A NOVEL COMPUTER AIDED DETECTION OF LUNG NODULES IN 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 Computer 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

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 1: CAD System block diagram
- Figure 2: Original chest radiograph
- Figure 3: Local Contrast Enhancement and Anatomical Segmentation
- Figure 4: Detection of potential nodule candidates
- Figure 5: CAD system result

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