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Survey on faster storing and retrieval of medical images

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Abstract—An Image Retrieval System is a method of retrieving images from a database using various computer vision techniques. The traditional approach involved human intervention, where he could manually tag the image based on the characteristics of the image. This method of adding textual information such as captioning or describing the image helped in categorizing image within the database. And images were retrieved on the basis on the metadata information was time-consuming and also needed a human intervention. To overcome this large amount of research was undertaken to automatically detect the image characteristics. This involved various imaging techniques like image preprocessing, image segmentation etc. Similar to the digital images, medical images are used in diagnosing of a particular disease or to understand the human anatomy in a better way. Medical images unlike normal images involve lot of details and vary from one individual to another. These are highly inconsistent and anomalies detected in the image cannot be ignored. So there is a necessity for feature extraction and classification of images for easy and efficient retrieval. Hence devising an efficient algorithm is required to store the data sets in an easier manner.

Index Terms: Image Retrieval, Computer Vision, Medical Imaging, Image Segmentation.

I. INTRODUCTION

Image in general is representation of photons in 2 dimensional arrays. In medical imaging, each pixel could represent radiation absorbed by an X-ray or radio frequency signals of an MRI. Similar to the text retrieval image could be retrieved using the following techniques Query techniques, Semantic retrieval, Relevance feedback, Iterative/machine learning. Image Retrieval (IRA) novel algorithms/models and systems in the domain of medical images in the feature space (e.g., architectural patterns - cytological and pathological patterns), image features (color, texture, shape etc. of liver images) of different modalities (e.g., ultra-sonography images, CT images, MRI images and Pathology images/slides) used different medical doctors/specialists to improve the retrieval performance measures such as efficiency and precisions. Each different modality is unique with its own significance, in which the high level features and low level features are characterized, segmented and extract features specific application domains.

This paper surveys is categorized into following: Section II Motivation for this paper. Section III presents the related work done on this front. Section IV presents a brief architecture. Section V concludes with the future scope of this paper.

A. Motivation

Accurate analysis of a medical image is always lies in the hands of trained medical professional. If all this result were meticulously stored in a central repository, it could help them in ease diagnosis of the problem. In this we try to address a novel algorithm which helps in proper categorizing the images into various stages of tumor and also to enable faster retrieval of the images from the database.

II. LITERATURE SURVEY

This survey involves in understanding the various existing methods in the imaging domain also try to correlate these study in devising a better algorithm for retrieval and storing of medical image in database.

[1] This paper addresses the problem of retrieving images from large image databases. The method used in this paper is on the basis of local grey value, which determines the ROI. The algorithm used in this paper is on the basis of voting and considering the local constraints. This approach helps in efficient retrieval of the images from database. Indexing feature helps in retrieving images from huge database. This paper addresses the problem of matching an image to a large set of images. This gives us a wide scope of how the

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indexing could help in faster image retrieval from a database.

[2] This paper deals helps in understanding visible textures within an image. Textures are modeled as patterns containing a limited range of spatial frequencies, where mutually distinct textures differ significantly in their dominant characterizing frequencies. Encoding images with narrow spatial frequency and orientation helps in better segregation of characteristics of images. Here the characteristics of images like region of interest and region of information is given prime importance. It also provides the usage of Gabor-filters.

[3] This paper presents regarding the texture analysis on image analysis and pattern recognition. Texture-based modelling is a important tool for CBIR. Fourier Transform could be used in finding local-similarity and spatial dependencies. It also tells the importance of Fourier coefficients maps for the classification of image texture properties.

[4] This paper presents image processing aspects and in particular using texture information for browsing and retrieval of large image data. It helps in understanding Gabor wavelet features for texture analysis. It also does a comparison study of various multiresolution texture features using the Brodatz texture database and arrives to the conclusion that Gabor filter is more efficient than other techniques.

[5] This paper presents novel approach for precise extraction of tissue deformation imaged. It is based on Gabor filters and provides an insight of how the features could be extracted with ease. They also suggest how accurately the tag line spacing, displacement, orientation, displacement and contrast of the image could be analyzed.

[6] This study basically understands the segmentation of liver and understanding the functional structures of the liver. Based on this study they were able to create a 3D liver model based on the readings of the CT scan. This helps in analyzing the liver related tumors or disease and also in performing hepatic surgery. Based on the data obtained it could be used in robot assisted surgery.

[7] This journal deals with segmentation of scenes into perceptually meaningful partitions in image understanding, especially when unsupervised methodology has been desired. A novel unsupervised segmentation approach based on texture is developed. The texture model is based on sets of gray level co-occurrence (GLC) matrices rather than measures extracted from them. The algorithmic constituents for the segmentation scheme: choice of seed regions, normalized match distances between texture models, region homogeneity, and aggregation criteria are systematically developed. The unsupervised algorithm works so that seed regions are discovered by an image search process. Initial estimates of the texture model prototypes are automatically computed for each seed region, and classification thresholds are based on the variance of the model over the seed region. An aggregation process then results in regions being successively classified and segmented out of the image. This recursive process of segmentation is continued until all pixels are classified. The segmentation strategy was tested successfully on natural texture mosaics. Works mentioned above are used to understand the various image segmentation techniques and currently available image retrieval algorithm. This study only tries to use the certain techniques to aid in designing a better image retrieval system.

[8] This paper presents a new method for the problem of image segmentation, using Mean-Shift and random-walks algorithm. The random walk is semi-automatic approach for segmentation and mean-shift method is fully automatic approach. Fusing both these algorithms it effectively determines
the intensity histogram of images. Few of the drawbacks of the Mean-shift is deterministic and does not provide the information regarding the class membership details. Ransom walk requires the intervention of human to determine the centroid, where the algorithm should be applied. This novel algorithm eliminates both; it is fully automated and determines the region of interest where the algorithm needs to run using the Mean-Shift method and uses the advantages of random walk in determining the edges and boundaries faster. Hence this algorithm could be used in determining the ROI in very large images.

[9] This paper addresses image segmentation to detect ex-tract and characterize the anatomical structure. The two widely used algorithm for tumor detection (i) K-means clustering (ii) Fuzzy C Means clustering the segmentation algorithms are compared to estimate the efficiency by evaluating the execution time and accuracy of the algorithm. The result shows that the execution time is less in K-Means compared to Fuzzy C Means clustering technique, because the number of iterations of K-Means

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is less than Fuzzy C Means clustering.

[10]This paper gives a brief overview of various segmentation and preprocessing technique. Medical image segmentation plays a crucial role in delineation of regions of interest under study. Advantages and disadvantages of the current segmentation methodologies are reviewed in perspective of medical imaging.

III. PROPOSED SYSTEM

Design a proper user interface through which the various medical professional can interact with the system. JAVA development environment is to be used for designing of the front end of the system.

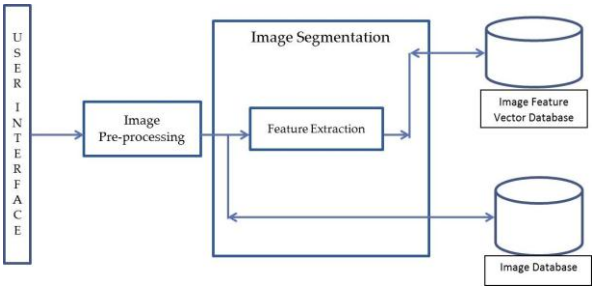

Fig. 1. Proposed Architecture

For Image Pre-Processing we use Image Normalization Technique and Weighted Mean Filter. This eliminates the Patient Specific artifacts and equipment based artifacts.

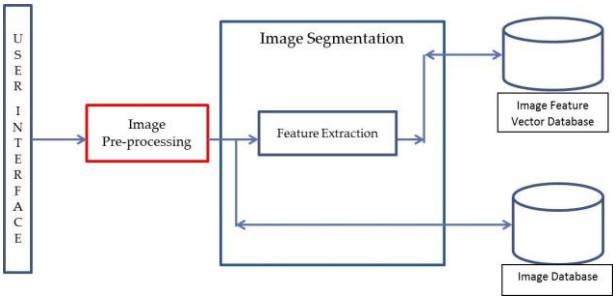

Fig. 2. Image Pre-Processing

For Image segmentation we used Radom walk based on histogram, which is combination of mean-shift method and random walk based.

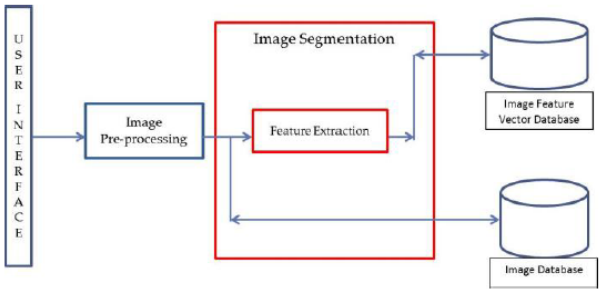

Fig. 3. Image Segmentation

For image pre-processing, ImageJ library is used to segment the valid feature set and the feature points are stored in Image Feature Vector Database. And the complete image is stored in Image Database. For Image Retrieval, based on the query provided by the user the feature points are identified from the feature Vector Database and the corresponding image is retrieved. The novel algorithm should be efficient enough to recognize the correct pattern.The advantage of the proposed system is 1. Based on the novel algorithm the image feature set extraction is faster and helps in categorizing the image in better way. 2. The feature set based on Vector comparison by Mahalanobis distance and indexing voting algorithm will enable accurate analysis of the result.

IV. CONCLUSION

This paper does a survey on image processing techniques and also storing and retrieval of image in large database. We try to address the image retrieval and storing of images in an efficient way. This technique could be used as valid tool in diagnosing tumors in an MRI image. And also in general used in storing large set of medical data in efficient way.

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