Title: Reduction of false positives in a computerized detection scheme for pulmonary nodules based on symmetry between left and right lung regions

We have developed a novel method for reduction of false positives reported by a computer-aided diagnosis (CAD) scheme for detection of lung nodules in chest radiographs. Our method is based on the removal of normal structures in the regions of interest (ROIs) based on symmetry between left and right lung regions. In our method, two ROIs are extracted, one from the position where a candidate of a nodule is located, and the other from the anatomically corresponding location in the opposite lung, which contains similar normal structures. A wavelet-based, multiresolution image registration method is employed for matching the two ROIs, and subtraction is performed. If no structure remains in the subtracted ROI, then the original ROI is identified as containing only normal structures; otherwise, it is regarded as containing a nodule. A measure that quantifies the remaining structures was developed for distinction between nodules and false positives. In an analysis of 780 ROIs consisting of 84 nodules and 696 false positives reported as detected nodules by our CAD scheme, we were able to eliminate 32% of false positives with loss of only one nodule with this new method. When receiver operating characteristic (ROC) analysis was employed for estimating the performance of our method for unknown cases, it yielded an area under the ROC curve (Az) of 0.82. These results indicate that the method is very effective in eliminating normal anatomic structures and thus reducing the number of false positives in the CAD scheme for detection of lung nodules.