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PNEUMONIC NODULE EFFECTUAL DISCLOSURE USING THORACIC CT IMAGES

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Abstract: **Prediction of lung cancer is most challenging problem due to structure of cancer cell, where most of the cells are overlapped each other. The image processing techniques are mostly used for prediction of lung cancer and also for early detection and treatment to prevent the lung cancer. Image quality and accuracy is the core factors of this research, image quality assessment as well as improvement are depending on the enhancement stage. The summary for the prediction of lung cancer by previous researcher using image processing techniques is also presented. There are three main components: multichannel super pixel level feature extraction and fusion, kernel sparse representation, and segmentation. In this method, sparse coding and dictionary learning, both part of kernel sparse representation, are implemented in a high-dimensional feature space F with the help of the kernel trick. Fusion system passes information within each decomposition level so that the details of the source image is preserved expressing the artifacts. It is difficult to determine whether narrowing of a spinal canal. In Proposed, Qualitative analysis like Clustering and quantitative analysis like feature extraction and image quality assessment is used to segment the cancer detected portion in lung scanned images. To segment the portion, have to filter out the acquired image based upon the masking methodology. The Clustering function will be applied extracted throughout the filtered image. After filtering and contrast enhancement, image quality assessment (Mean Square Error, Peak Signal to Noise Ratio etc.) is calculated to compare other techniques. After segmenting cancer region, the patient's caretaker can receive the details through E-mail as report. Finally Accuracy estimation will be done for algorithm efficient level. After result, Feature Extraction and Image quality values are plotted and the message is sent to the caretaker through GSM.**

Index Terms **– Image quality, Qualitative analysis, Mean Square Error.**

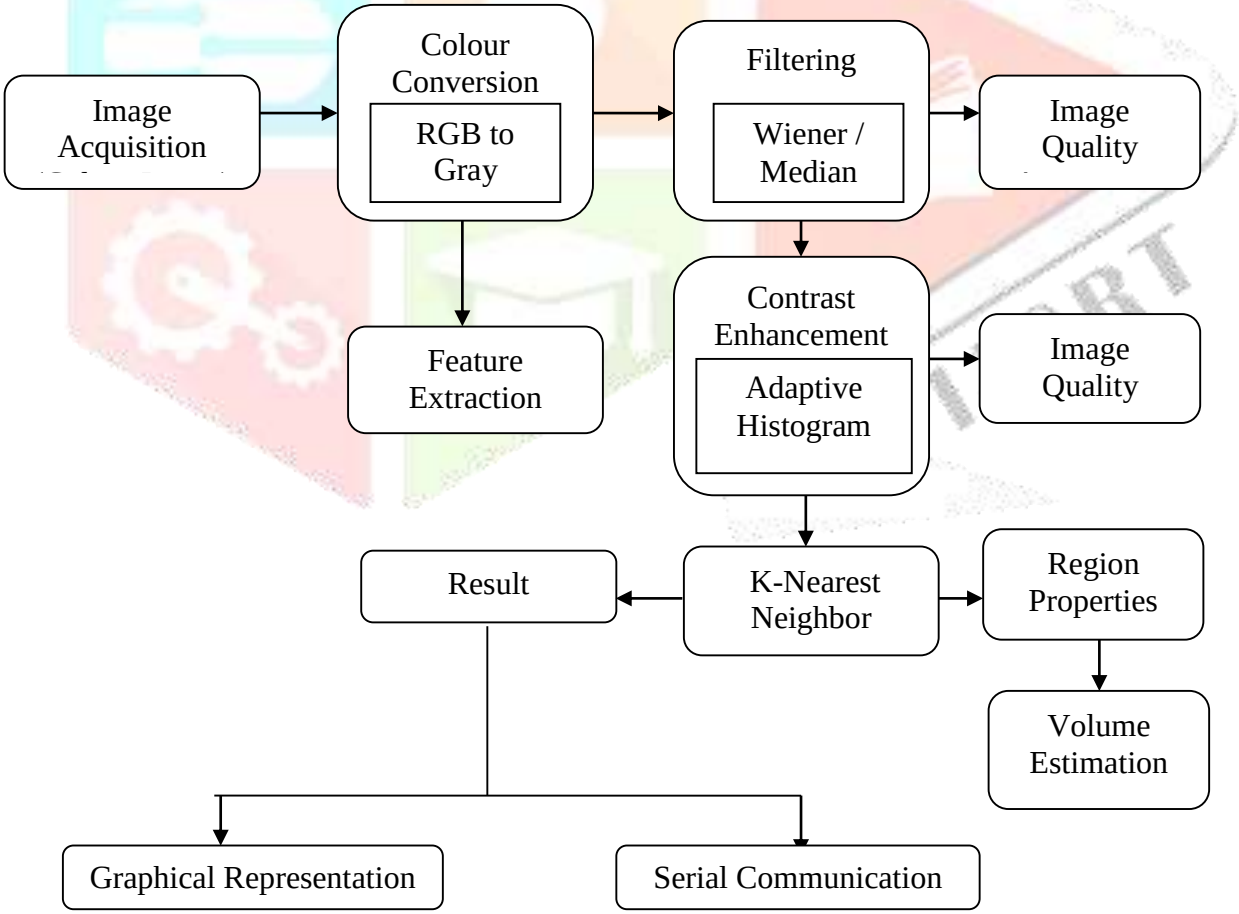
1. Introduction

The chest film throws-up all sorts of differential diagnoses, of which the foremost that comes to one's mind is lung cancer, primarily because it is a difficult and challenging affliction to manage the solitary pulmonary nodule is the prototype of the mass lesion in the lung. In general, any patient whose chest x-ray shows a single, rounded, or ovoid lesion in the lung parenchyma which is not associated with any obvious adenopathy, atelectasis, or pneumonia is considered to have a PN1.PNs are listed in the literature under various names as Coin lesions, Solitary intra-pulmonary tumours, Isolated pulmonary nodules etc.., The pulmonary nodule may be of any size. The shape may be round, oval, or slightly lobulated, but well-circumscribed. The lesion should be more-or-less homogeneous in density, but may contain calcium. The shadow of the PN could be in contact with the diaphragm or chest wall, but not to involve or appear to fuse with these structures. Malignant lung nodules include lung cancer lymphomas and cancers that have spread to the lungs from other parts of the body. Image segmentation is a process of partitioning a digital image into multiple segments. The goal of the segmentation is to simplify or change the representation of an image into something that is more meaningful and easier to analyse. It will segment the image into edge-based, region-based. There are three basic types of gray level discontinuities in a digital image: points, lines, and edges. The most common way to look for discontinuities is to run a mask through the image. Region growing: Groups pixels or sub-region into larger regions.

2. Materials and Methods

[Ref .1] An innovative GEP-based classifier is proposed to classify/predict lung cancer from microarray data. Compared with other representative machine learning-based classifiers, the proposed classifier achieved higher accuracies in classifying/ predicting lung cancers on the commonly used datasets (GEO, Michigan and Harvard). The evaluation results showed that GEP approach improved the lung cancer prediction. [Ref.2]Due to the unique physical and chemical properties of materials at the Nano scale. Silver Nano particles have been extensively studied recently in many biomedical applications especially in cancer treatment. AgNP's have been proved to have anti- tumors activity and the mode of cell death was shown to be apoptotic. The goal of the current work was to investigate the degree of DNA damage that may result from the usage of AgNPs as a photosensitizer in photo-inactivation and to evaluate the generation of reactive oxygen species (ROS) produced in the treatment. The results showed the occurrence of DNA damage in lung cancer cells the generation of ROS shown by mitochondrial membrane potential changes. [Ref.3]An image processing techniques has been used to detect early stage lung cancer in CT scan images. The CT scan image is pre-processed followed by segmentation of the ROI of the lung. Discrete waveform Transform is applied for image compression and features are extracted using a GLCM. The results are fed into an SVM classifier to determine if the lung image is cancerous or not. The SVM classifier is evaluated based on an LIDC dataset. The classifier achieves an accuracy of 95.16%, sensitivity of 98.21% and specificity of 78.69%. [Ref.4]The next step which develops a technique for CAD Systems i.e. more features has been added. By this method, it helps to detect the lung nodules in helical X-ray pulmonary computed tomography images. For the purpose of detecting a nodule in the existing area .We have proposed a novel template matching technique which is based on genetic algorithm and template matching. The main purpose of this method is proposed and research has been carried out and our result shows that our technique can be regarded for CAD system to detect nodules in helical CT pulmonary images. [Ref .5] Image fusion is a process of combining complementary information from multi-modality images of the same patient in to an image. In feature level fusion, source images are segmented into regions and features like pixel intensities, edges or texture are used for fusion. The fusion method contains the multi modal images are segmented into regions using automatic segmentation process and the images are fused according to region based fusion rule.

3. Proposed Block Diagram



3.1 Proposed System

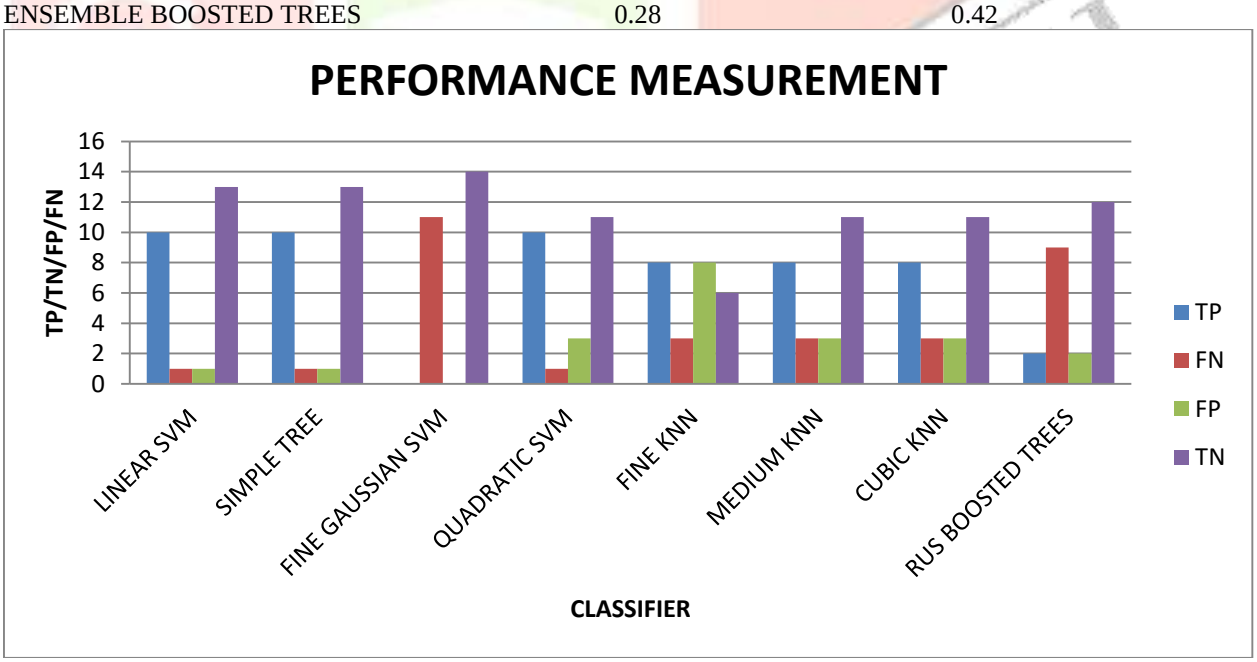
In Proposed, Qualitative analysis like Clustering and quantitative analysis like feature extraction and image quality assessment is used to segment the cancer detected portion in lung scanned images. To segment the portion, first have to filter out the acquired image based upon the masking methodology. The Clustering function will be applied extracted throughout the filtered image. By the method of morphological bounding box will be drawn over the affected portion. Then, the region enclosed by bounding box will be spliced out separately. After filtering and contrast enhancement, image quality assessment (Mean Square Error, Peak Signal to Noise Ratio etc.) is calculated to compare other techniques. After segmenting cancer region, the patient's caretaker can receive the details through E-mail as report. Finally Accuracy estimation will be done for algorithm efficient level. After result, Feature Extraction and Image quality values are plotted. SMS is sent through GSM module.

4. Results and Discussion

From the experimental results, it is concluded that Linear SVM gives the better classification accuracy than KNN and Trees classifier. The utilization of new and more efficient classifiers could improve the accuracy performance in lung cancer region. These features served as input into all classifiers in this study has proven to possess high discriminatory attributes however the generation of more feature may enhance the evaluation procedure accuracy. GLCM values are plotted. From the analysis, it is evident that the classification performance of Linear SVM is higher as compare to KNN and Trees classifier. New features are calculated to distinguish the SLC and NSLC nodules. The classification accuracy is calculated in term of true positive (TP), true negative (TN), false positive (FP), false negative (FN) with respect to the ground truth.

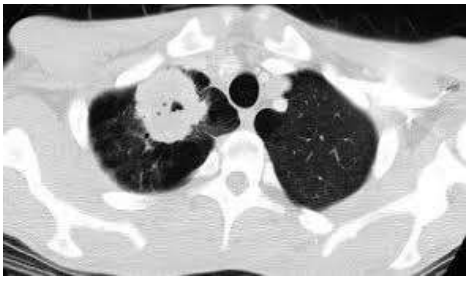
5. Tables and Figures

	SPECIFICITY	SENSITIVITY
LINEAR SVM	1	0.7
COMPLEXTREE	0.85	0.85
FINE KNN	0.7	0.57
MEDIUM KNN	0.7	0.57
QUADRATIC SVM	0.7	0.7
FINE GAUSSIAN SVM	0.28	0.42
ENSEMBLE RUS BOOSTED TREES	0.57	0.57
ENSEMBLE BOOSTED TREES	0.28	0.42



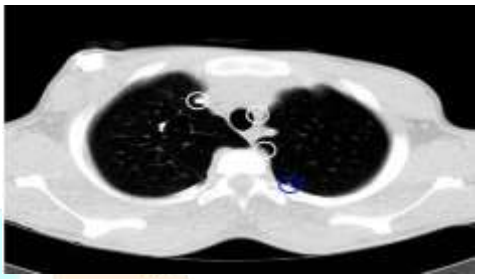
6. Figures

6.1 Input CT images of Lung Nodule



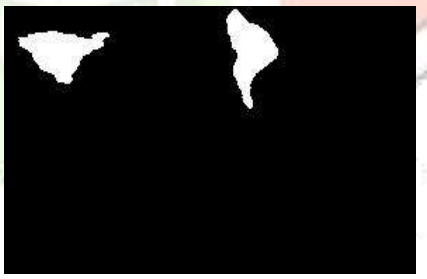
(a) Input image of pneumonic nodule

6.2 Gradient CT images for Nodule



(b) SVM classifier used for classification .Colors and FN added manually .
In this, Nodule to be detected near the bronchus and find false nodule.

6.3 Malignancy Level Classification



(c) Malignancy level of cancer nodule is detected

7. Conclusion

Lung is among the most important organs of human body which have a high influence on the performance of other body parts. Since lungs are responsible to control the body metabolism, the performance of the lung directly influences each of the main body organs. In this project, two segmentation processes have been used. The famous medical imaging is Lung CT scan images. These images are mixed types like some images has nodules, some images has not nodules, some type of images are small lung cancer (SLC) and some type of images are non-small lung cancer (NSLC) nodule. Total 25 Number of lung images were used where 11 NSLC total and 14 SLC images was selected in database. The establishment of scan images as a leading tool in the medical applications is directly associated with the evolution of imaging technology employed in medicine and biology. CT scan images are a widely used tool for clinical diagnosis, although it is time consuming for physicians to manually segment the thyroid nodule. This work proposed the method of classification of lung cancer segmentation (SLC and NSLC) nodules using the Trees, KNN and SVM, segmentation of thyroid nodules. New features are calculated to distinguish the SLC and NSLC nodules. The classification accuracy is calculated in term of true positive (TP), true negative (TN), false positive (FP), false negative (FN) with respect to the ground truth.

8. Future Work

This work will be extended to segment the lungs scan images using fuzzy neurologic and also classify the images to different stages of lung status.

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