ABSTRACT

Kidney stone problem (nephrolithiasis) is a common type of urological disease with a high recurrence rate.This disease is a progressive disease that damaged the kidneys leading to be permanent and undone problem. Therefore, it is vital to identify kidney stone disease before the permanent damage is done. If the stone problem is caught in the early stage, kidney disease can be treated very effectively. So, stone diagnosis is vital not only treatment of kidney disease but also management of recurrent stone formation. Hence early detection of kidney stone is essential Ultrasound imaging is one of the available imaging techniques used for diagnosis of kidney abnormalities, which may be like change in shape and position and swelling of limb. During surgical processes it is vital to recognize the true and precise location of kidney stone. The detection of kidney stones using ultrasound imaging is a highly challenging task as they are of low contrast and contain speckle noise. This challenge is overcome by employing suitable image processing techniques. The ultrasound image is first preprocessed to get rid of speckle noise using the image restoration process. The restored image is smoothened using Gabor filter and the subsequent image is enhanced by histogram equalization. The preprocessed image is achieved with level set segmentation to detect the stone region. Segmentation process is employed twice for getting better results; first to segment kidney portion and then to segment the stone portion, respectively. The results are analyzed using MLP-BP ANN algorithms for classification and its type ofstone.

Key words : Ultrasound image, Image processing, Image segmentation, Artificial neural networks.

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1.INTRODUCTION

Kidney stone disease is one of the major Life threatening ailments persisting Since kidney malfunctioning can be menacing, diagnosis of the problem in the initial stages is advisable. Ultrasound (US) image is one of the currently available methods with noninvasive low cost and widely used imaging techniques for analyzing kidney diseases.The ultrasound image is first preprocessed to get rid of speckle noise using the image restoration process. The restored image is smoothened using Gabor filter and the subsequent image is enhanced by histogram equalization. The preprocessed image is achieved with level set segmentation to detect the stone region. Segmentation process is employed twice for getting better results; first to segment kidney portion and then to segment the stone portion, respectively. Kidney Stones: Kidney stone has the chance of happening in half of people and in about portion of them gets clinically critical manifestations, which incorporates impeding simple stream of urine, swellings inside the kidney, torment in back or flank side of the low back, even queasiness, retching, and perspiring. The clinical name of the arrangement of kidney stone is NephrolithiasisIt is the collection of salts and certain minerals primarily comprised of calcium and uric corrosive in urine. It is caused because of deficient admission of water. Kidney stone fundamentally happens when our body needs liquid however collects a ton of wasteDiabetes, high circulatory strain and corpulence may expand the danger of kidney stone in a person.Ultrasound (US) picture is one of the as of now accessible strategies with noninvasive minimal expense and generally utilized imaging procedures for breaking down kidney infections.We present our strategy in the execution of US imaging for the assessment of kidney stone go and recognize that different conventions work similarly well. It is normal that these conventions will be altered over time as new hardware opens up**.** Rahman and Uddin have proposed lessening of dot commotion and division from US picture. It not just distinguishes

3.IMAGE SEGMENTATION

3.1 Introduction

In digital image processing and computer vision, **image segmentation** is the process of partitioning a digital image into multiple segments (sets of pixels, also known as image objects). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region are similar with respect to some characteristic or computed property, such as color,intensity, or texture. Adjacent regions are significantly different with respect to the same characteristics. When applied to a stack of images, typical in medicalimaging, the resulting contours after image segmentation can be used to create 3Dreconstructions with the help of interpolation algorithms like marching cubes.

Applications

Some of the practical applications of image segmentation are:

- Content-based imageretrieval[4]
- Machinevision
- Medical imaging, including volume rendered images from computedtomography and magnetic resonanceimaging.
    - Locate tumors and other pathologies
    - Measure tissuevolumes
    - Diagnosis, study of anatomicalstructure

3.3 Reaction Diffusion LSS

The RD equation is constructed by adding a diffusion term into the conventional LSE equation. Such an introduction of diffusion to LSE makes LSE stable without reinitialization. The diffusion term "$\varepsilon\Delta\phi$" was added to the LSE equation (3).

RD Level Set Segmentation Algorithm

(1) Initialization is as follows: $\phi n = \phi 0, n$.

(2)Compute0n+1/2asϕn+1/2=ϕn=$\Delta t2(\phi n)$.

(3) Compute 0n+1as ϕn+1/2=ϕn +$\Delta t2(\phi n)$.

(4) If 0n+1 satisfies stationary condition, stop; otherwise, n=n+1 and return to step (2):

$\phi n = \phi n$+1/2 .

From the analysis in DRLSE and RD, the equilibrium solution of (10) is seen t as $\varepsilon \to 0+$, which is the characteristic of phase transition. On the other hand, the said equation intrinsic problem of phase transition, that is, the stiff parameter $\varepsilon -1$, makes (10) difficult to implement. In TSSM section, we propose a splitting method to implement (10) to reduce the side effect of stiff parameter $\varepsilon -1$.

Speed of Segmentation. For the reinitialization methods, (4) should be iterated several times to make the LSF be an SDF while keeping the zero level set stationary. This is highly time-consuming for the reinitialization methods. The GDRLSE methods are computationally much more efficient than reinitialization method. Equation (8) in each iteration of the computation of GDRLSE includes two components: the regularization term and LSE term driven by force F, in each iteration of RD method; the computation also includes two similar components. The only difference is that we split the computation into two steps: first compute the LSE term, and then compute the diffusion term. Therefore, the computation complexity of RD is similar to that of GDRLSE methods and, using Xilinx system generator.

CHAPTER 4 METHODOLOGY

4.METHODOLOGY

4.1 Introduction

Figure 4.1 shows the general square outline of the proposed technique. It comprises of the accompanying squares by means of kidney image data set, image preprocessing, image division, wavelet preparing, and ANN arrangement.

Kidney Image Database. Kidney image information base comprises of almost US kidney images gathered from various people of different emergency clinics. It comprises of both typical also, strange images put away in the information base. One of the images is chosen from the information base and exposed to stone discoverymeasure.

Image Preprocessing. The point of preprocessing is to improve the gained low difference ultrasound image with spot clamor. It smothers the undesired mutilations and improves certain image highlights critical for additional processing and stone location. Without preprocessing, the US image quality may not be useful for examining. For careful activities, it is fundamental to distinguish the area of kidney stone precisely. Preprocessing assists with defeating this issue of low difference and dot clamor decrease. Figure 4.2 shows the means associated with preprocessing of US image, which are as follows:

(1) Imagerestoration,

(2) Smoothing andsharpening

(3) Contrastenhancement.

4.2 Image Restoration

Image restoration is intended to mitigate the debasement of the US image.Corruption might be because of movement obscure, commotion, and camera misfocus. The principle motivation behind picture rebuilding is to decrease the corruptions that are caused during securing of US examining. In this framework, level set capacity is utilized for appropriate direction. Utilizing plane bend movement, bend smoothers, recoils are ultimately eliminated Image restoration is not quite the same as image improvement in that the last is intended to underline highlights of the image that make the image more satisfying to the eyewitness, yet not really to create reasonable information from a logical perspective. Image improvement strategies (like difference extending or de-obscuring by a closest neighbor strategy) given by imaging bundles utilize no deduced model of the interaction that made the image. With image upgrade commotion can adequately be taken out by forfeiting some goal, however this isn't satisfactory in numerous applications. In a fluorescence magnifying instrument, goal in the z-heading is terrible all things considered. Further developed image handling procedures should be applied to recuperate the article. The target of image restoration strategies is to lessen commotion and recuperate goal misfortune Image handling procedures are performed either in the image area or the recurrence space. The most clear and an ordinary strategy for image restoration is deconvolution, which is acted in the recurrence area and subsequent to figuring the Fourier change of both the image and the PSF and fix the goal misfortune brought about by the obscuring factors. This deconvolution procedure, due to its immediate reversal of the PSF which normally has helpless grid condition number, intensifies commotion and makes a defective deblurred picture. Likewise, routinely the obscuring cycle is thought to be shift-invariant. Thus more complex methods, for example, regularized deblurring, have been created to bring to the table strong recuperation under various kinds of commotions and obscuring capacities. It is of 3sorts:

1. Geometric correction 2. radiometric correction 3. noiseremoval