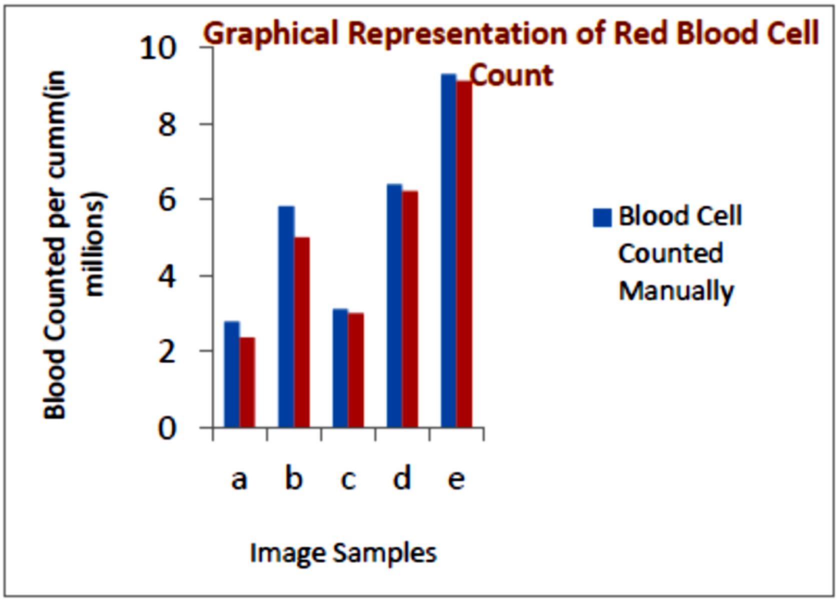

Figure-13. Classification ratio and result.

Table-1. Comparison of the standard distribution in the fuzzy method and IFC function.

Fuzzy method	IFC method	Image set
0.49595	1	Set 1
0.49605	1	Set 2
0.49344	1	Set 3
0.49602	1	Set 4
0.49326	1	Set 5
0.45605	0.95286	Set 6
0.49591	1	Set 7
0.49156	1	Set 8
0.49591	1	Set 9
0.49595	0.87857	Set 10

Table-2. Illation scale factor and time taken.

Image set	Number of iterations	Scale factor	Time taken
Set 1	4400	0.024	1047.85
Set 2	82000	0.202	1079.57
Set 3	219000	0.517	1214.45
Set 4	343000	2.035	1447.575
Set5	666000	3.045	2884.685

10. CONCLUSIONS

A) The proposed method of using the cores is effective and can be easily implemented in medical facilities anywhere. The current program can be modified to take account of its forms and sizes for medical images. Additionally studies will be centered on entire platelet check i.e. an aggregate check of the quantity of red platelets, in the blood test. This can be effectively done by adjusting the present programming to consider their diverse shapes and sizes.

B) The measurement of variance is a normal transverse product when separating into two groups, and is calculated. As a difference between the average values of the two groups. This measurement has more to do with

tissue extraction of other local contrast measurements, such as maximum reduction for lower gray levels or Minimum standard deviation. When the tissue is extracted, the contrast measurement is used to get rid of
Tissue with little or no inconsistency.

C) The adoption of the analysis window with small dimensions leads to more precise details of the textile image, which leads to an increase in the number of tissues and more than if adopted analysis window with higher dimensions.

D) The program can be modified to handle multiple types and by using the multifractal(MFG) method to obtain a more accurate result additional studies will focus on treating whole blood cell images, red blood cells, white blood cells, and platelets in the blood sample. This can be easily done by modifying the current program to take account of its various forms and sizes.

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