

AbstractID: 11372 Title: A Probabilistic Neural Network using the Haralick Transform to Segment Ribs in Chest Digital Radiographs

Purpose: Segmenting ribs in chest radiographs is the first step toward a system of automated diagnosis in digital radiography (DR) of the lung.

Methods: We use a probabilistic neural network (PNN) and selected components of the Haralick transform as a feature vector to train our neural network in this segmentation task. A Haralick transform composed of statistical components is employed as a feature vector where the relevance of each component to the particular task is determined using a simple scatter plot analysis. A training set is generated by randomly selecting pixels around which a 16 by 16 pixel ROI is constructed. This is done for rib and non-rib regions. The Haralick transform is applied to this window as a feature vector characterizing the window and hence the region. Once the components from the scatter plot analysis are selected, the Haralick transform is applied. The method is automated in that each pixel is interrogated and classified by the PNN.

Results: The PNN performs well with 50 training vectors each from rib and non-rib areas. There are typically 7 relevant Haralick components after scatter plot analysis. We demonstrate the effectiveness of the method with images that show rib segmentation on two different patients using the same Haralick components and PNN.

Conclusion: A probabilistic neural network and the Haralick transform have been shown to be effective methods for segmenting the ribs in digital radiographs of the lung. The next phase would consist of morphological operations to turn the extracted rib images into binary images, thereby allowing the ribs to be disregarded in computer assisted diagnosis of lung DRs.