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ULTRASOUND IMAGE ANALYSIS OF KIDNEY STONE AND RENAL CYST USING SVM AND KNN CLASSIFICATION

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Abstract— *Kidney stone detection is one of the major sensitive topic in this generation. There are several problems associates with this topic like low resolution of images, similarity of kidney stone and prediction of stone in the new image of kidney. Therefore, the image has to go through the pre-processing which normally contains image enhancement. The aim behind this operation is to find out the best quality of images, so that the identification becomes easier. Medical imaging is the major fundamental imaging, because they are used in increased sensitive in the field and the medical field and it must be accurate. In this project, we first proceed for the enhancement of the image with help of the median filter, Gaussian filter and un-sharp masking. The morphological operations such as erosion, dilation and entropy is based on segmentation is used to find the region of interest and finally we use KNN, SVM classification techniques for the analysis of kidney stone images and renal cyst.*

Keywords — US image of Kidney, Disease detection, Feature extraction, Classification-SVM, Classification-KNN, MATLAB.

I. INTRODUCTION

Kidney stone or Renal calculus is a solid piece of material formed due to the deposition of minerals in Kidney. A small stone may leave the body in the urine stream without causing symptoms. Renal cyst are round pouches of fluid that form on or in the Kidneys. Detection of Kidney stone and Renal cyst are challenging because of having low resolution image quality which is difficult to analysis by human as well as machine. That's why we choose to improve classification technique in In [11] Chen proposes a AMNP protocol that reduces the collision and interruption probabilities, and it uses the same frame format of IEEE 802.11 with some slight modifications but it lacks in reliable broadcast transmission. In [12] Lou proposes RBA (Reliable broadcast Transmission) with selected forward nodes to avoid broadcast storm and reduce broadcast redundancy. order to analyse best kidney stone detection. The image acquisition which is used to take image from the external source of system. Then the median filter is used to remove noise . Un-sharp masking is used for image sharpening. Image enhancement is required because the medical images in contrast form has poor quality. Image enhancement is essential for improving the perception of image information. IE transforms images to provide better representation of the subtle detail about the images. Here, a project is proposed with the idea of detecting Kidney stone and Renal cyst using image processing.

II. METHODOLOGY

In IEEE 802.11 DCF the MAC protocol is designed for sharing a single channel between the nodes. Nowadays most of the wireless devices are equipped with one half-duplex transceiver to transmit or to the system architecture for the kidney stone and Renal cyst detection and classification is shown in figure 2.1.

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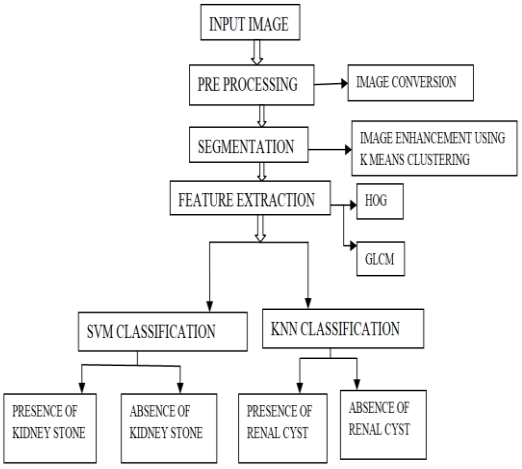

Figure 2.1: System Architecture for Image Processing

Ultrasound imaging is widely used in the area of diagnosis, image-guided intervention because it is noninvasive, portable, and versatile, it does not use ionizing radiations, and it is relatively low-cost. In the IOREWS method, the images can be resized to 256 x 256 pixels. The resized images are given as input . It is one of the critical tasks because ultrasound images have poor resolution quality and low contrast. In this operation we apply many methods to enhance and filter the image e.g., median and Gaussian filter for filtering the image, Un-sharp masking for sharpening. Morphological operations like erosion and dilation are used for finding the final segmented image.

Segmentation is first logical implementation in our research, which is generally used to find the region of interest on the behalf of some characteristic of the images. By using the characteristic of images and its features we are able to find the region where kidney may be suspected. After the image enhancement process, the image pixel values are grouped by the K-means clustering. K-means is one of the simplest unsupervised learning the algorithms should solve process of the well known clustering problem. K-means clustering is one of the method of cluster analysis which partitions or divides the number of observations into k clusters. Every observation should be belongs to cluster with nearest mean. The grouping should be done by minimizing the sum of the square of distance between data and corresponding to cluster centroid. The main purpose of the K-mean clustering is to classify the data. HOG (Histogram of Oriented Gradients) can be used for object detection in an image. The histogram equalization is utilized to enhance the image contrast, therefore the image seems to be clear and the kidney region can be easily found because the kidney region is darker than other area of the image. The contrast enhanced image by the histogram equalization. Grey Level Co-occurrence Matrix (GLCM) gives the spatial relationship between adjacent or neighbouring pixels. Textural properties can be calculated from Grey Level Co-occurrence Matrix to understand the details about the image content. For Kidney stone, SVM classification is used. Support Vector Machine classification is a non probabilistic linear binary classifier, which can analyze input data and predict which of two classes it belong to. In order to differentiate between two sample Support Vector Machine build a hyper plan for separating the two classes which is of higher dimension. For Renal cyst, KNN classification is used. KNN is a non-

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parametric, lazy learning algorithm. Its purpose is to use a database in which the data points are separated into several classes to predict the classification of a new sample point.

III. RESULT

The input image of kidney stone and Renal cyst images are loaded and the pre-processing is performed. By using the matlab, the contrast of the image is improved in the enhanced and get the processed image and the output image to display the presence and absence of Kidney stone and Renal cyst. Firstly display the selection menu to detect the Kidney stone or Renal cyst in fig3.0 is shown below.

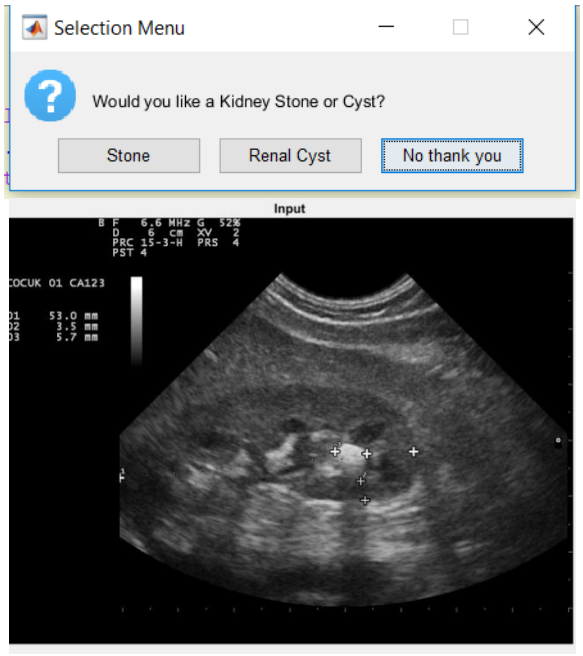

Figure 3.1 Input Image

Select the stone in the Selection menu and the kidney stone image have been given as an input image(fig:3.1) to detect the presence and absence of Kidney stone.

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Figure 3.2 Preprocessed Image

Figure 3.3 Enhanced Image

Figure 3.3 shows the Enhanced Image is shown in the Enhanced pair image to differentiate contrast after enhancement. The histogram of the Enhanced pair image is a graph showing the number of pixels in an image with different intensity value found in that image.

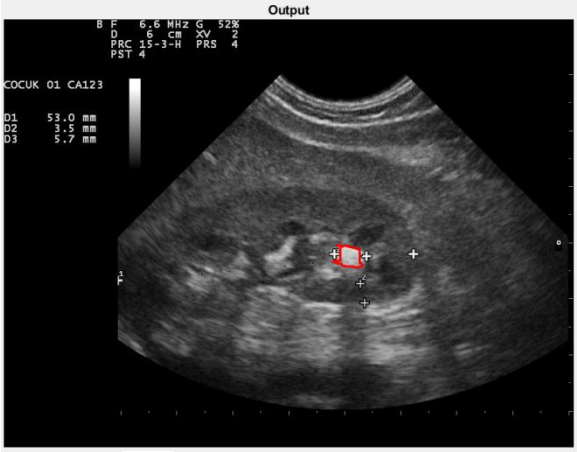

Figure 3.4 Output Image

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The Fig 3.4 shows the output image. The red box indicates the presence of Kidney stone.

The following procedure is also applicable for Renal cyst detection using KNN classification.

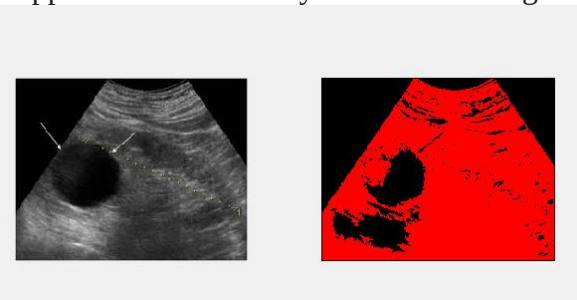

Fig 3.5 shown the input image and output image.

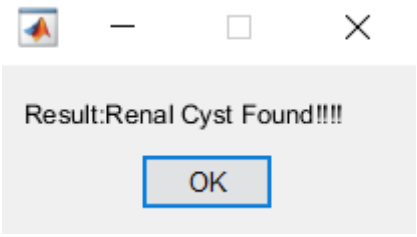

Fig 3.6 Result

The above dialog box(Fig 3.6) shown the presence of Cyst in the image.

IV. CONCLUSION

The present study detect the abnormality of Kidney(the presence and absence of kidney stone and Renal cyst)using image processing techniques in MATLAB. It involves loading an image, image pre-processing, image segmentation, feature extraction, and classification. The development of an automatic detection system using image processing facilitates to support the users in the identification of abnormality at an early stage and supply helpful data for its management.

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