

Towards An Automatic Segmentation for Assessment of Cardiac Left Ventricle Function

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Abstract. Research on detecting, recognising and interpreting Cardiac MRI has started since the 1980s. The problem with manual tracing efforts hampering the adoption of cardiac MRI as routine investigation. Manual tracing is also dependent on image quality, and there is no one-size-fits-all MRI setting for the optimum image result. In this paper, we present a proposed approach to automatically detect the left ventricle (LV) wall in the effort to automatically assist the assessment of cardiac function. Using a standard benchmark dataset, our experiments have shown that our proposed method had effectively improve the automatic detection of the epicardium and endocardium.

Keywords: Cardiac MRI, Left Ventricle, Automatic Segmentation

1 Introduction

Cardiovascular disease (CVD) is a term for describing disease related to the heart or blood vessels and had been one of the major reasons of death all over the world. For the past two decades, cardiovascular magnetic resonance (CMR) has emerged as an alternative noninvasive modality to assess and detect CVD. During a CMR scan, series of images are produced, and known as cardiovascular magnetic resonance images (CMRI). These CMRIs depicts the valve anatomy that can be used for quantitative evaluation of stenosis and regurgitation.

The World Health Organisation (WHO) has listed CVD as one of the Non-communicable diseases and mental health (NCDs) and is part of the Global Action Plan for the Prevention and Control of NCDs 2013-2020 [1]. In conjunction with the action plan, various semi-automatic and fully automatic techniques were developed to assess the cardiac function and estimate cardiac parameters for clinical use. Common cardiac parameters that are researched are ejection fraction (EF), end-systolic volume (ESV), end-diastolic volume (EDV) and myocardial mass. CMRI has become a reference examination for cardiac morphology, function and perfusion in humans. CMRI automatic analysis is an open research due to the characteristics of CMR and variability of the images among patients; the problem of cardiac cavity; weak edges information; papillary muscles identification; and signal intensity.