

# Segmentation of the Heart Ventricle and Atrium in Handheld Ultrasound Images

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## Extended Abstract

Ultrasound is widely used to diagnose a heart disease due to non-invasive method and real time [1-4]. The handheld ultrasound is rapidly increasing on small or private hospital because of mobility, compact and cheaper than premium model.[5] This purpose of this study is to develop an automate segmentation algorithm that uses a measure a volume of heart ventricle and atrium.

The commercial device that is developed our own research centre is used to take a heart ventricle and atrium image. 6 males who have any cardiovascular disorders for 2 years were enrolled on this study. The algorithms of ultrasound image were developed based on MATLAB. The commercial device (ACUSON X300, Siemens, Germany) was used to check a performance of developed algorithm. The image analysis algorithm consists of 3 steps which are a pre-processing, separate region and segmentation. The pre-processing step includes a data size reduction and image enhancement. The separate region step includes a finding contours and convex hell, composite process between binary image and convex hull image, and extract ROI section. The segmentation step includes a calculating adaptive radius and a measuring a volume on each ventricle and atrium. The value (mean  $\pm$  SD) of EDV, ESV, stroke volume and EF on one subject were  $2.20 \pm 0.05$ ,  $0.78 \pm 0.1$ ,  $1.42 \pm 0.12$ , and  $64.65 \pm 2.14\%$ , respectively. The accuracy (mean  $\pm$  SD) of EDV, ESV, stroke volume and EF were  $88.23 \pm 1.71\%$ ,  $88.36 \pm 2.14\%$ ,  $89.12 \pm 0.27 \%$ , and  $89.54 \pm 0.48 \%$ . Further study, we will optimize the algorithm to increase the accuracy and expand the clinical testing field for a variety ages and gender.

## References

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