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# DESIGN AND IMPLEMENTATION OF KIDNEY STONES DETECTION USING IMAGE PROCESSING TECHNIQUE

**Mrs. Monica Jenifer J[1], A Roopa [2], C R Sarvasri [3], G Sharmila [4], A Yamuna[5]**

*Research Scholar[1], U.G Student [2,3,4,5], Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering [Autonomous], Dr.M.G. R Nagar, Hosur, Tamil Nadu, India.*

*monicajenifer2090@gmail.com[1], roopa223@gmail.com[2], crsarvasri@gmail.com[3], sharmilavg0@gmail.com[4], yamunaece00@gmail.com[5]*

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**Abstract –** *In certain days, renal calculus has become a significant problem and if not detected at an early stage, then it's going to cause difficulties and sometimes surgery is additionally needed to get rid of the stone. Here, to detect the stone which too precisely paves the thanks to image processing because through image processing there's a bent to urge the precise results and it's an automatic method of detecting the stone. Doctor generally uses the manual method to detect the stone from the X-radiation image but our technique is fully automated so it's advantageous because the time is reduced and therewith the possibilities of error also reduce. This project presents a way for detection of kidney stones through different steps of image processing. the primary step is that the image pre-processing using filters during which image gets smoothed likewise because the noise is far away from the image. Image enhancement may be a part of preprocessing which is employed to reinforce the image which is achieved with Stevens' law transformation. Next, the image segmentation is performed on the preprocessed image using thresholding technique. this technique implements image processing technique to attain the aim. The imaging modality used is CT because its low noise compared to other modalities like x-ray and ultrasound.*

***Key Words:*** Kidney Stone, Computer Tomography, Kidney Scan, Image Enhancement, Image Processing and refinement.

## 1.INTRODUCTION

Kidney stones are on rise throughout the globe and majority of individuals with concretion disease don't notice the disease because it damages the organs slowly before showing symptoms. Kidney could be a bean shaped organ and present on either side of the spine. the most function of kidney is to manage the balance of electrolytes within the blood. Formation of stones in kidneys is thanks to blockage of urine congenital anomalies, cysts. differing types of kidney stones namely struvite stones, stag horn stones and renal calculi stones were analysed. concretion may be a solid concretion or crystal formed in kidneys from dietary minerals in urine. so as to urge obviate this painful disorder the urinary calculus is diagnosed through CT images so removed through surgical processes like ending of stone into smaller pieces, which then pass-through tract.

If the dimensions of the stone grow to a minimum of 3 millimetres, then they'll block the ureter. This causes lots of pain mostly within the back lower and it should radiate to groin. Classification of urinary stone is completed based upon their location within the kidney (nephrolithiasis), ureter (ureterolithiasis), or bladder (cystolithiasis), or by their chemical composition. The stone could even be present inside minor and major calyces of the kidney or within the ureter. In medical imaging modalities, computed axial tomography is used because it's low noise, when put next to other modalities and thus provide results with maximum accuracy. The kidney malfunctioning could also be life intimidating. Hence early detection of calculus is crucial. Precise identification of urinary calculus is vital so on ensure surgical operations success.

Thus, to supply the efficient stone detection system, image filtering is one amongst the foremost and important steps within the automated detection. this will reduce the erroneous detection which can occur because of knowledge variation of judging specialist pre-processing is then followed by segmentation and morphological analysis to detect the stone automatically. Many researchers have contributed within the field of nephrolith detection by presenting various algorithms to detect the stone within the kidney from MRI images. Some researchers emphasize on strong and efficient segmentation. Some emphasized on strong and effective segmentation for accurate detection of stone. Once the image enhancement and noise reduction of the CT image is finished then the region of interest is obtained from the image. Kidney stones are hard collection of salt and minerals often made of calcium and acid. Majority of individuals with stones in kidney at initial stage don't notice and it damages the organs slowly.

It is vital to detect the precise and accurate position of concretion for surgical operations. Sometimes, CT images indicating the presence of nephrolith can't be detected by mankind. Hence, we preferred automated techniques in detection of kidney stones in CT images using Digital Image processing technique employing Artificial Neural Network (ANN).

## 2.RELATED WORK

[1] Kaushal Kumar Abhishek, "Artificial Neural Networks for Diagnosis of Kidney Stones Disease". This work diagnosed kidney stone disease by using three different neural network algorithms which have different architecture and characteristics. The aim of this work is to compare the performance of all three neural networks on the basis of its accuracy, time taken to build model, and training data set size.
[2] Shukla A, "Diagnosis of Thyroid Disorders using Artificial Neural Networks". This paper presents Knowledge Based Approach for Diagnosis of Breast cancer. This paper presents a novel approach to simulate a Knowledge Based System for diagnosis of Breast cancer using Ann and apply three neural networks algorithms BPA, RBF and LVQ on the disease and find best model for diagnosis.

## 3.METHODOLOGY

Back Propagation Network is that the most ordinarily used algorithm in training neural networks. it's employed in processing the image and data to implement an automatic concretion classification. the standard technique for medical resonance kidney images classification and stone detection is by human examination. This method isn't accurate since it's impractical to handle great deal of information. resonance (MR) Images may inherently possess noise caused by operator errors. This causes earnest inaccuracies in classification features/ diseases in image processing. during this work, the rear Propagation Network was applied for the renal calculus detection.

## 4.EXPERIMENTAL RESULTS


**Fig 1**:Gray Level Image of Sample 1

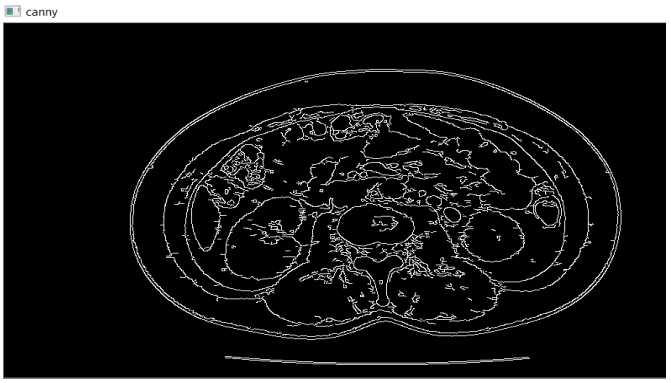


**Fig 2:** Canny Edge Detection of Gray Image

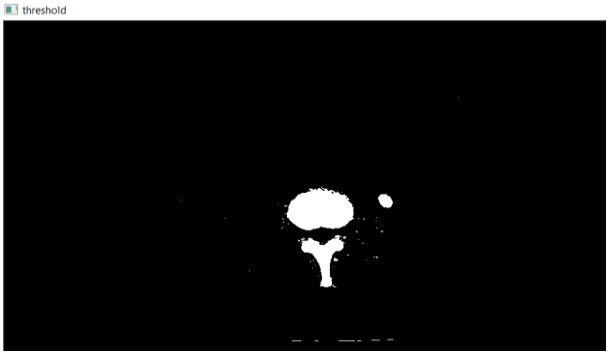


**Fig 3 :**Thresolded Image

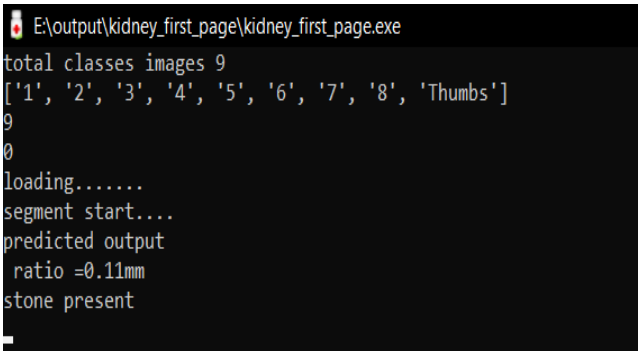


**Fig 4:** Final Output Result With Kidney Stone Detected


**Fig 5 :**Gray Level Image of Sample 2

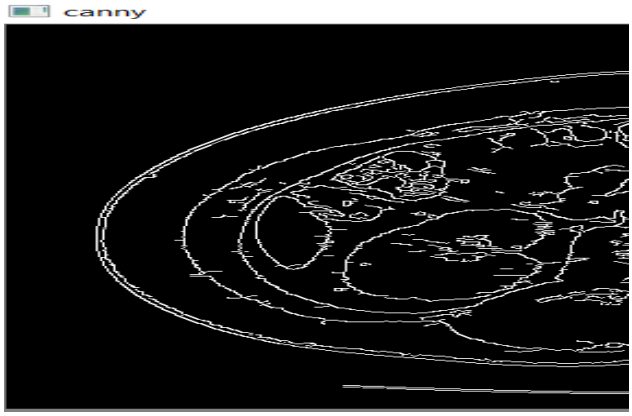


**Fig 6:** Canny Edge Detection of Gray Image

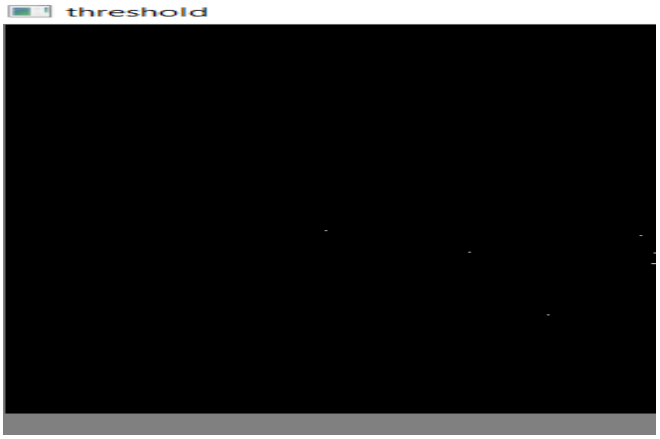


**Fig 7:**Thresholded Image

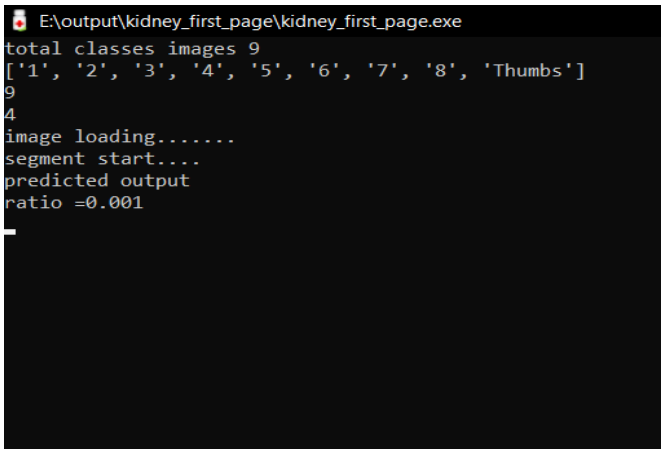


**Fig 8 :**Final Output Result With No Stone Detected

## 5.FLOW CHART

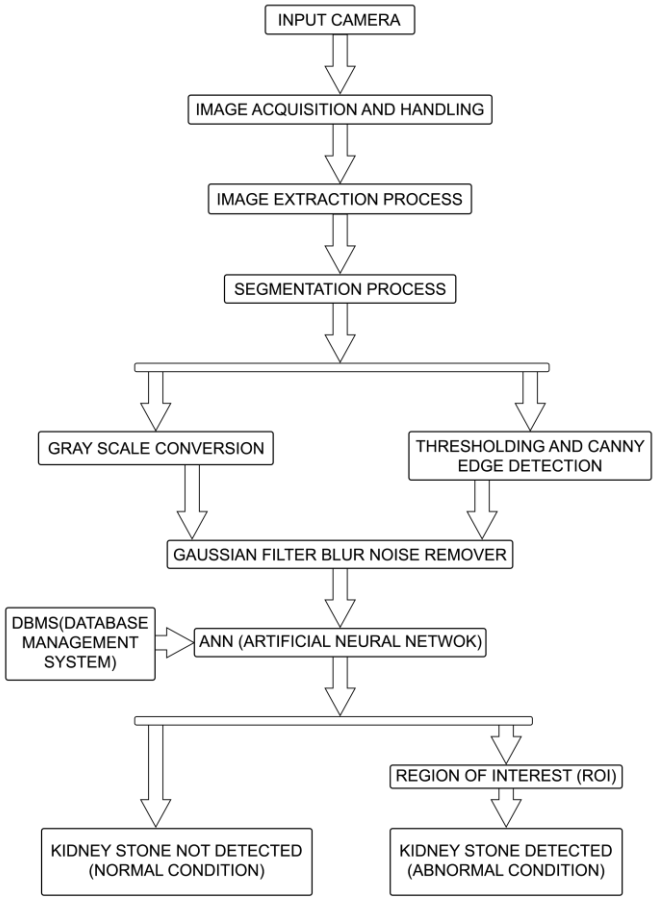


**Fig 9:** Flow Chart of The Process

## 6.CONCLUSION

The real time implementation via interfacing it with the scanning machines the captured kidney photograph can be subjected to the proposed set of rules to become aware of the affected vicinity and for accurate classification of kidney stone. For accomplishing better accuracy, we are able to compare the effects of another neural network except ANN algorithm. This method is carried out in python. Thus, the type of kidney stone usage of Gaussian filter and feature extraction neural network is efficaciously done. Comparing with grey scale conversion and filter, Canny Edge Detection lifting schemes for spotting the giant features for accurate categorization of kidney stone.

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## BIOGRAPHY:

Mrs. J. Monica Jenifer,
Research Scholar,
Engineering Department,
Adhiyamaan College of Engineering,
Anna University.