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Computational and Clinical Approach in Lung Cancer Detection and Analysis

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Abstract

Lung Cancer has been an issue of concern these days as there is an alarming toll of rising deaths every year. A good amount of research is pursued on aspects of the genetic and hereditary and also computational methods to detect Lung cancer. Even though there is a lack of awareness about this disease due to a colossal gap between technical and clinical research areas. Accordingly this research paper presents a comprehensive study on Lung Cancer detection in terms of simulation of medical images and clinical analysis wherein one of the KRAS mutations has been analysed in lung cancer patients and their lung images have been used for developing medical images with better tumour spot detection. The computational technique used for simulation purpose involves morphological image processing methods, which mainly work on the topological and shape content of the images acquired.

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Keywords: Antioxidants; Computed Tomography; Image; Lung Cancer; Samples.

1. Introduction

Lung cancer which is also called cancer of the bronchus is categorized by uninhibited cell growth in tissues of lungs, mostly caused by the carcinogenic agents. This cancer is a significant contributor of increased cancer deaths leading to abrupt changes in human life. The resulting cells will not develop into healthy ones; they divide to form tumours which are considered as the main cause of death from cancers[1]. Most of the times this anomaly is a genetic disorder, but these days it is even seen in normal group of people. This is mainly due to sedentary lifestyles and eating habits, moreover so called developed attitude of the people who take prohibited things for their entertainment and luxury. This class of cancer becomes more dangerous leading to pulmonary diseases during its course and makes the life of a patient a nightmare. Survival from lung cancer is directly related to its growth and its detection time. The earlier the detection is, the higher the chances of successful treatment are[2]. Once it is detected the patient has to undergo a proper treatment and rigorous painful medical procedures by avoiding the blunders they did to them with their habits.

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The current research work emphasize on two approaches, (i) Computational approach: using image processing methods that belong to class of morphology (ii) Clinical approach: the specific natural antioxidants available in the daily diet which can show anticancerous activity. Computational methods solve the problems without involving invasive procedures such as biopsies and also reduce the misinterpretations by radiologists[3,4]. Clinical work involves in blood sample collection and gene mutation process. In fact, *KRAS (Kirsten Rat Sarcoma)* mutations comprise 86% of all *RAS (Rat Sarcoma)* mutations.[5] Mutations in *KRAS* occur with the greatest frequency in all human cancers (21.6%), followed by *Neuroblastoma RAS* (8.0%), and *Harvey RAS* (3.3%).[5] *KRAS* was initially identified in a human lung cancer cell in 1982 and, since then has been shown to be mutated in 35%–50% of all non-small cell lung cancers.[6] Of all the known human *RAS* genes, *KRAS* is most frequently mutated in cancer[7].

2. Computational Approach

Digital Image processing is one of most wide spread research area these days. As said in old proverb that an image worth more than thousand words, it means even a common man without much knowledge of any subject can easily understand and interpret the images. Medical image processing application has occupied its importance in both technical and clinical aspects for its help towards the detection and analysis of abnormalities, by making the work easier for medical professionals in treating the problem with more scientific and sophisticated methods. Most of the diagnostic systems these days depend on Medical Imaging Modalities and these images also have some limitations which are to be given attention. The limitations are such that human intervention is necessary such as clinical expertise and knowledge on techniques used. The purpose of this approach is to detect cancerous lesions present in the CT images of lung using median filtering process (most often in simple words this process is called enhancing the intensity levels of the image for better understanding and analysis) for image enhancement and morphological operations to segment the lesions.

2.1 Implemented model

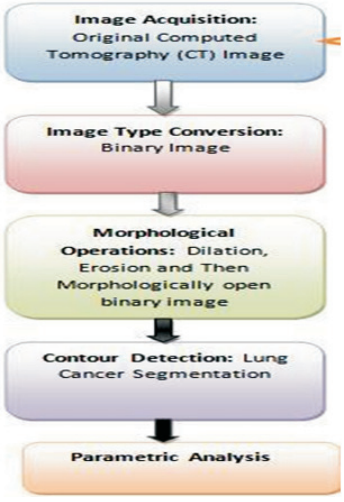

Fig. 1. Implemented Model Block Diagram.

2.2 Results and analysis

The working of the model starts with image acquisition i.e. the CT image considered in this work is used in consultation with a Physician after taking proper permission from the patient. The image is fed to pre-processing by a