A novel Computer Aided Detection for identifying lung nodules on chest radiographs

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Introduction
Lung cancer is the leading cause of cancer death in the United States. Lung cancer usually exhibits its presence with the formation of pulmonary nodules. Nodules are round or oval-shaped growth present in the lung. Chest radiographs and Computed Tomography (CT) are used by radiologists to detect and monitor treatment of such nodules. However, chest radiographs are far more common, simple, low-cost, widely prescribed and provide only a fraction of x-ray dose when compared to CT. Computer Aided Detection (CAD) applied on chest radiographs is very essential and would be valuable in lung cancer screening. Dr. Hardie’s CAD system [1] was able to detect 78.1% of the nodules with a set of 4.0 False Positives per image and it serves as a benchmark to this research. In this poster, we present the facets of our proposed algorithm.

CAD Algorithm
The algorithmic steps of the CAD system include:
- Local contrast enhancement
- Automated anatomical segmentation
- Detection of potential nodule candidates
- Candidate segmentation
- Feature extraction
- Candidate classification

![Figure 1: CAD System block diagram](image1)

Methodology
Here, proposed CAD algorithm is implemented for both Japanese Society of Radiological Technology (JRST) and Lung Image Database Consortium (LIDC) - Image Database Resource Initiative (IDRI).

- Algorithm is trained using Riverain Dataset provided by the Riverain Medical Group.
- JRST Database comprises of 154 chest radiographs containing one radiologist confirmed nodule each.
- LIDC-IDRI comprises of 276 patient chest radiographs containing nodules of various types and sizes whose centroids are provided by at least one of the four radiologists.

Results
![Figure 2: Original chest radiograph](image2)
![Figure 3: Local Contrast Enhancement and Anatomical Segmentation](image3)

Future Work
- Enhance the performance of front end detector by optimizing allowable parameters
- Identify the best classification technique for distinguishing candidates
- Improve the accuracy of detection of nodules in the existing CAD algorithm

References