New technique towards operator independent kidney ultrasound scanning

Abstract

Ultrasound imaging has been widely used as the primary screening of the kidney as it is non-invasive and affordable. Ultrasound can be used to measure the size and appearance of the kidneys and to detect tumors, congenital anomalies, swelling and blockage of urine flow. However, this scanning procedure is a time taking method because of the ultrasound image is full of speckle noise. Thus, the user eventually notices that it is hard to detect the boundary of the kidney in the US image, even it's done by the trained sonographers. In addition, human error might occur during the interpretation of ultrasound image by untrained sonographer, especially when taking measurement. Therefore, in order to reduce the dependability to the sonographers' expertise, some image processing can be done which can automatically detect the centroid of human kidney. The software was developed using MATLAB consist of speckle noise reduction, Gaussian filter, texture filter and morphological operators which were used for image segmentation in order to extract important features. For the result, median filter has been chosen as speckle noise reduction techniques as it is faster and detect kidney centroid better compared to wiener filter, wavelet filter and speckle noise anistrophic diffusion (SRAD) filter. This software can achieve until 96.43% of accuracy in detecting the centroid. The detected centroid can be implemented in the existing ultrasound machine that will be used as segmentation tool to reduce human errors and time.