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A FEATURE MATCHING-BASED APPROACH TO DEFORMATION FIELDS MEASUREMENT FROM MR IMAGES OF NON-RIGID OBJECT

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Abstract. *Though a variety of different algorithms have been implemented for estimation of the deformation fields of biological tissue from magnetic resonance (MR) images, few attempts in feature tracking areas have been reported. In this study, we propose a method to measure deformation fields of biological tissues based on local feature tracking. First, we use* correlation score *(cs) based method to obtain a candidate matches set. Secondly,* relaxation *technique is used to disambiguate matches. Next, the dense deformation fields is calculated using linear interpolation approach within Delaunay triangles net. To test the validity of our approach, we apply the proposed approach to MR images of a volunteer's calf. Moreover, the reverse movement of selected check points is used to evaluate the reliability and accuracy of the results. Preliminary experiment results of this paper reveal that the proposed approach is effective.*
Keywords: Feature matching, MR image, Deformation measurement

1. **Introduction.** Since its initial use for human imaging over 20 years ago, magnetic resonance imaging (MRI) has become a widely used in clinical imaging modality [1]. MRI has increasingly employed in biomedical applications. As one of research branches in MR image processing, interior deformation fields measurement is very important for physical parameters estimation. The purpose of this paper is to develop a valid approach for measurement the dense deformation fields of non-rigid and non-uniform object. The input data of this procedure are MR images before and after deformation.

Though there has been significant growth on deformation fields measurement from medical MR images, most works that have been done are mainly focus on non-rigid registration approaches. Especially, many proposed approaches are based on elastic deformable model [2-10]. Generally, the deformable models can be classified in two basic categories: parametric and geometric deformable models [5]. Parametric deformable models, also called snakes, was first proposed by Kass, Witkin and Terzopoulos in 1987 [11]. Parametric deformable models represent curves and surfaces explicitly in their parametric forms during deformation. Usually, it must formulate an energy function for a deformable contour in order to find a parameterized curve that minimizes the weighted sum of internal energy and potential energy. Different from parametric deformable models, geometric deformable models are based on curve evolution theory and the level set method, representing curves and surfaces implicitly as a level set of a higher-dimensional scalar function. Their parameterizations are computed only after complete deformation, this allowing topological