A NOVEL METHOD FOR PREDICTING KIDNEY STONE TYPE USING SUPPORT VECTOR MACHINE

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***Abstract*: Ultrasound imaging is a non-destructive technique widely used to visualize internal body structures like kidneys, muscles, vessels, joints, and other internal organs of living beings. Kidney ultrasound imaging can determine kidney size, position and help diagnose structural abnormalities like presence of stone, cyst, and other infections. Early detection of the presence of stone is beneficial in therapeutic treatment and also better survival rate. Apart from surgical removal of stones, ultrasound and laser lithotripsy are the common options followed by the medical fraternity. This work introduces a unique approach for removing speckle noise in US images to improve the readability of ultrasound images and enhance the quality of images for better diagnosis by radiologists. In this work, different preprocessing methods like spatial and wavelet domain filtering are applied to both normal and abnormal kidney stone US images. The accuracy is achieved up to 97.86 %.**

***Keywords*: Kidney Stone, Ultrasound Images, Accuracy**

I. INTRODUCTION

Kidney stones (KSs) sickness is ending up increasingly more typical now days. KSs are made whenever certainly substances in pee included Ca, oxalate, & once in while uric corrosive take shape. Such minerals & salts design precious stones that would then be able to combine & shape KS. Each sort of KS has alternate reason [1]. Stones are characterized by their synthetic creation. Around 80.00% of KSs are CaC_2O_4 stones that are increasingly in charge of arrangement of these stones. development of these stones might be brought about by elements [2]. Be that as it might, increasingly significant are dietaries & life waying factors, & aftereffects of gained metabolic deformities prompting gem development & development of KS [3]. In [2] creators give detail clarification with respect to what are KSs, its Types & various indications of this sickness. In [3] creators portray various elements like age, sex, race, body weight, ethnicity which may reason for KSs.

The most widely recognized issue in Field of programmed demonstrative is diagnostics utilizing quick & precise calculation which doesn't require long time to run & give exact & right outcomes [4]. To diminish finding time & to improve conclusion precision, it has turned out to be additionally requesting issue to create solid & amazing therapeutic determination framework to help treatment & control confounded analysis choice procedure. restorative determination naturally is mind boggling process thus delicate figuring strategies, for example, neural systems, have indicated extraordinary potential to be applied in improvement of medicinal conclusion. In sickness finding learning & identification of fractional malady can be useful when time & data limitations are available. Accordingly counterfeit neural systems give decent way to halfway conclusion.

Nowadays, common disorder found among humans is disorder of KSs of urinary tract. This disorder is common in Malaysia, due to living style of people. Substances mainly found in our urine when gathered together forms KS termed as renal calculi. Renal calculi generally found in kidney but sometime it will travel through duct to ureter. KS may occur in various size like it may be too small and it may be too large to block urinary tract. If it is not diagnosed in early stages, then size may grow. When stone is small in size it flows down with urine causing no or very little pain. Sometime stone block urinary duct because sometime size of calculi increases and this may cause extreme pain and sometime cause harm to internal parts of urinary tract.

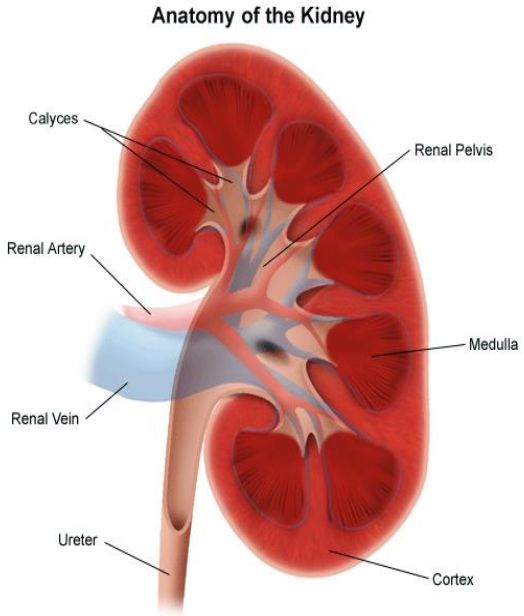

Figure 1 Anatomy structure of normal kidney [15]

Urinary tract has 2 kidneys, 2 ureters, bladder and urethra. Kidney is small organ in our body which seems like bean shaped. By help of kidney we can process 200 quarts of blood and can remove unwanted particles from blood by help of processing through kidney and this process it produces around 1-2 quarts of urine after processing that have waste material and water. Bladder stores that blood and releases it after some time. At bottom of bladder is tube called urethra which releases urine outside human body. stones called renal calculi stones may occur in kidneys, ureters or urinary bladder. Earlier in diagnosis of renal calculi; it was found that there was presence and absence of spots of calculi. algorithm was proposed to detect renal calculi and its size. we present method for diagnosing renal calculi by help of US and here we also determine size of calculi by help of advanced seeded region growing based segmentation. current diagnosis on computer operating systems improves accuracy of stone detection than earlier used procedure.

The right kidney is found just below liver and left one is found near spleen and both are protected by lower ribs. [14]. Function of kidney in our body is to remove waste material from our body by help of filters it contains. These filters are called nephrons there are almost 1 mn nephrons in our kidney by help of which we can filter out waste material particles from kidney.

II. RELATED WORK

K Shahina et.al (2019) discussed some non-intriguing cases, happen where the stone may be pretty much nothing and never causes an issue. As the size additions bit by bit, particularly when the stone goes unnoticed, it may act clinical issues such like extraordinary back torture and stomach torture. Due to the extension in the proportion of specific minerals these stones are molded in both of the kidneys. Ideal treatment of the kidney stones every so often makes any issues. These stones are of various sizes and shapes. The size scopes from as meager as a sand atom to as extensive as a pea. Exceptional cases have moreover been represented where the size could go up to the size of golf balls. Pee assessment and radiographic examinations are helpful in the kidney stone assurance. Region and the reality of the torture collaborators in the clinical finding. Consequently, area and assessment of kidney stone is a noteworthy point of view in the finding of kidney stone afflictions. The zone and size of the kidney stone is done using GAC division despite feature extraction and morphological exercises.

Nilar Thein, Kazuhiko et.al (2018) Precise division strategies utilized in robotized KS identification is one of most testing issues as result of dark levels likenesses of adjoining organs, variety in shapes & places of KS. Significant picture preprocessing is basic advance to improve exhibition of district of intrigue (ROI) division by expelling undesirable locale (non ROI), commotion & aggravation. examination expects to direct near investigation of three distinctive preprocessing methods for commotion expulsion from CT picture of KS.
Three noise evacuation procedures are processed dependent on size-based thresholding (strategy I), shape-based thresholding (technique II) & cross breed thresholding calculation (technique III). techniques expect to upgrade their meaningfulness & to help division procedure in KS finding framework. Digitized transverse midriff CT pictures from 75 patients with KS cases were done in measurable examination & approval. estimation of arrange focuses in stone district was estimated autonomously by master radiologists to get approval information for investigation. outcomes

demonstrate that proposed technique I, II & III have affectability of 90.91%, 92.93% & 68.69%, separately. execution times of in general procedure were 9.44 sec, 10.14 sec & 34.5 in normal, separately [2].
Kaplan, Adam G 2017 good renal stone treatment centre will effectively manage treatment of complex urinary stone disease by help of special tools. There full team of experts for diagnosis of problem which includes urologist, nephrologist, and dietician. concern centre have well equipped laboratory that will take care of all test to be carried out and at home services. Imaging technology that we are using have to be accurate in detecting stone activity.

Morrison, Jeffrey C 2017 urolithiasis disease increases worldwide in recent year and this is increasing with rate of 6-10% per year. As there are various technologies are being developed for diagnosis of disease but for safe treatment and to increase life of children, some medical institutes banned use of those methods which use ionized radiation method while treatment and these institute are opted those methods which are not producing any ionized radiation and safe to use for example US instead of CT. this paper examines use of US in detection and diagnosis of KS and treating urolithiasis.

Ibrahim, El-Sayed 2016 in this author tells about eh use of MRI to detect KS, this is possible by use of ultrashort echo time sequences. In this study author tells that by help of merged MRI UTE technology we can detect stones of various composition and sizes.

Ganesan, Vishnu 2016 in this author study about sensitivity and specificity of ultra-sonography to detect KS and to increase accuracy of this technique in determination of size of stone and how this may affect out treatment procedure.

Viswanath, K., and R. Gunasundari 2016 in previous years there is increase in cases of KS, this disease is caused among men or women and in all age groups and in all racial communities. According to survey result this is being estimated that in future KS disease surpass number of cases of chronic cases like diabetes, heart disease like BP etc. this increase need to develop technology which can detect this disease in early stage and method by which we can accurately diagnose stone. urologist is having very much stress while treatment of stone because of at time of surgery he has to assure about location and risk which can be occur due to any fault action. Kidney abnormalities mainly swelling in kidney, formation of stones, cysts, cancer cells etc., current technology which are using now days in most of hospital are not that much accurate and we cannot detect minute stone at early stage with much accuracy, technique which are used in hospital are US imaging, MRI, CT scan. Thus by these machine we can diagnose and detect stone is early stage because images obtained by these machines are of low contrast and have noise content so it become difficult to read those images and detect stone. Thus to make this more effective we do some post processing to improve image quality like removal of noise from scanned images. Then we apply segmentation process twice in first we segment kidney portion and in second portion we segment stone area in kidney.

Brisbane, Wayne, Michael R. Bailey 2016 In this study author tells about importance of diagnostic tool and initial step in deciding that which treatment method is most suitable according to criticality of disease. Urolithiasis is common disease in which calculi is formed in urinary bladder or kidney and it is spreading worldwide and possibility of having this disease in life is around 50% which increase criticality of this disease because these cases and increases worldwide. To diagnose this disease, we generally opt imaging method by which we can detect stone more precisely. As non-contrast CT provides most accurate results to diagnose KS but there is some problem associated with this which is exposure of patient to ionized radiation that is dangerous for human. But there is also alternative for this which is ultrasonography it has lower sensitivity then CT but is did not need any radiation. When we compare diagnostic accuracy of this method it finds to be resemble with CT scan. Thus bithe techniques have their own advantages and limitations: KUB plain film radiography is most helpful to determine calculi at inner part of organs of that patient which are suspected for KS disease. MRI also provide method of 3D imaging without any exposure to radiation, but his method is much expensive and it becomes difficult to visualize organ by this imaging. There are chances of further improvement in future for development of more accurate and safe method for detection renal calculi.

Kaya, Coskun 2016 in this article author discuss about color Doppler US which is used to detect stone location because stone gives twinkling effect we apply this technique by which we can detect location of stone. As this technique has much better specificity than traditional detection methods but it has lower sensitivity. Thus to increase performance of Doppler US method we optimize parameters to vitro. To study this effect total of 101 patients are being subjected under experiment and on all of those this technique is used. All stones are subjected for chemical composition study. Here we evaluate relation between BMI, size of stone, its chemical composition was evaluating statistically. We get following result for our study. stone which is found in kidney is contain around 66% of calcium oxalate stone. It also finds that twinkling artifact intensity did not show cystine and calcium oxalate stones and intensity of twinkling artifact is increase with increasing body mass index. This study shows that we cannot use TA technology with that much accuracy in overweight persons. This technology did not tell about chemical composition of stone.

Navratnam, Sujata, SitiFazilah 2016 as standard of living is changing around world and in this scenario most common disease that are face by daily life of man and women around world is KS which is also named as renal calculi in medical science. These stone are found in kidney, urinary bladder and urethra. Various studies are being carried out to diagnose and detect renal calculi effectively which include US imaging which help in pre-treatment analysis and to diagnose disease and to supervise condition at various stages during treatment. To develop CAD method by which we can detect renal stone early by which we can prevent this disease in early stage and by changing diet and with normal treatment we can prevent this disease. In this method firstly US images are being diagnosed to check presence of calculi and to measure its size and position and its growth rate. Then we apply image segmentation process which is seed pixel based region by which we localize intensity threshold variation, thus on basis of different results obtained we categorize this into three classes: normal, stone, and stone at early age. This segmentation process is basically work on detecting those regions which have most possibility or have homogenous nature to find calculi and thus obtained structure which have different size is compare with speckle size. Size of obtained structure is depending upon look up table we used. After checking and detecting region where calculi is grown, now we use region merging to suppress high frequency artifacts in US images. Once we segmented calculi portion then we do some calculation to detect statistical feature of that calculi which detect size and affected area of calculi. Then this calculated feature is supplied to ANN classifier to get increased accuracy in comparison with previous works. possible result is based on texture value, threshold value variation, and size of stone which we measure by help of US imaging, position of stone and location of stone that in which part stone is basically present. Thus we get results from seed pixel segmentation process and from artificial neural network by which we can diagnose problem, by that we can easily detect renal calculi in early stage before formation of stone and enhance accuracy rate of classification.

Bakin, Salinawati, 2015 in this study author's main aim is to 1) show sensitivity of US in detection of urinary stones, ii) to calculate size of renal calculi that does not seen by US but later on detected on computer tomography urogram. method to accomplish this to take 201 patients US and CTU and then compare them to find occurrence of calculi. We calculate various values of US as gold standard like sensitivity, accuracy etc. we get following results after performing test on 201 set of data that we collect from different patients on which we perform both USG and CTU: sensitivity after result found to be 53% and specificity is found to be around 85%. average size of stone detected by US machine is around 7.6 mm ± 4.1 mm and average size of stone detected by CTU was 4 mm ± 2.4 mm. when we observe specificity of US machine was 97% and sensitivity of machine is around 12%/. In same way when we calculate these parameters for urinary balder calculi we found sensitivity around 20% and specificity is found to be 100%. From this study we conclude that accuracy of US machine in detecting stone of ureteric and urinary bladder calculi are 67%, 80% and 98% respectively.

Andrabi, Yasir, et al 2015 Urolithiasis is common disease in which calculi is formed in urinary bladder or kidney and it is spreading worldwide and possibility of having this disease in life is around 50% which increase criticality of this disease because these cases and increases worldwide. To diagnose this disease, we generally opt imaging method by which we can detect stone more precisely. For diagnose of this problem computer tomography is generally used to get imaging of affected area, this machine has sensitivity of greater than 95% and specificity is also greater than 96%. As due to evolution of multi detector computer tomography this technology in combine with dual energy computer tomography increase scope of this technology and increase its accuracy and field where it can be used effectively. This dual energy computer tomography technique shows considerable enhancement in pre-treatment detection and diagnoses of stone composition and its structure as compare to conventional multi detection CT. thus this technology is widely opted around world.

Moore, Christopher 2015 this paper tells about reduced dose computer tomography that this technology is generally use this technology is not recommended for emergency setting. This is because test characteristics of this technology is not completed, thus this makes problem in detection of renal calculi for obese patients. So here our main objective to check sensitivity and specificity of reduced dose computer tomography for symptomatic urinal calculi.

Mansouri, Mohammad 2015 in this paper author explained about DECT technology. Dual energy CT technology is basically produced two sets of diverse peak KVs from identical region, and its metal composition is based on various energy levels. By help of these technologies we can also differentiate composition of renal stone. By help of various post processing applications we can differentiate various renal stone types.

Viswanath, Kalannagari 2014 in this study author explained that abnormalities of kidney are found by US imaging methods. As when there is any abnormality in kidney there are various signs which show that like swelling in kidney change in shape or structure and change in its position. These kind of abnormalities are generally arising due to presence of stone, cysts, cells which cause cancer and blockage of urine etc. to carry any diagnose operation or any surgical treatment this is most important to get detailed information about size and location of stone in kidney. As images

obtained from US images have noise content and are of low contrast so this is become much challenging task to detect stone by this method.

Cunitz, Bryan, 2014 in this article author discuss about color Doppler US which is used to detect stone location because stone gives twinkling effect we apply this technique by which we can detect location of stone. As this technique has much better specificity than traditional detection methods but it has lower sensitivity. Thus to increase performance of Doppler US method we optimize parameters to vitro. data thus collected shows that this twinkling artifact is caused due to random oscillations of micro size bubbles that are trap in cracks of KSs. Then we apply some optimization parameters so that we can take output within FDA approved limits.

Botsikas, Diomidis 2014 proposed technique to investigate extra advantages of IV furosemide injection and urine dilution in detection of renal stone in its early phase by help dual energy CT urography.

Max W. K. Law 2013 in this paper author tells about challenges of image segmentation like it will be difficult to segment those images of low intensity and have low contrast. In case of intracranial aneurysms, this become necessary to segment high intensity major vassals by use of magnetic resonance angiographic (PC-MRA) images. This technique has some major challenges like varying voxel intensity which have various velocity of flow and it also have loss of single in those area where turbulent flow is occur. results of this test are 0.8 dice score in phantom case. In this method we use various kind of elements like multi-range filters, local variances. Then we evaluate elements in comparative nature among proposed method and minor complex variants. Thus these comparisons available for variants and existed vascular segmentation method, thus this comparison gives advantageous nature of this method over other traditional methods. This method analyze weakness of those traditional methods and shows role of every element use in this method. This method also proves that we can use this method to separate blood vessels on PC-MRA image.

III. RESEARCH METHODOLOGY

In the imaging modalities the information can be provided in the form of imaging data. It may examine the imaging information to remove valuable implications is itself a testing and tedious undertaking. In addition, examine of Kidney malignant growth utilizing computer aided diagnosis (CAD) is enhanced over manual survey of

image filters. Image processing methods are utilized for recognizing information through imaging. The flow chart shows the stages of Kidney cancer

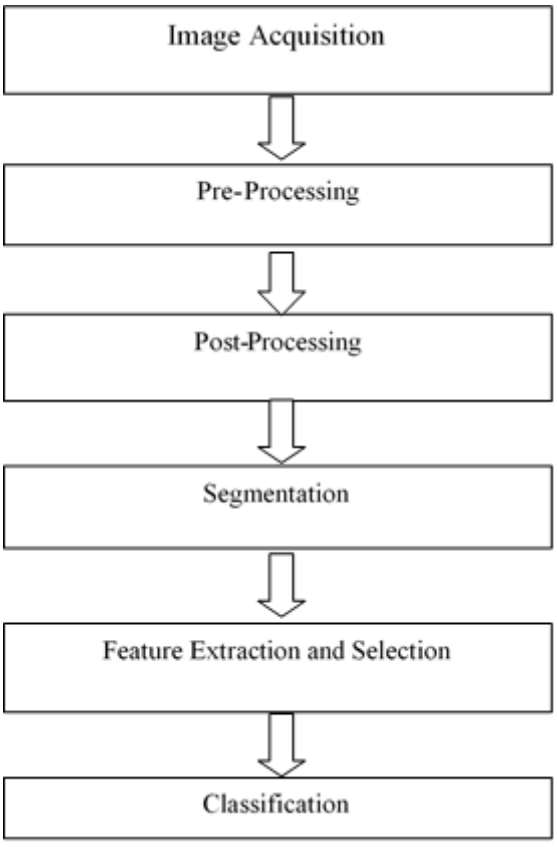

Figure 2 Flow chart of Kidney Cancer Detection

4.1.1 IMAGE ACQUISITION

In this process through various imaging modalities the acquisition of medical images is obtained. There are two sorts of screening methods invasive along with non-invasive. These methods are generally used to recognize and breakdown Kidney diseases and are very helpful for identifying an abnormality. Invasive systems are likewise used to recognize arrange assignment.

4.1.2 PRE-PROCESSED

These centres on imaging qualities enhancing & improve the interpretably of procured imaging by diminishing noise, image debasement & undesirable antiquities. Pre-processing strategies incorporate image smoothing and image upgrade methods. The distinctive image improvement procedures can be described as recurrence area and spatial space strategies. Histogram equalization is utilising to enhance the nature of image and improvement [6]. Principal component analysis by [6] Gaussian filter, multistage selective filter, median filtering [15,21,24] Gabor filter [20,21,23,24] Disk filter [7] Average filter, background thresholding [17], Isotropic re-sampling [10,27], Erosen and dilation [15], Massive screened & edging preservation smoothing [12] are observed to suitable for medical images. Such images are applied to take out noise, improve the imaging qualities and identify limit of Kidneys destruct to be valuable tissue calculation channel on PET/CT images [3].

4.1.3 SEGMENTATING PHASE

Kidneys segmentation referring to the strategy for dividing an image into constituent regions or objects of enthusiasm via another anatomical parts of the body notwithstanding evacuate the relief of the image. This procedure acting an essential undertaking for nodule location in the Kidney by allotting each pixeling to its label. Accordingly, in literature Segmenting had huge significance by expanding exactness, accuracy, dependability and decreasing computational expenses for Kidney malignancy identification [14]. Thresholding methods is widely utilized in literature for segmentation by limit the fluctuation inside class and amplify the irregularity between classes [1,5,7,9,11,17,18,19,21]. To fragment Kidney inner structure to isolate the conceivable nodule and the streamline examine of Kidney local, different segmentation techniques include –Fuzzy clustering method [12], vascular subtraction, [27],K-mean fraction of R=1 [4], marker based watershed [6,8], 3D morphological processing [10], anatomical segmentation technique, deformable model based segmentation, morphological closing & labeling [13], shape model & edge model, detection method & thresholding fraction of R=1 [4], region growing technique, connected component analogies, sober edge linear combination of Gaussian (LCG) are proposed in literature.

4.1.4 AFTER PROCESSED IMAGE

These systems are connected after the segmenting procedure for imaging upgrade to accomplish greater clearness of an image. A few specialists join this component with segmentation. A few calculations, for instance, associated segment

naming [2], morphological operation, PCA, nodule volume determines, marker controlled watershed [21], appearance based registration, seed point detection, cluster merging, cluster formation, Markov Gibbs random filed depended appearance model, canny edge detection [19] candidate location adjustment [21] doubling time estimation & VGI computation methods are utilized to remove the additional muscle, fringe improvement and limit extraction of Kidney dividers extricate missing or covered areas.

4.1.5 FEATURE EXTRACTING & SELECTION

These are estimations that determine designs having a place with specific class. Features extraction/determination is a critical module to discover fitting features of Kidney diseases recognition. After component extraction some applicable featuring are chosen with highest segregation capacity for grouping and different featuring are disposed of. To recognize principal Kidney malignant growth, a few features are separated, for instance area of locale, sweep, length width, the M property of its edge and spatial histogram [2].Correspondingly, area, eccentricity, parameter [6,8],auxiliary features(proportional breadth and robustness)[19,23] and surface features (vitality, mean standard deviation, mean)[19] and morphological colorimeter specification are extracted specification from the area of significance of Kidney.

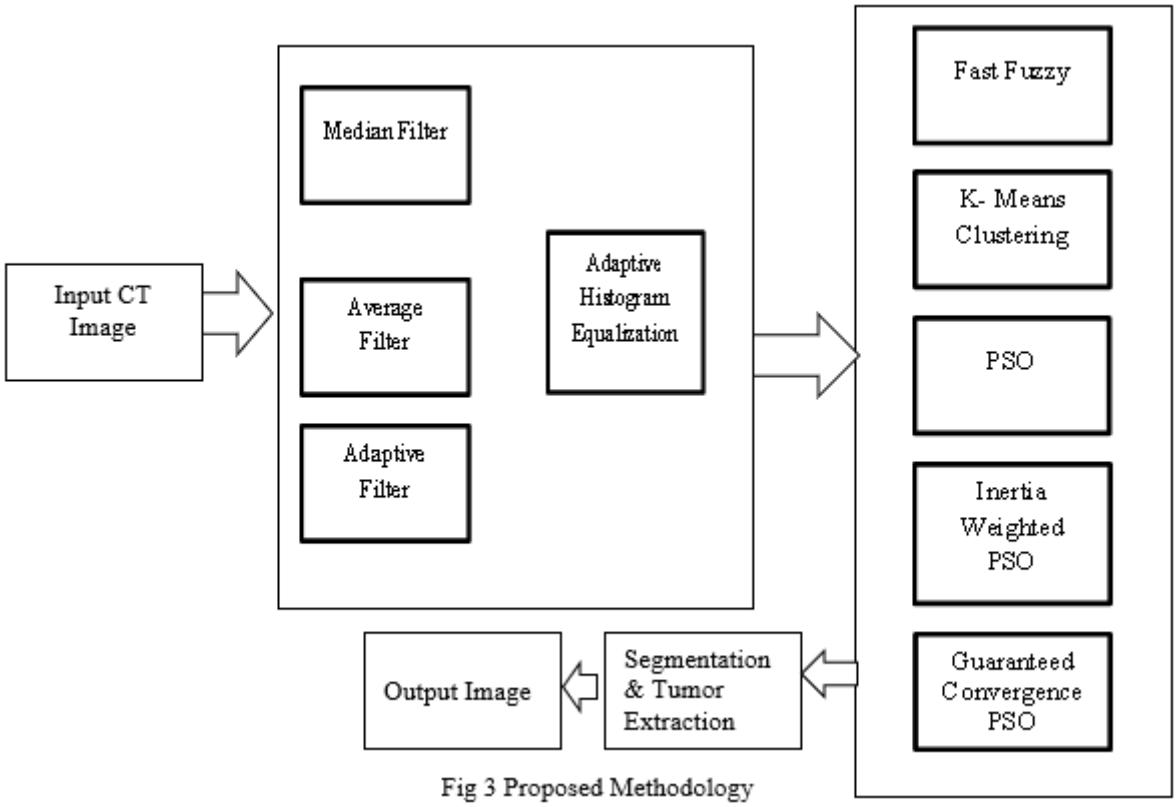

Fig 3 Proposed Methodology

4.2 Neighborhood Filter Technique

(1) Consider the information lattice "A" which has M lines and N sections.

(2) Construction a network with M + 2 lines and N + 2 segments by attaching zeros to sides of the information framework

(3) Take a veil of size 3 × 5. Different and include

$\sum_{s=-1}^{1}\sum_{t=-2}^{2} m(s,t)p(i+s,j+t)$ ……. (1)

(4) Placement of the veil on the main component, i.e., component on the principal line and first segment of framework "A".

(5) Select all the components recorded by the veil and sort them in rising request.

(6) Take the middle worth (focus component) from the arranged cluster and supplant the component A (1, 1) by the middle worth

(7) The strategy for playing out a convolution is equivalent to that for separating, then again, actually the channel must be pivoted by 1800 preceding increasing and including. Utilizing the m(i,j) and p(i,j) documentation as in the past, the yield of a convolution with a 3 ×5 veil for a solitary pixel is

$$\sum_{s=-1}^{1}\sum_{t=-2}^{2} m(-s,-t)p(i+s,j+t)$$

(8) Slide the cover to the following component.

(9) Repeat the means from 4 to 8 until all the components of network "An" are supplanted by their relating middle worth.

IV. RESULT ANALYSIS

In this section, we have to discuss the result analysis of kidney stone as pre-processing and inverted kidney image. The fuzzy segment tumor images are analyzed in the same section.

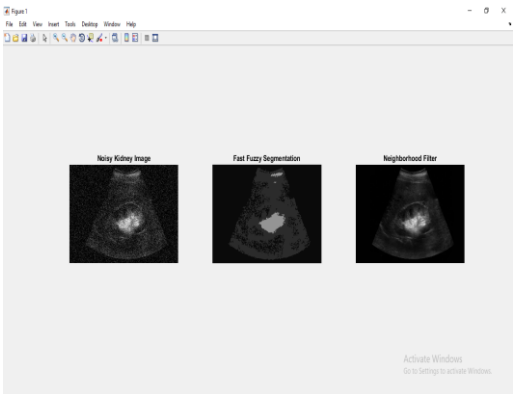

Fig 4 Comparative Analysis of Noisy Kidney Image, Fast Fuzzy Segmentation and Neighborhood Filter

Comparative Analysis of Noisy Kidney Image, Fast Fuzzy Segmentation and Neighborhood Filter is shown in figure 4. In this, preprocessing of image occur by the removal of noise from the image. Then image is segmented with fast fuzzy technique. In this process, segmentation is done using membership function. The removal of noise is done using neighborhood filter.

Small Tumor Regions found in Image is shown in fig 5. Similarly, Fuzzy Segmented Tumors is shown in fig 6. Comparative Analysis of different methods are shown in the figure 5.7. In the previous method, PSO, GA and SVM are analyzed with accuracy 89.650 %. From last decade of years K-NN with GA and GC PSO technique is analyzed. Since the accuracy K-NN with and GC –PSO is 90 % and 95.81 % respectively. The accuracy of detection of kidney stone is 97.46 % using proposed fast fuzzy algorithm

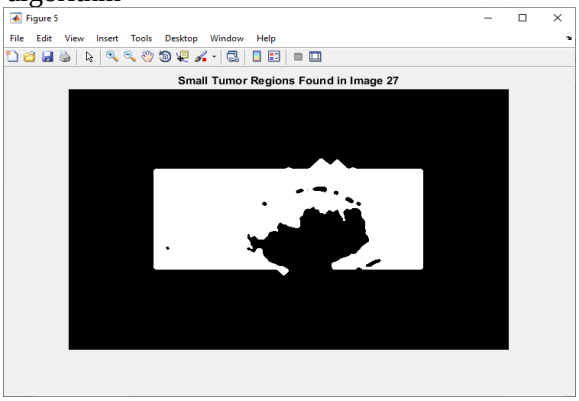

Fig 5 Small Tumor Regions found in Image 27

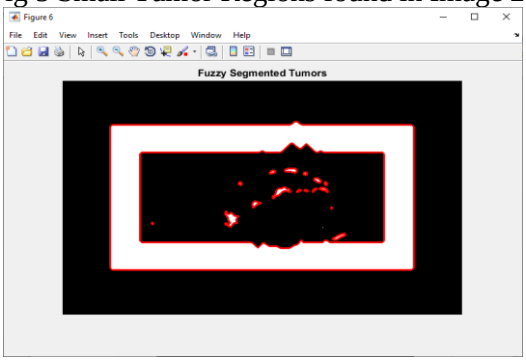

Fig 6 Fuzzy Segmented Tumors

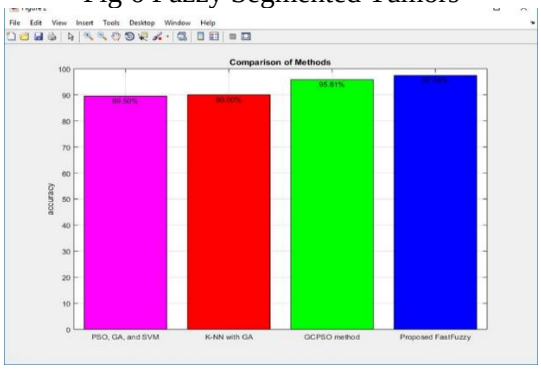

Fig 7 Comparative Analysis of Methodology

From the proposed dataset, we analyzed a set of 10 images for calculating MSE and the accuracy. Comparative Analysis for different Images is given by table 1. Statistical Result from Proposed Fast Fuzzy is shown in table 5.2 Maximum accuracy is got it from image 7.

Table 1 Comparative Analysis for different Images

Sr. No.	Image	No. of Stone Region	MSE	Accuracy
1.	Image 1	2	1.93	98.07
2.	Image 2	20	2.37	97.45
3.	Image 3	10	2.13	97.87
4.	Image 4	9	1.98	98.02
5.	Image 5	9	2.21	97.79
6.	Image 6	15	2.21	97.79
7.	Image 7	14	2.32	97.68
8.	Image 8	15	2.00	98.00
9.	Image 9	11	2.07	97.93
10.	Image 10	6	1.98	98.02

Table 2 Statistical Result from Proposed Fast Fuzzy

Images	True Positive Rate	True Negative Rate	False Positive Rate	False Negative Rate	Accuracy
Image 1	95.5	99.99	0.01	6.12	98.07
Image 2	94.4	98.81	1.19	5.12	97.45
Image 3	95.5	98.88	1.12	4.12	97.87
Image 4	96.6	98.21	1.79	4.02	98.02
Image 5	95.6	98.88	1.12	5.11	97.79
Image 6	95.4	98.77	1.33	5.01	97.79
Image 7	95.3	97.11	2.89	5.01	97.68
Image 8	96.6	98.22	1.88	4.01	98.00
Image 9	95.1	97.88	2.12	3.01	97.93
Image 10	96.8	98.12	1.88	6.11	98.02

The accuracy of image different image is shown 8. The maximum accuracy of different image is 98.07 of image 1. A Comparative Analysis of different Methodology is shown in table 3 and fig 9 respectively.

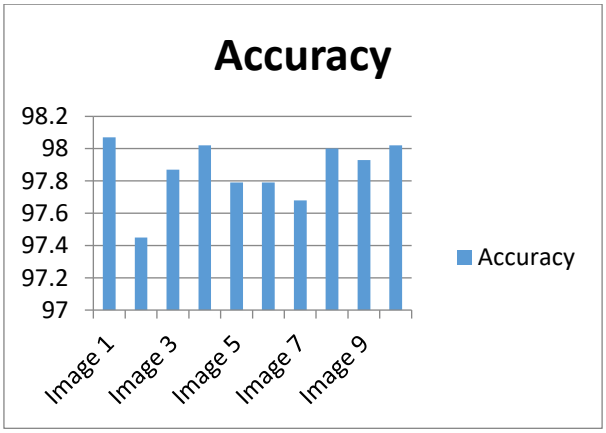

Fig 8 Accuracy for different Image

Table 3 Comparative Analysis of different Methodology

Sr. No.	Algorithm	Accuracy
1	PSO, GA, SVM	89.5
2	KNN with GA	90.00
3	GCPSO	95.81
4	Proposed Fast Fuzzy	97.86

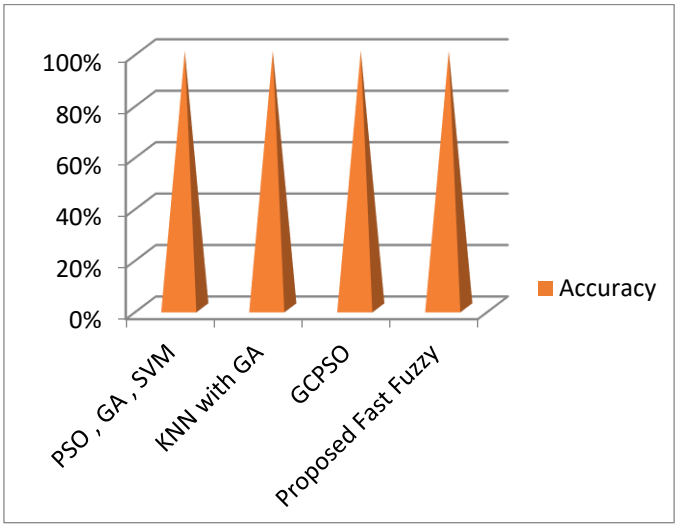

Fig 9 Comparative Analysis for Accuracy

V. CONCLUSION

The proposed smart system detects and classifies multiple kidney disorders such as stones and tumors. This work can detect other abnormalities in different parts of the human body. In the future, CT, MRI, PET scans can be used with the existing US scans by forming a multi-modality imaging model with better diagnostic capabilities. The following observations of proposed algorithm that Mean square error of Image is 1.93. True positive rate and true negative rate of proposed fast fuzzy algorithm is 95.5 and 99.99 % respectively False positive rate and false negative rate of proposed fast fuzzy algorithm is 0.01 and 6.12 % respectively. The overall accuracy of proposed fast fuzzy algorithm is achieved upto 97.86 %

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