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A TEXTURE FEATURE-BASED METHOD FOR DYNAMIC ORGAN TRACKING

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Abstract. *In this paper, a novel approach for dynamic organ tracking based on texture feature is proposed. The purpose of this work is to find an efficient way to delineate and track the contours of a specific organ such as mouth, eye and lung which has distinct intensity from the surroundings and whose shape and position vary smoothly. The initial organ contours were manually delineated as the reference. Control markers on the organ contours were chosen for automatically tracking the dynamic organ contours. The tracking procedure consists of two major steps. Firstly, texture features were extracted from the regions under these control markers by using Sobel operator; and secondly, a local searching strategy based on the texture feature was performed for marker matching and further the dynamic contours tracking. The advantage of this approach lies on that it makes use of the local contrast between the organ and its surroundings to capture efficient local texture features and match fast to the corresponding location on target images while considering the motion and deformation of the organ in target images. The proposed approach was tested by tracking eye, mouth contours in videos and lung contours in clinical 4D thoracic CT images respectively. The satisfied results were obtained. An accordance coefficient was proposed to quantitatively evaluate the tracking performance and it was found that our approach performed best in lung contour tracking with accordance coefficients about* 95%.

Keywords: Dynamic contour tracking, Texture feature, Sobel operator, Accordance coefficient

1. **Introduction.** Dynamic organ tracking has extensive applications in radiotherapy for cancer treatment. Accurate delineation of the target organ is necessary and important for making treatment planning. As the emerging of the 4D radiotherapy technique, the motion and deformation of the organ during radiation treatment should be taken into account to improve the treatment accuracy [1, 2], which heavily relies on the dynamic tracking method. In recent years, the applications of dynamic organ tracking extend to the intelligent video processing and analyzing. The researches focus on working out efficient and robust dynamic tracking algorithm. Eyes and mouth are the organs being tracked and delineated mostly for driver fatigue monitoring, expression recognition, patients monitoring, person based indexing and so on [3, 4, 5, 6, 7, 9]. Besides, the dynamic tracking is also applied to many other fields such as intelligent fire alarming systems [10].

Object tracking based on and derived from the image segmentation techniques which might be considered as a dynamic segmentation. Thus, the region growing approach [11,