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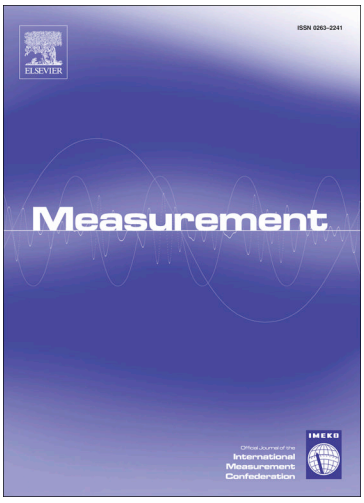

A decision support system for detection of the renal cell cancer in the kidney

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A DECISION SUPPORT SYSTEM FOR DETECTION OF THE RENAL CELL CANCER IN THE KIDNEY

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ABSTRACT

Renal cell cancer is the most common type of kidney cancer and usually occurs at an advanced ages. The rapid spread of renal cell cancer and the inability to detect the disease early often results in a fatality. Therefore, it is important to identify the renal abnormalities before the disease reaches the advanced phase. This paper proposes a decision support system that detects renal cell cancer using abdominal images of healthy and renal cell cancer tissues. Renal cell cancer detection involves two main stages as segmentation and cancer detection. In the first step, the kidney areas have been obtained by segmentation based on clustering analysis. In the second step, classification has been made by computer-assisted detection system to identify renal cell cancer. Feature vectors that support the originality of the study at this stage have been created. Subsequently, classification has been made using these feature vectors with the Support Vector Machines (SVMs). For detecting the renal abnormality, 130 different images obtained from the image archiving system of the Radiodiagnostic Department of Fırat University Medical Faculty were used. Thirty of these images have been used to train the K-means classifier. Performance evaluations have been made for both segmentation and classification. In order to measure segmentation success, the Dice coefficient was obtained as 89.3%. Sensitivity, Specificity, Accuracy, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) coefficients, which have been used to determine the classification performance, were obtained as 84%, 92%, 88%, 91.3% and 85.19% respectively.

Keywords: Spinal Cord, Renal cell cancer, Decision support system, K-Means.

1.Introduction

Kidney tumors are either benign or malignant. Simple kidney cysts are the mostly common, a benign mass that is completely different from cancerous tissue. Renal cysts, which often occur as naturally, do not require treatment unless they are causing symptoms [1].

Normally, cells that are the basic building blocks of the body multiply in a controlled manner according to the needs of the body, whereas cancer is the uncontrolled and irregular proliferation of a cell type. Cancer spreads to tissues and organs and invades them [2].

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