**REF-10**

In present times Lung cancer is one of the leading cause of death and to improve the life expectancy of the patient by 5 years it is important to identify the lung nodule at an early stage. To do this there are three possible methods, first is rule based, second being SVM and third is the combination of both.

Initially the features are calculated and since they are the input to the system therefore the extracted features of candidates’ ROI play an important part in the efficient diagnosis of the nodule. Total of thirteen features are extracted including seven shape features: area, perimeter, rectangle degree, ellipticity, circularity and slenderness, two gray features: gray means and gray variance and four texture parameters: energy, contrast, entropy and adverse moment.

Secondly, if all the 13 features are taken into consideration then the computation can be dreadful and some abundant blood vessels may take longer time in classification thus decreasing the efficiency of SVM. As a result some non-nodule candidates can be ignored by following the simple rules which are:

1. Rule 1: if the rectangle degree R >= 1, then the ROI is considered to be the blood vessel and excluded;
2. Rule 2: if the slenderness S <= 0.4, then the ROI IS considered to be the blood vessel and excluded;
3. Rule 3: if the ellipticity e >= 4, then the ROI IS considered to be the blood vessel and excluded.

Finally all the extracted features are taken as an input to the SVM in order to classify the candidate. The input data of SVM are normalized to [0, 1], and the output of SVM is divided into two classes: nodule (out= 1) and non-nodule (out=-1).

Also as an extra step to determine which system is better of all three the results of the approach combing the two methods are compared to rule based and SVM individual results and the analysis that can be drawn from it shows that the rule-based approach has no omission, but the misclassification probability is too large; the approach combining rule-based and SVM has higher omission than SVM, but lower misclassification. The approach combining rule-based and SVM extracts only 53 SVs, which means that it is faster than SVM (with 67 SVs) for classification. In a nutshell it can be said that the approach combining the rule-based and SVM is more efficient than the other two.