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Analysis of Image Processing for Digital X-Ray

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Abstract - *The X-ray is capture for many reasons to diagnosis the disease. Therefore the accurate diagnosis of bone fracture is important aspects to the doctors in medical field. So digital x-ray images help to provide appropriate treatment. Normally X-ray images are used for bone fracture analysis. But sometime x-ray does not provide or diagnosis the disease because of noise in the image or blurring images. The aim of this paper is to develop an digital x-ray based on image processing system which gives a quick and accurate classification of disease based on the information gained from the digital x-ray images which are saved in computer image format like jpeg, png etc. Digital X-ray images are provide the accurate result. This image are recorded digitally and characterized by large size, wide dynamic range and high resolution. In this research paper, x-ray image can subjected to various degrees of noise reduction, compression and quality has been measurable provides accurate result in medical field.*

Key Words*: *Image Processing, Detector, Photographic Film, MRI, Noise, DICOM

1. INTRODUCTION

X-rays are important medical tool for doctors. X-rays are ionized forms of radiation which capture the image using rays. Doctors found that they could not get a detailed view of patient's body. Thus different technology like MRI or CT scans are used which are more expensive for viewing the detailed information. X-rays images do not give any medical data for organs or tissues, only an image of bones. MRI and CT scans can give more bone details than traditional X-rays. CT scan has ability of creating a 3-D image of bone structures while an X-ray creates a 2-Dimage bone structure. But MRI and CT scans are more costly which not affordable to the patients. So that digital x-ray technology is solution for the x-ray which shows 3D digital image structure. Digital x-ray is also called as digital radiography.

Digital x-ray can widely used in medical technology. Digital x-ray is use for digitally enhancing, altering, improving quality of image or transferring image from one place to another. Digital x-ray is advance technology. Of x-ray that is traditional photographic film which are less efficient. Digital x-ray is capture the bone/chest x-ray images and convert it in the form of digital files but sometimes digital images are not clear so that before saving the digital x-ray image noise reduction techniques applied on the image and improve quality the image so that it is easy for doctor to diagnosis the diseases efficiently and immediately. Digital x-ray is a used to capture the images, scanned the image or stores the image in digital format like jpeg, png etc. so it is useful to diagnosis the disease of the patients. But digital x-ray images contains noise like gaussian noise or salt and paper noise so that sometimes it's not gives the clear view of the x-ray image. Therefore for improving the quality of images, this is important to remove the noise from the image so that image gives the clear view of bone structure.

The database of image is DICOM images. In most of hospitals, digital x-ray images are stored in the DICOM format which stands for Digital Imaging and Communications in Medicine which contains text into the images. Any attempt to retrieve and display these images needs to go through PACS (Picture Archives and Communication System) hardware.

2. LITERATURE REVIEW

There are different research papers which were developed for x-ray images, noise reduction images, different filtering image algorithms, quality of images.

In this chapter, a broad description of literature is presented. Starting with the paper Ravi Kumar at [1] Analysis Of Various Quality Metrics for Medical Image Processing represents comparison of various quality metrics for medical images. They can be explain these techniques using sample application. Then M.V.Bramhananda Reddy, 2Varadala.Sridhar, 3M.Nagendra at [2] Dental X-Ray Image Analysis by Using Image Processing Techniques presents the image processing for dental x-ray. They was explains algorithms and process using specialized image processing software.

Ajay Kumar Nain, Surbhi Singhania,Shailender Gupta and Bharat Bhushan at [3] A Comparative Study of Mixed Noise Removal Techniques shows that the comparative study of mixed de-noising techniques. They perform various performance metrics such as MSE, PSNR, MAE and time complexity to evaluate the efficacy of these techniques. Arpita Mittal1 and Sanjay Kumar Dubey2 [4] represents the

radiographic Image Processed based methodology presented the results that are obtained from the clinical trial data.

3. IMPLEMENTATION OF DIGITAL X-RAY IMAGE WITH NOISE REDUCTION TECHNIQUES

The digital X-ray images are captured for fractured bones or any other health problems view in detail.

Fig -1: Digital X-Ray Flow Diagram

Digital x-ray is medical tool technology which tool is used to capture the images, scanned or stores the image in computer. Thus digital X-ray is used for diagnosis the disease for checking the patients quickly. But digital x-ray images contain noise so that sometimes it's not gives the clear view of x-ray images. Thus reducing the noise and improve the quality of the images are both important thing in digital so that image gives the clear view of bone structure. Therefore proposed research paper can be gives the idea related to digital X-ray to reduced the image noise and enhanced the image quality so that it's easy for doctor to analysis the patient problem in detail.

There are different processes to capture digital x-ray image and reduce the noise with enhancing the quality of image.

1) Capture Digital X-ray Image

2) Image Preprocessing

3) Noise Reduction

4) Image Edge Detection

5) Image Feature Extraction

3.1 Capture Digital X-ray Image

Digital X-ray is X-ray imaging. In digital x-ray, digital X-ray sensors chips are used instead of traditional photographic film used to capture the x-ray. Digital x-ray required less radiation which is used to be producing an image of similar contrast to conventional x-ray. Digital x-ray not used X-ray film, instead of digital x-ray uses a digital image capture device. This device gives immediate image preview and availability of images and eliminates cost of film processing steps as well as the ability to perform image processing techniques that enhance overall display quality of the image.

There are two digital image capture devices:

a) High-density Line-scan Chip:
This is detector chip which records the X-ray energy and is scanned by a laser diode to excite the stored energy and released it then read out by a digital image capture array of a CCD.

b) Flat Panel Chip:
This detector converts X-rays to light. The light is channeled through the a-Si photo diode layer. These light is transfer to a digital signal. The digital signal is then read by thin film transistors (TFTs) or fiber-coupled which are stored in digital format.

3.2 Image Preprocessing

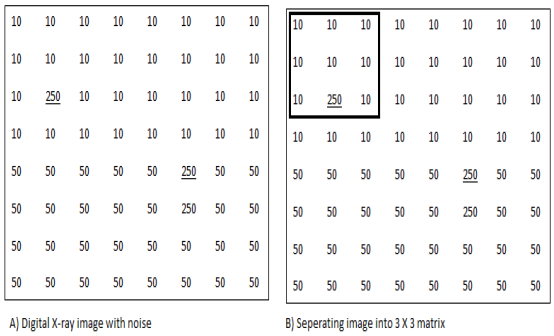
After capturing the X-Ray images, we are applying the preprocessing techniques on digital images like RGB to Gray scale conversion and used appropriate filtering techniques. In this research paper, Gaussian filter is used to image enhancement or noise reduction. In Noise, gray scale power is directly proportional to the variance. So that different values of noise variances are taken for the purpose of improving the image.

3.3 Noise Reduction

During capturing the x-ray image, some noise can be added on image like blur the image, some black dots on images or unwanted effects on the image. There are multiple noise during capturing the images but in X-Ray images mostly Gaussian noise and Salt and pepper noise presents. To reduce the noise, digital median filtering technique is used.

I. Separating the image into matrix:

Divide image into the 3 x 3 matrix because noise image on images are not spread across the image. Noise spread on some part of the image. This method applied on digital X-ray image which has noise as follows given be,



A) Digital X-ray image with noise

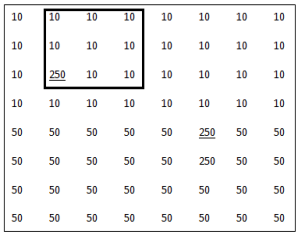
B) Seperating image into 3 X 3 matrix

II. Calculating the median from matrix pixel:

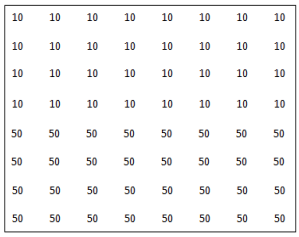
Each matrix is considered as single image. So calculate its median based on gray value pixels. So that arranges the 3 X 3 matrix of 9 pixel in ascending or descending order and choose the median from these nine values and place this median at the center of mask.

Then move the mask in similar fashion to averaging the filter. In median filtering, gray level of center pixel is replaced by median value of neighborhood. So that arrange the pixel in ascending or descending order so we get (10,10,10,10,10,10,10,250).

Then select the median of the 3 x 3 mask on 5th place as 10. Place median value at the center. Now move the mask to new location as shown in figure(C) and continue the process. Performing operation on all 3 X 3 masks, we get final image as figure (D).Using this method noise gets eliminated without distorting the edges.



C) Mask move to next location



D) Output images without noise

III. Median Filter Algorithm:

Median Filter on X-Ray image with salt and white paper pschudocode as follows:

1) clear all

2) I=imread(”image.tif”);

3) J=imnoise(I,’Salt & Paper’,0.02);

4) a=double(J);

5) b=a;

6) [rowcol]=size(a);

7) for x=2:1:row-1;

8) for y=2:1:col-1;

9) To make 3x3 mask into 1x9 mask :

a1=[a(x-1,y-1) a(x-1,y) a(x-1,y+1) a(x,y-1) a(x,y) a(x,y+1) a(x+1,y-1) a(x+1,y) a(x+1,y+1)]

9) a2=sort(a1);

10) median=a2(5)....the fifth value is median

11) b(x,y)=median

12) end

13) end

IV. Combine all matrix images as one image:

All matrix images are combined to form a one single image which is noise reduced image.

3.4 Image Edge Detection

Edge detection operation reduced the pixels and save the images. Edge detection is the method of identifying points where image brightness changes sharply, or blur more etc. Edge detection has two methods as gradient which uses first derivative of x-ray images and Laplacian which used second derivative of images to find edges.

3.5 Image Feature Extraction

We are uses the Gray Level Co-occurrence Matrix (GLCM) method to extract textural features which entropy, contrast, correlation, homogeneity.

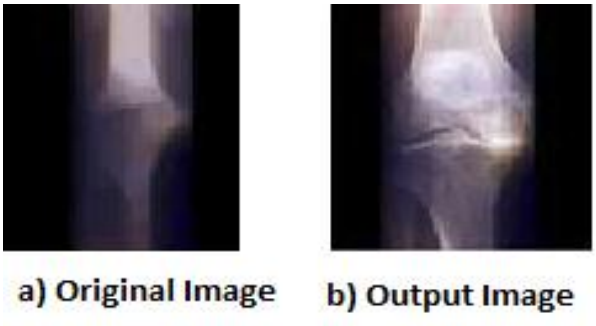


Fig -2: Digital X-Ray Image

4. RESULTS

The result of all above processing images are shown in Figure 2(a) is original image of normal X-ray and Figure 2(b) shows the digital x-ray image with noise reduced and quality image which help to the doctor to view the clear image of bone. The proposed techniques have tested of collection of digital x-ray images. In this research paper tested 5 X-ray in that 4 digital x-ray shows the clear and details information about bone disease. This process gives the approximate 85 percentage result accurately.

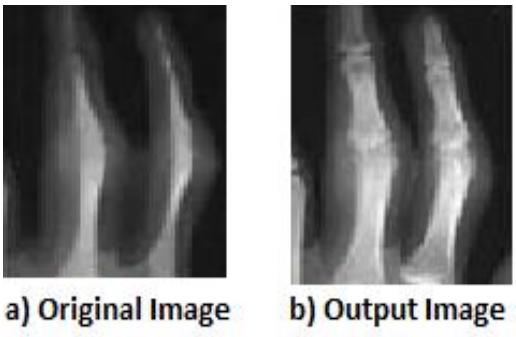


Fig -3: Digital X-Ray Image Quality

5. CONCLUSIONS

This research paper shows the digital x-ray image capturing and show these images on computer using different detector chips which are connected to the X-ray films and saved it in the digital format with reduced the noise from the digital x-ray image and enhanced the quality of images so that its gives the clear image of the bones. This implementation can be tested on set of patient's bones and result can be calculated on based of research paper. After doing analysis on images, it shows that result is satisfactory and image quality can be improve images. The future enhancement is digital x-ray can be implemented in 3D view using different techniques.

REFERENCES

[1] Analysis Of Various Quality Metrics for Medical Image Processing Ravi Kumar Volume 2, Issue 11,November 2012, ISSN: 2277 128X.

[2] Dental X-Ray Image Analysis by Using Image Processing Techniques M.V.Bramhananda Reddy, Varadala.Sridhar, M.Nagendra and Roy Volume 2, Issue6.

[3] A Comparative Study of Mixed Noise Removal Techniques Ajay Kumar Nain, Surbhi Singhania, Shailender Gupta and Bharat Bhushan, International Journal of Signal Processing, Image Processing and Pattern Recognition Vol.7, No.1 (2014), pp.405-414.

[4] International Journal of Innovative Research in Computer and Communication Engineering-Comparative Analysis of Image Quality Assessment Using HVS Model (A ISO3297: 2007 Certified Organization) Vol. 2, Issue 7,July 2014.

[5] Image Quality Assessment Techniques Nisha, Sunil Kumar, Department of Electronics and Communication Engg., DCRUST Murthal, Sonepat (Haryana), India Volume 3, Issue 7, July 2013.

[6] Analysis of MRI Images of Rheumatoid Arthritis through Morphological Image Processing Techniques Arpita Mittal Amity University,Noida and Sanjay Kumar Dubey Assistant Professor,Amity University,Noida IJCSI International Journal of Computer Science Issues, Vol.10, Issue 2, No 3, March 2013.ISSN(Print): 1694-0814 — ISSN (Online): 1694-0784

[7] Detection of Bone Fracture using Image Processing Methods Anu T C, Mallikarjunaswamy M.S. Department of Instrumentation Technology