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AUTOMATIC TUBERCULOSIS IDENTIFICATION IN RADIOGRAPH IMAGES BY FUSION OF TEXTURAL FOCAL AND SHAPE PARAMETERS

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Abstract:

Tuberculosis is one among the common disease causing high mortality rate worldwide. As it is prevalent in most populations, and also difficult to identify individually we are using automatic identification of tuberculosis. For this automatic identification we use CAD (Computer Aided System) which has the subs cores of the parameters. The Parameters includes Focal, Textural and Shape. The sub scores are cumulated in database and then identified as a single score. The sub scores will be compared to an external radiation and radiation calculated manually. Initially the radiation will not be considered. In the final stages the manual score and the experimental radiation is compared to obtain better results. Two datasets were used to evaluate the CAD system .For each dataset an external and radiological reference standard was used. Both databases have 200 digital chest radiographs. The abnormalities are classified as Textural, Focal and Shape. The compared sub score results will be significant in both databases, but the independent and the combined scores will not be significant. A combination of multiple systems to address the abnormalities is used. To identify the abnormalities in Heterogeneous populations we use multiple detectors. As multiple detectors are used some abnormalities are missed. This reduces accuracy of the system. So to increase the accuracy we are using TUBERCULOSIS INDEX which discriminates between normal and abnormal. The index has the value and this can be used initially in screening, so it is not necessary to wait till the output phase to detect whether there is tuberculosis or not.

Introduction:

Tuberculosis is one among world's major health concern .Majority of the disease is focused in Asia and Africa. Chest Radiography is the increasing threat for Tuberculosis. The reason behind that is the screening process such as the sputum staining which has been an increasing prevalence for HIV/AIDS. Computer Detection system is introduced for screening in mass population. The presentation of the chest radiographs also

differs with various morphological patterns. They have been described as post primary, primary and general stages. But abnormalities will be observed at earlier stages. Here there are three types of abnormalities are seen. Textural Abnormalities are characterized by the changes in the structure of a region. Focal Abnormalities are characterized by changes in densities. Shape Abnormalities are characterized by changes in shape. Here the combination of subsystems to address the problem of Computer Aided system with proper generalization. It is impossible to detect the abnormalities with the single subsystem. Here all the three abnormalities are combined together into a single subsystem to deal with the heterogeneous population. The performance is evaluated on two databases namely TB-NEAT and Find &Treat. Through these all the abnormalities are detected or identified automatically.

EXISTING SYSTEM:

Tuberculosis automatic detection method includes taking scores of all the abnormalities are combined together into a single TB score. So the subsystems depends upon the segmentation of anatomical structure and the preprocessing of the chest radiography. The segmentation will include the Local feature Computation and the Lung Segmentation. Then the preprocessed lung image will be given as the input. Then the next phase is the Abnormality detection subsystems. Two datasets are used in the existing systems to differentiate among the heterogeneous populations. From each dataset an external and radiological reference standards are used. Two materials are used namely the Evaluation Datasets and the Reference Standards are mainly considered here. When Evaluating datasets ,the functions of each databases are taken. The Find & Treat database is used for screening stage in tuberculosis. Mostly in Sputum cultures also tuberculosis were highly detected. TB-NEAT database is used for multiple diagnostics in different populations. The reference standard is used for two main purposes. One is to evaluate the individual sub scores.

Second is to train the supervised subsystems. The existence of tuberculosis were considered with the score or threshold. If the value is above 50 or higher then there is a sure existence of tuberculosis. The graph indicating the external and the radiological references in two different databases are drawn. The performance of the subsystems were carried out with evaluation references such as S-shape, S-texture, and S–focal along with their reference values in two databases. Christo Ananth et al. [4] proposed a system, this system has concentrated on finding a fast and interactive segmentation method for liver and tumor segmentation. In the pre-processing stage, Mean shift filter is applied to CT image process and statistical thresholding method is applied for reducing processing area with improving detections rate. In the Second stage, the liver region has been segmented using the algorithm of the proposed method. Next, the tumor region has been segmented using Geodesic Graph cut method. Results show that the proposed method is less prone to shortcutting than typical graph cut methods while being less sensitive to seed placement and better at edge localization than geodesic methods. This leads to increased segmentation accuracy and reduced effort on the part of the user. Finally Segmented Liver and Tumor Regions were shown from the abdominal Computed Tomographic image.

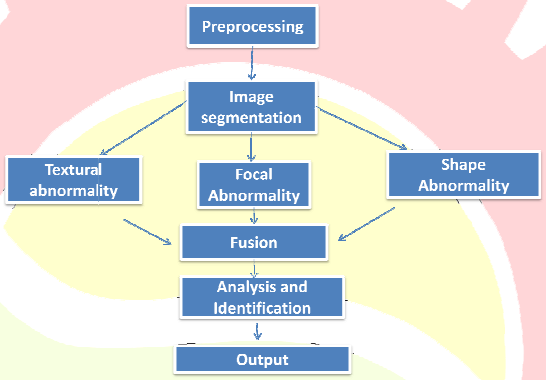
The cumulative scores is also taken as a result of the evaluation. The supervised systems will respond to those types of abnormalities that the system is trained with and therefore the presented system might detect all the diseases. In the TB-NEAT database we have observed disagreement between the radiological reading. Then the values for positive and negative scores were also taken. The TB positive and negative values are prioritized according to the threshold value obtained. For instance the value of #30 has an abnormality in the upper left lobe. Even though all the components mentioned above seems to be advantageous, there exists an disadvantage that abnormalities are still missed. So there is a further improvement required in automated systems.

PROPOSED SYSTEM:

As multiple detectors are used and abnormalities are still missed there is a decrease in the accuracy. So to increase the accuracy a value called the Tuberculosis index is used. The TB index is a value which can be used

to detect the tuberculosis at the initial stages and also increase accuracy. In normal detection we include stages such as preprocessing segmentation detection of type of abnormality, combination of the scores, analysis which will consume more time and also errors may encounter at any stage. This value will reduce the time consumed also.

SYSTEM DESIGN:



MODULES:

PREPROCESSING:

The preprocessing stage will include considerable variation in proportion to the total image occupied by the lung image. The variation is reduced according to the specified size and then applied to the newly developed collimated procedure. A normal level of 5% is added to width and the height. The cropped image was then resized to 1024 pixels. The preprocessed image is given with the standard specifications.

IMAGE SEGMENTATION

The lungs and the clavicles are segmented to limit the analysis of the subsystems. Segmentation is based on pixel classification and the values are computed for each pixel. Segmentation has three parts namely local feature computation ,lung segmentation clavicle segmentation.. Local feature computation includes the local characters of each pixel is calculated. The images were re sampled to 256 pixels. In addition to two position features, the x and y coordinates were normalized to the height of the image. Each pixel is described by 43 local features. In lung segmentation Lung-PC and lung-HAP is used. Lung-PC will produce the post- processed output of pixel classification stage. Lung-HAP will combine the pixel classification and shape model information to improve the segmentation of lungs. Initially the local feature of the image is computed for each pixel.HAP means Hybrid Active Shape Model Pixel Classification. Clavicle segmentation renders the upper region since it is most difficult to analyze. Active shape model segmentation is based on the interior segmentation to generate an initial outline which can be refined using dynamic programming.

DETECTION OF ABNORMALITIES:

Three types of abnormalities are identified here. In the shape analysis, the abnormalities close to the lung walls are present and the normal shape of the lungs is corrupted and difficult to determine. This indicates the shape abnormalities. Then the texture abnormalities normally occurs in lung parenchyma and changes in

pleural space. In addition the whole lung fields and all types of textural abnormalities and separate scores were calculated for different region of the lung and for different types of abnormalities. Focal abnormalities includes changes in density.

FUSION :

The scores obtained by the individual sub scores are combined together into a single sub score. The sub scores will be obtained in different ranges and it has to be normalized. The normalization parameters are obtained from the training set. The trained classifier is constructed from the labeled training set. The image label is provided by a reference for every images.

ANALYSIS AND IDENTIFICATION:

The sub scores obtained from each abnormality are cumulated and got as a single score. The range of values will be stored in a database. Through this range of values the presence of the above abnormalities are identified.

OUTPUT:

The final outcome will reveal the existence of tuberculosis.

CONCLUSION:

Images varied according to the databases used. Since each database had different ranges to specify. There are many detectors which had reduced the processing time of the system. So measures had been taken to overcome the problem and to detect the existence of tuberculosis automatically.

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