VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama" Belagavi – 590 010

PROJECT REPORT ON

"DESIGN AND IMPLIMENTATION OF KIDNEY STONE DETECTION USING IMAGE PROCESSING"

Submitted in partial fulfillment of the requirements for the award of degree

BACHELOR OF ENGINEERING
IN
ELECTRONICS & COMMUNICATION ENGINEERING

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CERTIFICATE

*Certified that the project work entitled "***DESIGN AND IMPLIMENTATION OF KIDNEY STONE DETECTION USING IMAGE PROCESSING***" is a bona fide work carried out by*

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in partial fulfillment for the award of **BACHELOR OF ENGINEERING** in **ELECTRONICS & COMMUNICATION ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2020–2021. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

A kidney stone forms when too much of certain minerals in your body accumulate in your urine. When human is not well hydrated, your urine becomes more concentrated with higher levels of certain minerals. When mineral levels are higher, it is more likely that a kidney stone will form. Kidney stones typically form in the kidney and leave the body in the urine stream.

In 3D medical imaging, anatomical and other structures such as kidney stones are often identified and extracted with the aid of diagnosis and assessment of disease. Automatic kidney stone segmentation from abdominal CT images is challenging on the aspects of segmentation accuracy due to its variety of size, shape and location. The performance of 3D organ segmentation algorithm is also degraded by the image complexity containing multiple organs and because of their huge size. The current need is a preprocessing algorithm to assist the segmentation process. The objective of the present study was to develop reader independent preprocessing algorithm for kidney stone detection and segmentation in CT images.

The input data is a CT scan from the patient, which is a high-resolution 3D grayscale image. The algorithm developed extracts the regions that might be stones, based on the intensity values of the pixels in the CT scan. This process includes a binarizing process of the image, finding the connected components of the resulting binary image and calculating the centroid of each of the components selected. The regions that are suspected to be stones are used as input of a CNN, a modified version of an ANN, so they can be classified as stone or non-stone. The parameters of the CNN have been chosen based on an exhaustive hyperparameter search with different configurations to select the one that gives the best performance.