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REDUCTION OF PROCESSING TIMES FOR TEMPORAL SUBTRACTION ON LUNG CT IMAGE EMPLOYING OCTREE ALGORITHMS

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Abstract. *The temporal subtraction image, which can be obtained by subtracting previous image from current one, is useful for visual screening in clinical field. The temporal subtraction technique removes normal structures, e.g., blood vessel. Hence, it can enhance interval changes such as the new lesions and the changes of existing abnormalities on medical images. Recently, several temporal subtraction methods have been proposed for thoracic medical images. In temporal subtraction, image registration technique is required for correcting displacement between current image and previous one. However, efficient image registration technique of temporal subtraction for MDCT (Multi Detector-row CT) has not been proposed because of the complication of deformation in 3 dimensional region. In this paper, we propose a new efficient computer aided diagnosis (CAD) algorithms for detection of lung nodules which are obtained by temporal subtraction for thoracic MDCT images. We have tried to reduce the computational time for the temporal subtraction image by use of octree algorithms on 3-dimensional image space. To evaluate our method, we have applied the method to 4 MDCT dataset and confirmed its efficiency.*
Keywords: Computer aided diagnosis, Temporal subtraction, Image warping, Octree

1. **Introduction.** Computed tomography (CT) can be used to obtained detailed images of pulmonary complaints such as nodule, cancer. In recent years, importance of diagnostic imaging has been increasing. To identify candidate of the pulmonary complaints on CT images, many computer aided diagnosis (CAD) systems have been developed. The purpose of CAD is to provide helpful information for diagnosis to medical doctors as "second opinions" [1]. Also, several CAD systems have been proposed for thoracic images [2-8]. Especially, to detect lesion shadows such as lung cancer, nodules or/and ground glass opacity on thoracic CT images, many techniques have been developed.

On the other hand, image registration technique is a fundamental problem in medical image analysis for detecting geometric correspondence between multiple images. As an application of image registration technique, temporal subtraction technique based on image registration has been proposed on medical field [9-11]. The temporal subtraction technique removes normal structures, e.g., blood vessel. Hence, the technique can enhance interval changes such as new lesions and/or existing abnormalities by subtraction of the two images. In the visual screening, medical doctor compares current images and previous ones. However, some problems such as oversight and misdiagnosis are feared because abnormal areas on medical images are small and faint. On the other hand, abnormal areas are enhanced on temporal subtraction image, and the positions of abnormality are explicit. Therefore, effective diagnosis is expected by comparing not only current images