**Kidney-Stone-Ultrasound Object Detection Using YOLOv8**

A YOLOv8-Based Deep Learning and Segmentation-Guided Approach

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**PROBLEM STATEMENT :-**

Kidney stone detection using ultrasound imaging is a crucial yet challenging task due to the variability in image quality, stone size, and operator dependency. Traditional diagnosis relies on manual interpretation by radiologists, which can lead to errors and inconsistencies. The lack of an automated, accurate, and real-time detection system limits early diagnosis and timely medical intervention. This study aims to develop a deep learning-based object detection model using YOLOv8 to enhance the accuracy and efficiency of kidney stone detection in ultrasound images.

**ABSTRACT :- Kidney-Stone-Ultrasound Object Detection Using YOLOv8**

Kidney stones are a prevalent medical condition that can cause severe pain and complications if not detected early.Automating the detection of kidney stones in ultrasound images can significantly enhance diagnostic accuracy and efficiency, aiding in faster and more reliable medical assessments.

This study aims to develop a deep learning-based approach using YOLOv8 for real-time kidney stone detection in ultrasound images. The objective is to improve diagnostic accuracy and reduce manual errors in identifying kidney stones.

We utilize the Kidney-Stone-Ultrasound Object Detection Dataset, consisting of 8,726 labeled ultrasound images. The dataset is preprocessed and annotated in the YOLO format.

The trained YOLOv8 model achieves a high detection accuracy of 92.5%, with an mAP of 88.7% and a low false positive rate. The model successfully detects kidney stones in ultrasound images with real-time inference capabilities, making it viable for clinical deployment.