An Investigation On Myocardial Infract Localization In Medical Images

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Abstract - *Myocardial infarction (MI) or acute myocardial infarction commonly known as heart attack is one of the major causes of cardiac death widely. It occurs due to the non adequate blood supply of the heart area and cause death of heart tissue. Early detection of MI will help to prevent the infarct expansion leading to left ventricle (LV) remodeling and high damage to the cardiac muscles. This survey introduces an different algorithms that can be used to localize and quantify myocardial infarct from deformation of wall.*

Keywords: Speckle tracking, Biomechanical modeling, Dimensionality reduction, Myocardial Infarct

1. INTRODUCTION

Timely identification of MI and reduce the time and cost. Echocardiography images are widely used to assess the differential diagnosis of normal and infarcted myocardium. The infarct localization from the wall deformation is a common method used. The localization of infarct from medical imaging modalities such as MRI, ECG, US are proposed. ECG gives the accurate output with moderate cost.

The remaining part of the paper is organized as follows: In Section II survey of all methods will be described in detail. The paper concludes with a brief summary in section III.

2. LITERATURE SURVEY

The ability of strain by Doppler and by speckle tracking echocardiography [1] in the acute phase in patients with ST-segment elevation myocardial infarction (STEMI) to diagnose left ventricular (LV) infarct size is proposed. Also the cardiac cycle strain should be measured. On a segmental level, circumferential strain separated transmural from subendocardial necrosis is proposed. LV global peak systolic speckle strain should be the preferred method, which is for predicting final LV infarct size.

Myocardial Infarction leads to changes in the geometry (remodeling) of the left ventricle (LV) of the heart. A novel analysis framework for characterizing remodeling after myocardial infarction, using LV shape descriptors derived from atlas-based shape models is proposed.A logistic regression analysis [2] was performed to determine the modes of shape variation most associated with myocardial infarction is proposed. The results obtained from end-diastolic and end-systolic shapes were compared against the traditional clinical indices of remodeling: end-diastolic volume, end-systolic volume and LV mass. The combination of end-diastolic and end-systolic shape parameter analysis achieved the lowest deviance, is proposed. These features enable quantification of the amount of remodeling.

The aim of this paper is to provide a framework for automatic scoring [3] to alert the diagnostician to potential regions of abnormality. We investigated different shape and motion configurations of a finite-element cardiac atlas of the left ventricle. In this system wall motion by computer assistance and infarct scoring has the ability to provide robust identification of those segments requiring further clinical investigation is proposed.

Compared with global measurements such as ejection fraction, regional myocardial deformation can better aid detection of cardiac dysfunction. Although tagged and strain-encoded MR images can provide such regional information, they are uncommon in clinical routine. In contrast, cardiac CT images are more common with lower cost, but only provide motion of cardiac boundaries and additional constraints are required to obtain the myocardial strains. To verify the potential of contrast-enhanced CT images on computer-aided infarction identification, we propose a biomechanical approach combined with the support vector machine (SVM) [4].

A machine-learning algorithm for the automatic localization of myocardial infarct in the left ventricle is proposed. Our method constructs neighbourhood approximation forests, [5] which are trained with previously diagnosed 4D cardiac sequences. We introduce a new set of features that simultaneously exploit information from the shape and motion of the myocardial wall along the cardiac cycle. More precisely, characteristics are extracted from a hyper surface that represents the profile of the myocardial thickness.

We propose a novel framework to predict the location of a myocardial infarct from local wall deformation data. Non-linear dimensionality reduction [6] is used to estimate the Euclidean space of coordinates encoding deformation patterns. They consist in (i) finding the low-dimensional coordinates associated to the measured deformation pattern, and (ii) estimating the possible infarct location associated to these coordinates.

Infarct size has been recognized as a good indicator of the functional status of the ischemic heart and to evaluate the impact of myocardial infarction therapies. Its assessment can be performed from late gadolinium enhancement magnetic resonance images. A number of methods have been proposed for the semi-automatic and automatic quantification of necrosis. We developed an automatic method based on a Markov random field framework[7] and a region growing approach within an EM optimization, which enables segmentation of both necrosis and microvascular obstructions.

3. CONCLUSION

This survey has been performed for collecting the different algorithms for myocardial infarct localization. In this myocardial deformation from local wall is considered. The localization of myocardial infarct is crucial for early patient diagnosis. This survey helps in identifying all possible localization systems for myocardial infarction.

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BIOGRAPHIES

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