

## Lung Cancer Detection and Multi Level Classification Using Discrete Wavelet Transform Approach

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**Abstract :** Uncontrolled growth of abnormal cells in the lung in the form of tumor can be either benign (non-cancerous) or malignant (cancerous). Patients with Lung Cancer (LC) have an average of five years life span expectancy provided diagnosis, detection and prediction, which reduces many treatment options to risk of invasive surgery increasing survival rate. Computed Tomography (CT), Positron Emission Tomography (PET), and Magnetic Resonance Imaging (MRI) for earlier detection of cancer are common. Gaussian filter along with median filter used for smoothing and noise removal, Histogram Equalization (HE) for image enhancement gives the best results without inviting further opinions. Lung cavities are extracted and the background portion other than two lung cavities is completely removed with right and left lungs segmented separately. Region properties measurements area, perimeter, diameter, centroid and eccentricity measured for the tumor segmented image, while texture is characterized by Gray-Level Co-occurrence Matrix (GLCM) functions, feature extraction provides Region of Interest (ROI) given as input to classifier. Two levels of classifications, K-Nearest Neighbor (KNN) is used for determining patient condition as normal or abnormal, while Artificial Neural Networks (ANN) is used for identifying the cancer stage is employed. Discrete Wavelet Transform (DWT) algorithm is used for the main feature extraction leading to best efficiency. The developed technology finds encouraging results for real time information and on line detection for future research.

**Keywords :** artificial neural networks, ANN, discrete wavelet transform, DWT, gray-level co-occurrence matrix, GLCM, k-nearest neighbor, KNN, region of interest, ROI

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