Analysis The Effectiveness of Novel Development of Patient Assistive Tool For Detection of Abnormalities In Kidney Using SVM&ANN Classification Techniques

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Abstract- *Kidney stone disease is one of the major life threatening ailments persisting worldwide. The stone diseases remain unnoticed in the initial stage, which in turn damages the kidney as they develop. A majority of people are affected by kidney failure due to diabetes mellitus, hypertension, and so forth. Since kidney malfunctioning can be menacing, diagnosis of the problem in the initial stages is advisable. 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 pre-processed 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 pre-processed 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. Data mining techniques plays a vital role in different domains such as text mining, graph mining, medical mining, multimedia mining and web mining. The objective of this work is to predict kidney Stone diseases by using Support Vector Machine (SVM) and Artificial Neural Network (ANN). The aim of this work is to analysis the performance of these two algorithms on the basis of its accuracy and execution time.*

I. INTRODUCTION

Kidney stones form, when your urine contains more crystals-forming substance such as calcium, oxalate, and uric acid-than the fluid in your urine can dilute. At the same time your urine may lack substance that prevent crystals from sticking together, creating an ideal environment for kidney stone to form. Kidney stone, also known as a renal calculus is a solidpiece of material which is formed in the kidneys from minerals in urine. Kidney stones typically leavethe body in theurine stream, and a small stone may pass without causing symptoms.

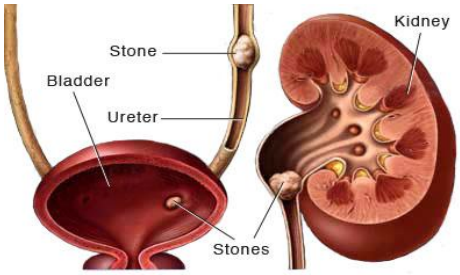


FIGURE:1 KIDNEY STONE

Kidney stone detection is challenging because of having low resolution image quality, which is difficult to analysis by human as well as machine. As we all know that medical cannot afford low accuracy that is why we choose to improve classification technique in order to analyze best kidney stone detection. The proposed techniques start with image acquisition which is used to take image from the external source of system. After first step we move to the median filter which is actually used to remove noise for the image. Sharpening of the image is done with the help of un-sharp masking. Generally medical images are poor quality especially in contrast form. Therefore it is required to enhance the image. Image enhancement (IE) is essential for improving the perception of image information

1.2 Symptoms of kidney disease:

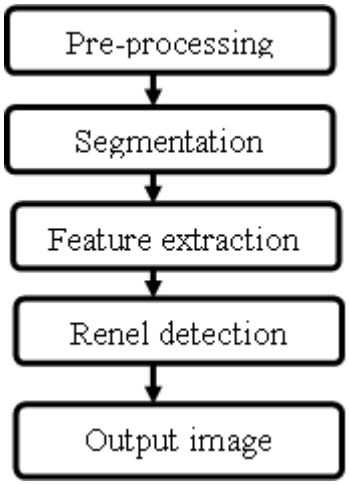
- Changes in your urinary function
- Difficulty or pain during voiding
- Blood in the urine
- Swelling & Pain in the back or sides
- Extreme fatigue and generalized weakness
- Dizziness & Inability to concentrate
- Feeling cold all the time

- Skin rashes and itching
- Ammonia breath and metallic taste
- Nausea and vomiting
- Shortness of breath

II. METHODOLOGY

It is a human health based concept and in the fields where we are using SVM techniques to detected the kidney stone .To investigate and implement the proposed method publicly, the available dataset and MATLAB computing is used for implementation. Principal Component Analysis is used for feature reduction. Classification is carried out using Multilayer Perceptron with different learning rate and Momentum. The proposed design consists of three sections.

- PREPROCESSING
- SEGMENTATION
- CLASSIFICATION & ANALYSIS



Flow diagram of proposed method

III. BLOCK DIAGRAM

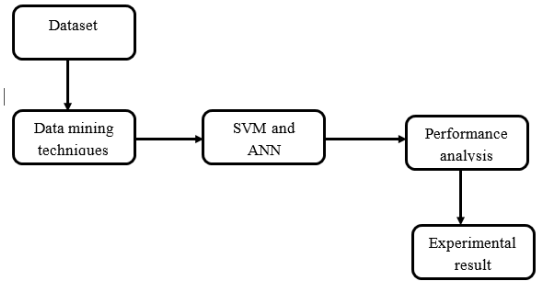


FIGURE:2 BLOCK DIAGRAM

3.1 Data set:

The dataset is collected from several medical labs, centres and hospitals. From this the mock kidney function test (KFT) dataset have been formed for study of kidney disease. This dataset contains four hundred instances and twenty five attributes are used in this comparative study. The attributes in this KFT dataset age, blood pressure, specific gravity, albumin, sugar, red blood cells, pus cell, pus cell clumps, bacteria, blood glucose random, blood urea, serum creatinine, sodium, potassium, haemoglobin, packed cell volume, white blood cell count, red blood cell count, hypertension, diabetes mellitus, coronary artery disease, appetite, pedal edema, anemia, class. This dataset consists of renal affected disease information.

3.2 Support Vector Machines:

Support Vector Machines (SVM) is a powerful, state-of-the-art algorithm based on linear and nonlinear regression. Oracle Data Mining implements SVM for binary and multiclass classification. The advantage of the SVM is that, by use of the so-called ‘‘kernel trick’’, the distance between a molecule and the hyper plane can be calculated in a transformed (nonlinear) feature space, lacking of the explicit transformation of the original descriptors. The radial basis function kernel (Gaussian kernel) which is the most commonly used was applied to this study. SVM 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 samples SVM build a hyper plan for separating the two classes which is of higher dimension.

3.3Artificial Neural Network:

Artificial neural networks (ANN)are computing systems vaguely inspired by the biological neural networks that constitute animal brains.The neural network itself is not an algorithm, but rather a framework for many different machine learning algorithms to work together and process complex data inputs. Such systems "learn" to perform tasks by considering examples, generally without being programmed with any task-specific rules. For example, in image recognition, they might learn to identify images that contain cats by analysing example images that have been manually labelled as "cat" or "no cat" and using the results to identify cats in other images. They do this without any prior knowledge about cats, for example, that they have fur, tails, whiskers and cat-like faces. Instead, they automatically generate identifying characteristics from the learning material that they process.

3.4Applications:

- Image Processing and Character recognition.
- Forecasting.

IV. RESULTS AND DISCUSSION

In this project based on multiclass problem according to this research these techniques should not be the only method to solve these practical problems. For that we use pre-processing, clustering, discrete wavelet transform, stationary wavelet transforms techniques and finally classify the image dataset with kidney stone detection or without stone. Because of training of the machine for both the type of image, now machine will able to predict the new kidney image that whether it is an ABNORMAL KIDNEY IMAGE that has stone or NORMAL KIDNEY IMAGE having no stone. Therefore, it reduces medical work for many check-up and all. With our proposed algorithm more than 98% we find correct classification result.

FIGURE:3 Normal Kidney Image

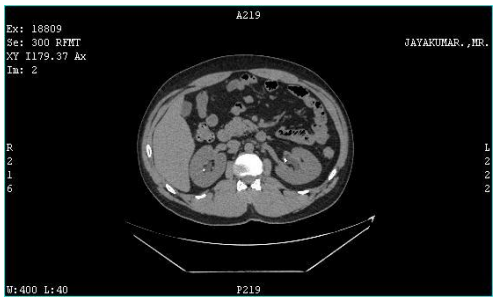


FIGURE:4Abnormal Kidney Image

OUTPUT:

Classify the abnormal CT image:

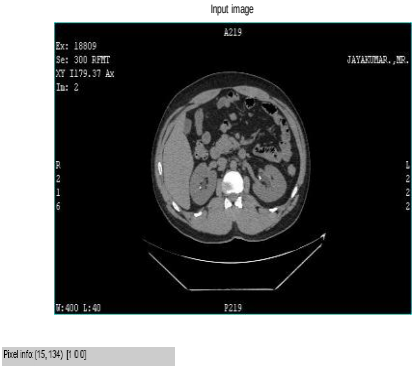


Figure:5 input image

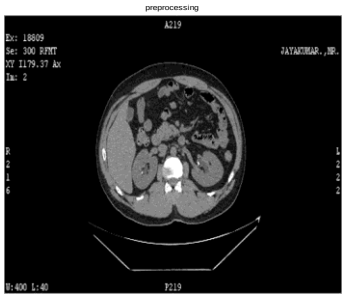


Figure 6 pre-processing image

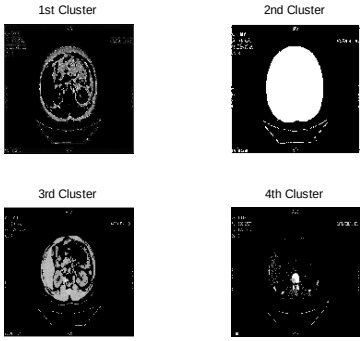


Figure:7Culstering image

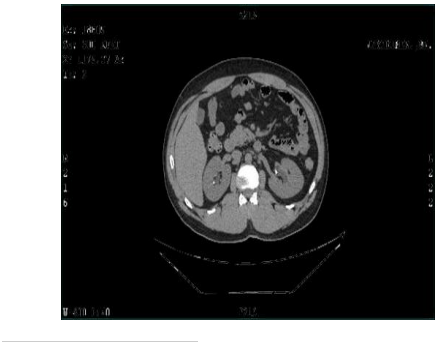


Figure:8 pre-processing image

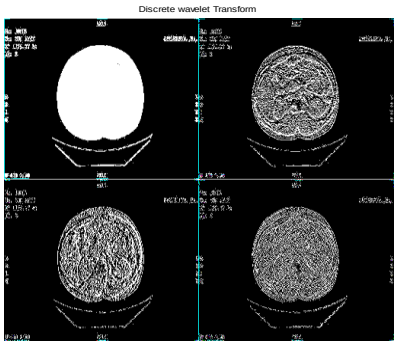


Figure:9 discrete wavelet transform

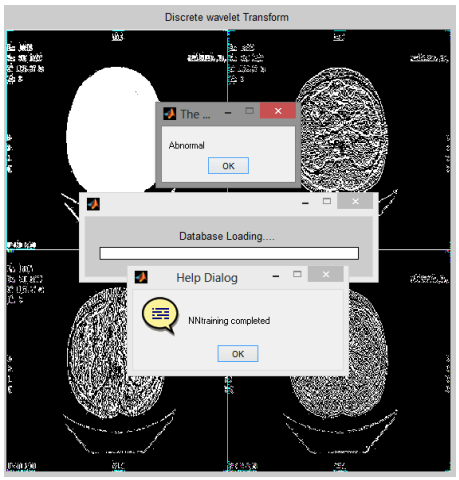


Figure:10 output image

Classify the normal ultrasound image:

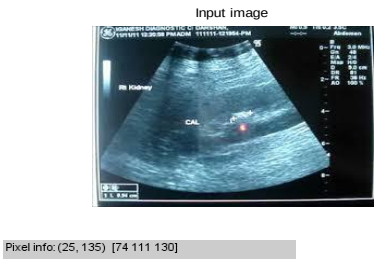


Figure:11 Input image

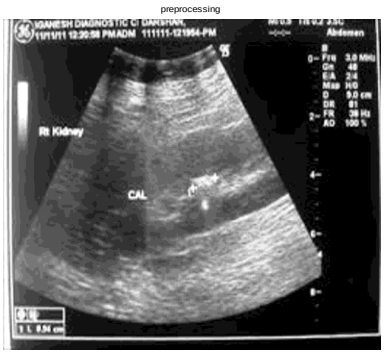


Figure:12pre-processing

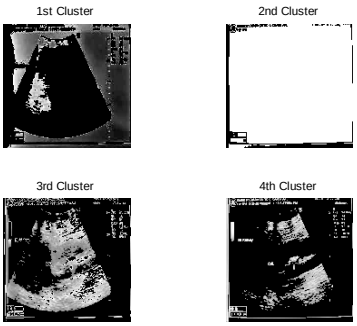


Figure:13 Clustering

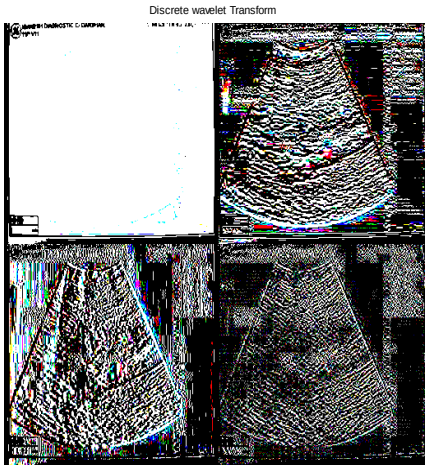


Figure:14 Discrete Wavelet Transform

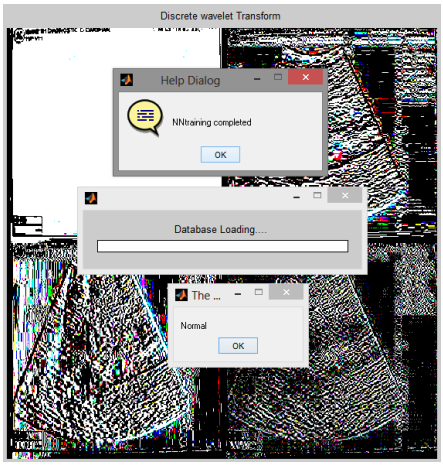


Figure:15 Output Image

V. CONCLUSION

In this work, kidney disease prediction system was developed using classification algorithms SVM and ANN through Mat lab data mining tool to predict effective and better accurate results regarding whether the patient is suffering from kidney disease or not. The SVM and ANN classifier used to analyse the features for detection of stone in

the images. The overall accuracy of the system is 98% which is satisfactory at the time. The accuracy may be enhance by considering more suitable features which can define stone region and multiple classifiers can also be added into the system. We concluded that, SVM and ANN algorithms has a minimum execution time and hence, it is considered as the best classification algorithms.

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