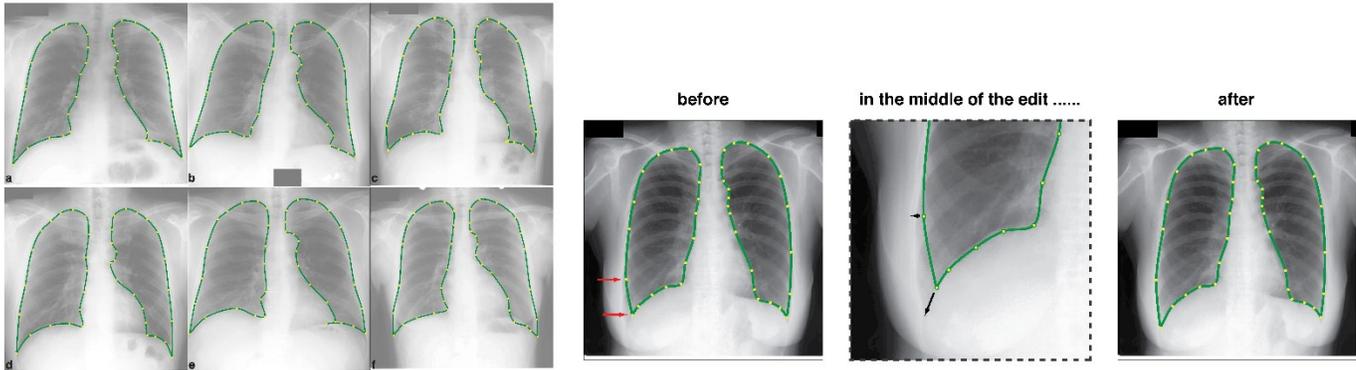


Automated Segmentation of Lungs with Edit Capability



Technology Overview

Segmentation for medical purpose often needs corrective measure if the software wants FDA approval. Most of the algorithm proposed and the software developed probably can do automated segmentation, but they do not provide a simple, integrated measure to edit segmentation.

This technology achieves both features through active spline model. The method is adopted to segment lung. However, by the method itself, manual direction is always required for the algorithm to start off. To make the segmentation automated, active spline model is run on a standard image pyramid comprising 5 levels of resolution, from the lowest to the highest.

As the segmentation completes, centripetal parameterized Catmull-Rom splines go through the salient points and delineate the lungs. When the result is unsatisfactory, user needs only to shift any of the 39 salient points to make the correction, and the boundaries will be redrawn.

Technology Features & Specifications

In this algorithm, the point distribution model for lung is built on 124 chest x-rays, extracted from JSRT database. The model uses 39 salient points to capture the shape of the lungs, 18 for right and another 21 for left. The segmentation runs on a standard image pyramid, starting from level 5 (the lowest, with a resolution of 16x16) to level 1 (the highest, 256x256). For each level of resolution, histogram equalization is applied to enhance contrast. For level 2 and level 3, median filters of size 3x3 and 4x4 are used respectively to improve convergence. Gradient vector flow field is selected to produce the necessary force field for active spline model. This technology achieved an average accuracy of 88% before any human intervention. After edit, the average accuracy increased to 95.5%, with a minimum of 92.5%.

Potential Applications

Any software that involves posterior-anterior chest x-ray will find the technology useful.

Market Trends and Opportunities

The medical image analysis market is estimated to be \$1.7 billion in 2012 and is growing at a rate of 7.2% from 2012 to 2017 to reach \$2.4 billion. The growth of the medical image analysis market is mainly contributed by the standalone software market which is accelerating at a faster pace as compared to the integrated software market which is moving at a stable rate (Markets and Markets). Currently, most medical image segmentation doctors prefer to have semi-automatic where they will have a say on the actual region of interests, should they disagree with the CAD tools' ROI. This software allows the doctors to be able to alter the CAD tool result by simply click and drop the points.

Customer Benefits

Almost all of the automated segmentation provides only rudimentary methods to edit segmentation, and those methods are always a complimentary function to the main algorithm, as though segmentation is always perfect. As a result, the usage experience of the edit function is bad. This technology approaches segmentation from another point of view. It recognizes the importance of edit in lung segmentation, and thus provides not just an automated lung segmentation, but also the best edit experience over segmentation correction.

OVERVIEW

- Technology Category Healthcare - Telehealth, Medical Software & Imaging
- Technology Status Available
- Technology Readiness Level [TRL4](#)
- Keywords medical image segmentation



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CONTACT:

Technology Development and Innovation Office
Website : www.np.edu.sg/tdi
Email: dept-tdi@np.edu.sg