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Modern Approaches to Kidney Stone Detection with Using Machine Learning

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Abstract : Approximately ten percent of individuals globally suffer from kidney stones, which can cause major side effects, including renal damage and blockage of the urinary tract. Traditional detection techniques depend on the manual evaluation of CT or X-ray images, which is not easy and may contain errors. With the aim to enhance kidney stone detection using medical imaging, this research explores various machine learning methods, such as Convolutional Neural Networks (CNN). By reviewing many machine learning algorithms, like ensemble techniques, Decision Tree, Random Forest, and Support Vector Machines (SVM), this study shows that machine learning tends to improve accuracy and reduce kidney stone detection time. According to the results of the earlier research, ensemble methods produced a classification accuracy of 97.95%, whereas the Decision Tree Classifier obtained an F1 score of 85.3%. Ensemble approaches gave a classification accuracy of 97.95%. Advanced techniques utilizing transfer learning, such as ALEXNET, achieved an accuracy rate of 96%.

Keywords : kidney stones, machine learning, medical imaging, CNN, transfer learning, decision tree, ensemble methods, random forest, SVM, ALEXNET
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