Volume 7, Issue 4, April 2017 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Identification of Disease by Using SVM Classifier

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Abstract: ***In radiology field, the large number of radiology reports is generated every day but never use again. Radiology reports are in unstructured format and it is difficult to understand. Procedure of radiology reports is the part of medical field. This paper describes the classification of disease from the radiology reports. The proposed methodology includes image pre-processing, segmentation, feature extractions and classification. First take an input image then apply enhancement technique for pre-processing of input images. After completing the image pre-processing perform segmentation using k-means clustering algorithm, select the region of interest and extract the grayscale and texture features of segmented image. These features are used to train the support vector machine (SVM). Support vector machine is used for classification.***

Keyword: SVM, KNN, ANN, PNN

I. INTRODUCTION

Large number of radiology reports are daily generated hence classification of that reports in various ways by using methods like clustering. Clustering method is able to navigating and shortening documents have expecting lots politeness. Clustering have been examine for grouping the reports of radiology reports into main clusters, in sequence to discover the essential features of image. A knowledge set of creating the clusters of algorithmic rule for unsupervised and establishing the different medical domains use different lexical and semantic patterns.

Medical imaging is that the process and techniques are applied to create the individual imaging of the structure for clinical analysis, classification and treatment. It is speedily increasing in medical field. The physical therapy usually creates the use, to obtain the medical imaging like X-rays, CT-scan, MRI scan and images of ultrasound. It is suitable to extend the implementation of automatic clinical record system. Many radiology reports are produced in health organization daily [2]. Useful information are taking out from the clinical comments use to creates the reports for specific patients [7].

Automatic and inexpensive recognizable proof of medical images is very important. Software engineering and information technology are the most important part of the medical image processing, classification and clinical review. The proposed plan includes the image preprocessing, image segmentation and extraction of features and classification by suing support vector machine. Preprocessing of image utilized to obtain the improvement of better radiology reports. Save the brightness of variation resulting in the marginal blurring of native boundaries. Extraction of image features may be treated as quantitative measures of medical images essentially used for creation of radiology reports. Extraction of image features are carefully, it is certain that the set of image features will remove the very important information from the input files. SVM, rules of KNN, ANN, PNN i.e. Probabilistic Neural Network, Hidden markove model etc. furthermore many applications almost like identification of digit by hand written, entity identification ,identification of speakers, face identification, text classification and clinical uses.

Classification technique previously specified its unmistakable properties and connected points and problems. K-nearest neighbor, the main disadvantage of K-nearest neighbor it utilized each feature in computationally focused. Largely Once the set of training can be increases. The K-nearest neighbor rightness of classification is strictly degraded via the noise presence or not connected features, variety of features will increases commonly once. Probabilistic neural network, drawbacks of this method is very time consuming than the multi-layer perceptron model of networks are classify new cases and wants additional memory gap to the model is saved. Artificial neural network perform greater than from diff classification techniques by features of high dimensional and awareness about contradictory.

However the cost of high registering that utilization of electronic hardware and use of physical memory is the real disadvantage of ANN. Main approach of Bayesian through its simplicity and short process an incentive in every classification and training stage and it is wide authorized into fluctuated sorts of spaces and applications. But the generative strategies are in step with be less right than the discriminative ways that almost like SVM. SVM has shown to the bulk, accurate than the uncommon classification technique [6].Classification method is divide into two part i.e. the training part and furthermore the testing part. Training part gives the training data to the classifier. Testing part unknown data provides for classifier and classification executed when training. Exactness and inexactness classification relies upon the training efficiency.

II. RELATED WORK

Parveen, Amritpal Singh [3] describes that the system is magnetic resonance imaging of brain images recognized to find the tumor. The hybrid method is a combination SVM and fuzzy c-means cluster for classification provides correct result for recognize the tumor. Magnetic resonance imaging is the significant technique, in identifying the tumor of brain. A technique of data mining is used for classification images of MRI. For segmentation FCM i.e. Fuzzy c-means clustering algorithm is used to identified the affected region in MRI images of brain.

Ketan Machhale, Hari Babu Nandpuru , Vivek Kapur and Laxmi Kosta describes the classification of the query image into normal image and abnormal image by using support vector machine and support vector machine K nearest neighbors . Result gives the details the value of the two forms. SVM by Quadratic kernel obtained the highest value of 96% classification accuracy and SVM KNN classifier combination obtained 98% classification accuracy in analysis of similar set [5].

Noramalina Abdullah, Umi Kalthum Ngah, Shalihatun Azlin Aziz describes this work developed estimated coefficient of wavelet MRI of Brain is place in to the SVM. During the machine learning techniques, and expect to reach superior accuracy and higher exactness understand a brain image of normal and abnormal [4].Soud Demigha describes the methods build up the data mining mostly in the medical field. Data mining is beneficial in the clinical field. Decision tree method is useful to the knowledge to get the process. Decision tree method is very simple to know. It is the combination of information with variety of types, function of non linear, classification and used different accessible tools. Data mining in medical field allow to rising the quality and decreasing the cost. Text mining technique is the application of the medical field are useful to extract the medical useful infofor analysis, decision making, showing, checking, remedy support and patient administration [1].

Anuradha Bodile, Manali Kshirsagar [2] describes the extraction of image and extraction of text methods are explained. Natural language processing method is used for extraction of text, stemming is used for getting the root word, term mapping is used to evaluate the particular word is repetitive. Extraction of Image features to take out the image features and save in database. SVM classifier is used for classification and regression. Check whether the input report is currently available or not. The system gives the input report is matched with the data base report.

III. METHODOLOGY

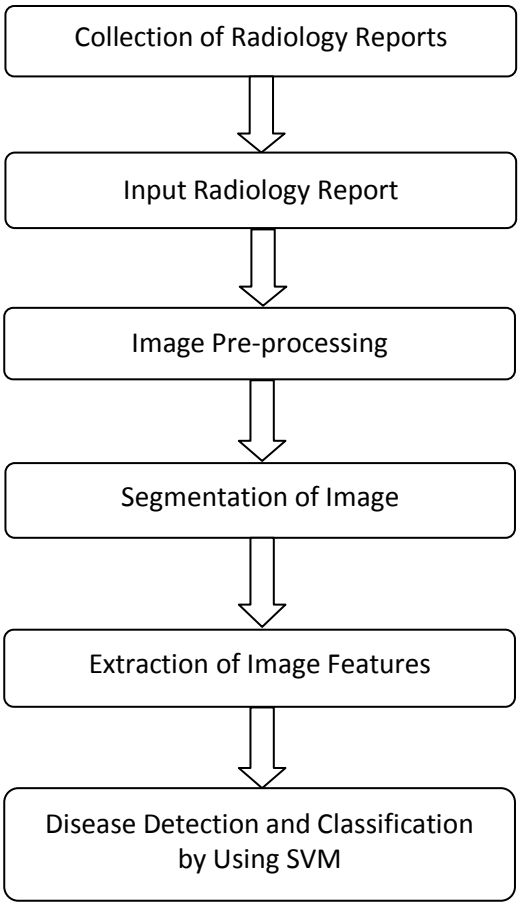

Fig 3.1: Proposed System.

IV. RESULT AND DISCUSSION

A. Input Image:

Load the radiology image file from database. We used digital images to classify the diseases. Images are taken from diff online source.

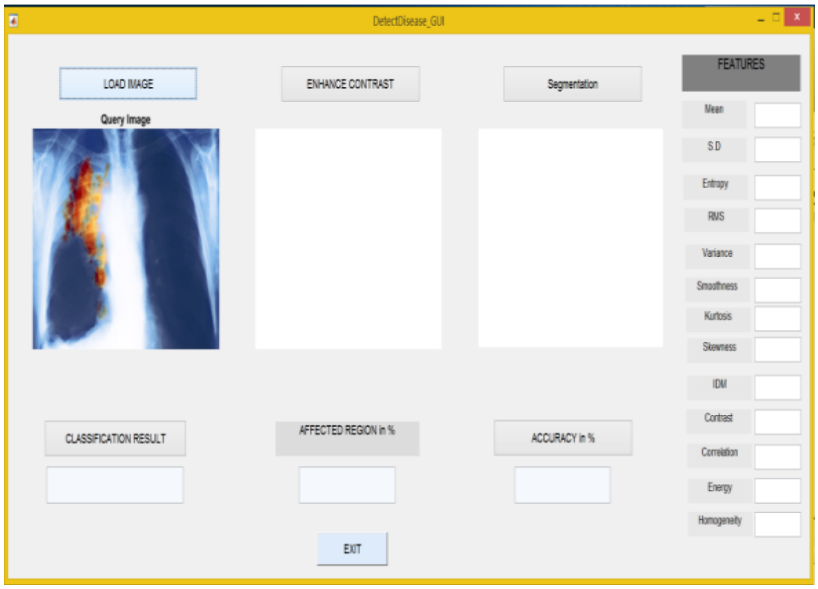

Fig: Input Image.

B. Image Preprocessing:

Pre-processing is done on collected radiology images to increasing the quality of images. Pre-processing is the initial phase before extraction of image features. First adjust the image intensity and determine the limits to stretch image contrast and resize the image 300x400. Enhancement technique is to increases the image contrasts. Increasing contrast can be useful to eliminate the noise from the given images.

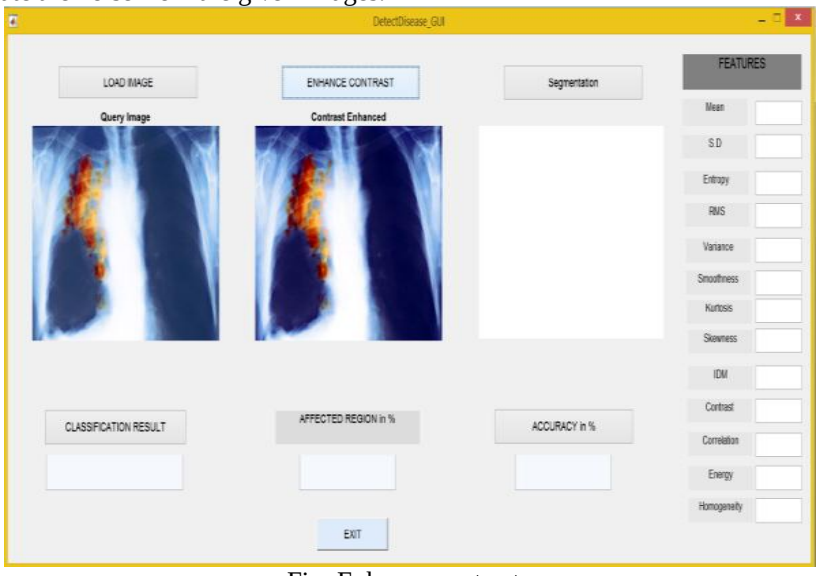

Fig: Enhance contrast.

C. Segmentation of Image:

Segmentation of image is the main origin for detection of disease and essential impact of the performance of the proposed system. Segmentation is the partition of image into different part of related features. Clustering is the technique which is used for huge no of data is grouped into the clusters of small set of data. Image segmentation is done with k-means clustering. This algorithm is union and tries to optimize the separating decision based on user original cluster. K-means clustering image is portioned into three clusters of similar features as shown in Fig. Cluster include diseased part before clustering chromaticity component (a*) is take out from L*a*b space. It is used to segment the target area which affected by disease.

Steps of K-means Clustering Algorithm

1. Read input image.
2. Input images is converted from red green blue (RGB) to L*a*b Color space.
3. Classifying the colors in a* and b* layers.
4. Measure the distances using Euclidean distance metric.
5. Label all pixels in the image.
6. Create blank cell array to stored result.
7. Create label of RGB using pixel labels.

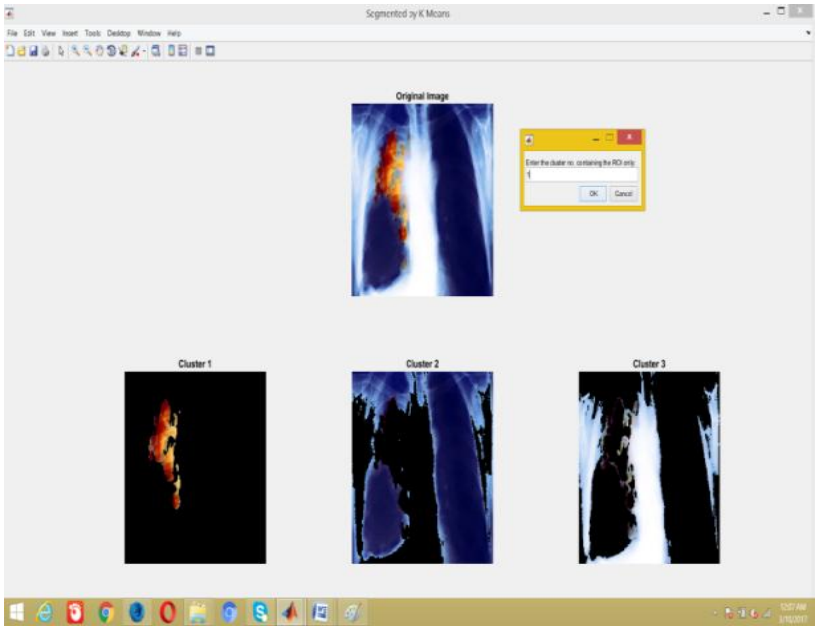

Fig: Image segmentation by Using K-means clustering and select Region of Interest (ROI).

D. Feature Extraction:

It is used to extract the information that may be discovering the importance of the sample. Feature extraction is necessary and important stage to taking out region of interest i.e RIO. In this proposed system the grayscale features are mean, variance, standard deviation, skewness, kurtosis, root mean square and texture features are entropy, energy, contrast, inverse difference moment, homogeneity, correlation and smoothness are calculated and measured feature values.

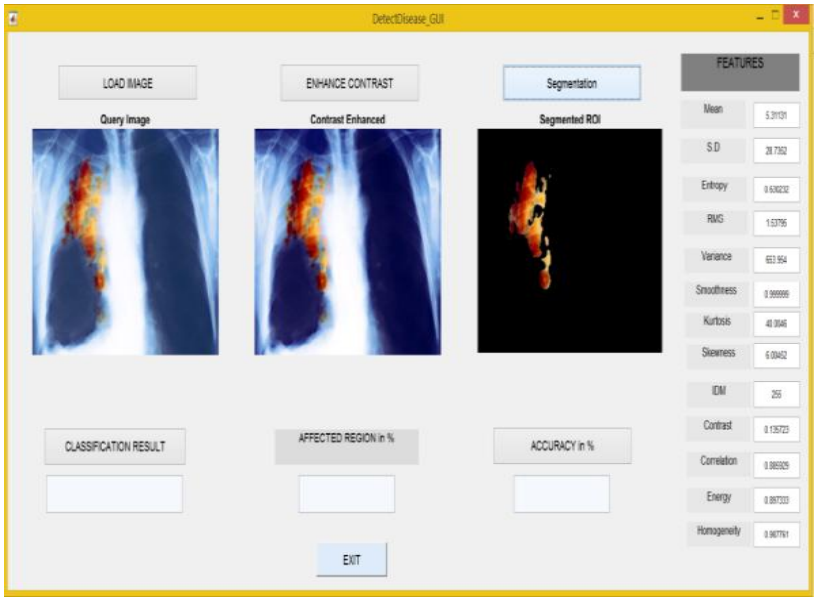

Fig: Segmented image and Feature Extraction.

E. SVM Classification:

In classification, support vector machine (SVM) classifier is used to classify the classes. This class is strongly connected to the identified classes. The SVM makes the best separation of the hyper plane among the classes by using training data. The best hyper planes enhance the margin of the nearest data. If hyper plane has the most important distance to the closest training options of any category is taken into account nearly as superior separation. Margins and max margin hyper planes designed for SVM classifier with completely different categories of two samples. The samples of support vector machine on the margin are known as support vector. SVM separates the given knowledge into identify surface. Identify surface is separate the information interested in hyper plane of two categories. Training data describes the supporting vector that describes the hyper plane.

The basic plan of SVM is employed to extend the margins among the hyper plane of two classes. Mainly the SVM will exclusively decide the issues that are associated with binary classification. Currently they need enlarged to the method of multi classes difficulty. It uses the methodology to suit sub classes of all binary classifiers and determined the right classes by selecting mechanism to grant the classification of multi classes.

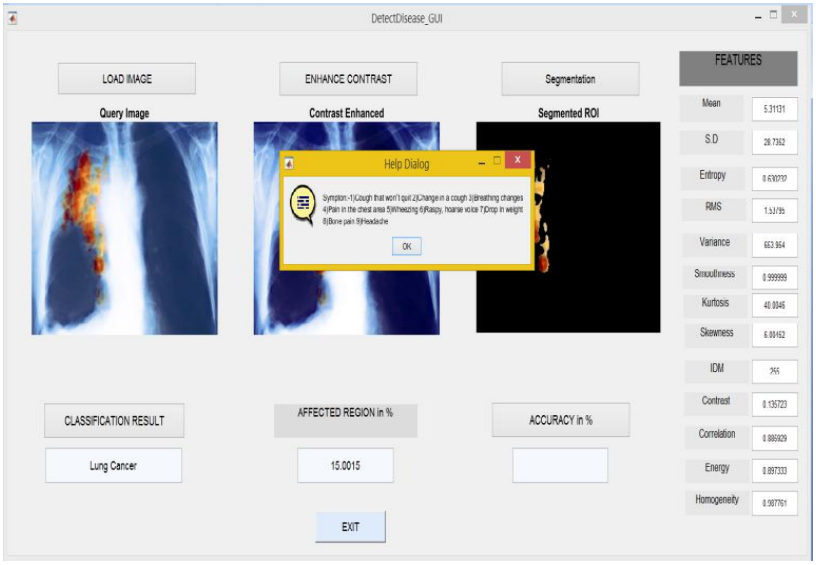

Fig: Classification Result, affected region and its symptoms.

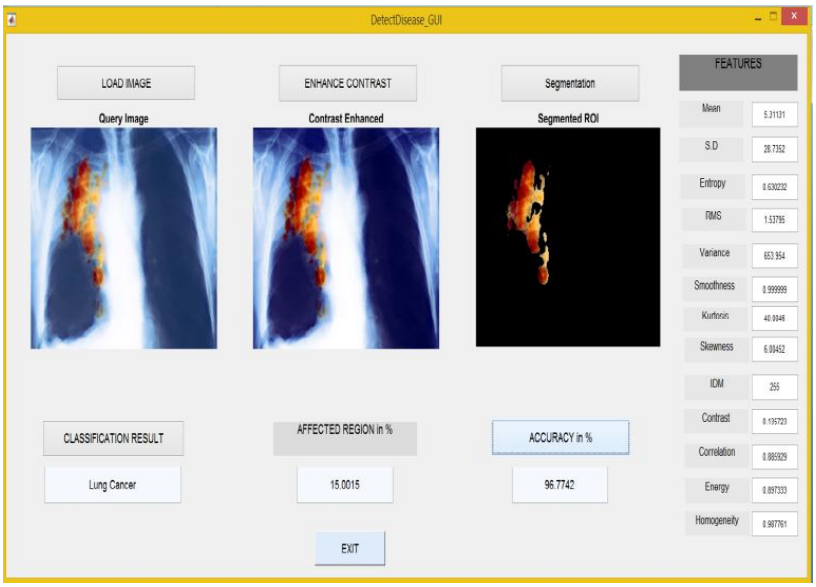

Fig: Accuracy.

V. CONCLUSION

Summarized the methods used in image processing for identifying the disease from radiology reports. From the literature review several methods are used to identify the disease but they have several limitation. Implemented methods are SVM and segmentation using K-means clustering. In our proposed system follow approaches in which first step is take an input image from the database and then apply preprocessing on input image for getting better result and then perform segmentation by using K-means clustering algorithm and then extract the features from segmented image and then these features are used to train the classifier and test the classifier. Classification is done with SVM classifier. The proposed systems successfully detect the disease from radiology reports and show the % of region of interest and give the accuracy on the database.

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