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3D-MRI Obstruction and Visualization of Pharyngeal Airway Tract using Open Source Seeded Technique

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Abstract: *Obstructive Sleep Apnea(OSA) is breathing disorder syndrome in which the airway tract pauses during sleep due to collapse of pharyngeal airway. It is occurred at the sleep time, with fourth dimensional high resolution in airway tract Obstruction in children and adults with OSA. Here, we the operator places the seeds that includes the Oesopharyngeal air tract and found out a threshold for the first frame in order to determine the affected tissues which blocks the patients pharyngeal tract. In this automated segmentation method it shows the process of MRI studies of the pharyngeal air pathway and enable diagnose of obstructive tissues with the collapse tissues. Region growing method results well in Dice Coefficients compared with manual segmentation. It automatically detects 90% of collapse tissues. This approach leads to segment the pharyngeal pathway correctly. It uses long MRI scans in order to diagnosis the collapsed tissues with graph, accurate details and coefficients in a short span of duration.*

Keywords: Oesopharyngeal, Dice coefficients, Open source method of multi-seeded method, 3D-MRI-Dynamic Magnetic Resonance Imaging.

1. INTRODUCTION

Obstructive sleep apnea (OSA) (or apnea) is the common method of sleep apnea and is caused by complete or partial collapse of the pharyngeal upper airway tract. It is characterized by repeated slides of shallow or paused breathing during rest, having difficult to breathe, and is associated with a decrease in blood oxygen saturation. The fact decreased breathing called "apneas" (literally, "without breath"), typically last 25 to 45 seconds. It is identified as a pause of breathe by others who see the person during episodes or any queries because of the disease effects on the body. OSA is commonly accompanied with snores. As the muscle tone of the pharyngeal tract ordinarily relaxes during sleep, and the airway path at the throat is composed of walls of soft tissue, which can affected, it is not only surprisied that breathing can be obstructed during sleep and in rest also. Although a very slight degree of OSA is considered to be within the limits of normal sleep, and many individuals experience episodes or slides of OSA at some point in daily life, a small percentage of people have chronic, severe OSA.

Apnea is associated with symptoms in the day time also. OSA is linked to decreased productivity, accidents, and increased risk of cardiovascular disease . In static CT images of Three dimensional the Upper Airway were segmented for volumetric analysis using level-set-based deformable models. In 3-D T2-weighted MR images were segment using a fuzzy connectedness-based algorithm. This concept required significant power, operator and processing time, even for shorter scan type. This static 3-D and ex post facto gated UA images had significantly have much contrast-to-noise ratio (CNR) and less smaller images compared to what is noted in real-time 3-D Upper Airway MRI. Additionally, these alternative methods were not designed for or applied to collapsed or affected airways tissues. In this paper, we reveal visualization of Upper Airway dynamics method and found out of natural obstructive apneas during sleep or rest time. This method development is for half automated method of real time Upper Airway MRI using multi-seeded method region growing algorithm.Region growing algorithm was chosen for its easy to applicate and reveal a new application where segmentation gives the workflow of this method. One or more seeds were decided to enable more correct segmentation and visualization during collapsed or affected tissues when the airway is segmented into two (or more) licensed section. We narrow the analysis volume to just the pharyngeal airway tract and propagate seeds points from one time moving frame to the next frame using the practical noting that the nasal cavity and lower part of the airway remain licensed at all times. We vaidate that this approaching method performs as same as manual segmentation. Errors were comparable to intra operators variability of manual segmentation. This method also show that it analysis of long time period scans and visualization the most important factors in an MRI such as the second, place, and enlargement of airway collapse.

Section 2, the Identification of problems formulation related to the existing methods. Section 3 presents detailed description of proposed techniques for

solving plant related issue. Experiment results and discussions are described in Section 4. Finally, the conclusion and further enhanced are given in Section 5..

2. PROBLEM DESCRIPTION AND PREVIOUS WORK

Magnetic resonance imaging (MRI) is an another image technique that has shown good possible for airway path evaluation and affected tissue site identification in these patients, It involves no ionize radiation, and can found all same soft collapsed tissues in three dimensions work. It is shown to obtain extremely useful insight into the dynamics and shape of pathway airway tract for patients pathway with Apnea disease and the method restriction until now have been as a envisionspeed**.** Formerly, automatic segmentation of the Upper Airway has been applied to MRI images. Three dimensional method of static Computer Tomography images of the Upper Airway were segmented for gravimetric analysis using level-set-based deformable models and region-growing algorithm . Static 3D weighted MR images were segmented using a fuzzy connectetness-based algorithm that required 1-4 min/study. This substructure required significant operator points and processing period, even for shorter time scans.

3. PROBLEM IDENTIFICATION AND SOLUTION

The tract which places affected tissue is selected as region of interest (ROI).Then the selected tissue from the roof of the mouth to the windpipe in the mid-mesial slice of the referenced frame work of the method. Two points of the seeds are placed within the mid-mesial slice: one in the nasopharyngeal pathway airway tract and the other in the oropharyngeal pathway airway tract. The first frame is segmented using multi-seeded method od 3D region growing algorithm. The threshold value is selected by user and placed to differentiate air and tissues in the ROI. The first two points which is as starting point seeds along with this the two new seeds which is already selected by system are used for segmentation. This method repeats until all frames or slices are processed. Segmentation is performed using an open-source implementation method of multiseeded 3D region growing method .Open source implementation method of multi-seeded techniqus is a simple and easiest region-based image segmentation technique. It is only classified which uses pixel-based image segmentation method and it also takes the selection of initial seed points in semi automatic method. It is the technique used to segment the airway path tract and collapsed events by placing 3 seeds in the pharyngeal airway tract. Threshold value method is used to turn a gray-level scale image into a binary image inorder to separate airway path and collapsed airway collapsed tissues. This approach to segmentation examines neighboring pixels of initial seed points and determines whether the pixel neighbors should be added to the region. The main aim of the segmentation approach is to segment an image into regions. The first step involves in the region growing is to select a set of seed points. Seed points selection is based on some user criterion pixels value in a certain gray level scale range, pixels evenly spaced on a grid line value.

The initial region of interest starts from the exact location of these seed placed in the pharyngeal tract and it grows from the seed points to adjacent points of area followed by region membership criterion method. It includes the region of interest comprises of the oropharyngeal path, the mid-sagittal slice and the nasopharyngeal path. Here we use four connected neighbourhood to grow from the seed points of the selection. We may also opt 8-connected neighborhood values for the pixels value adjacent relationship value. The principle consider the same value of pixel within the regions .The adjoining pixels value of seed points in which is continuously revised it by the user. If the nearest value of pixel value also have the same intensity value of pixel with the nearest seed points, we mean it by th classification it into the seed points value. It is another repeaditly process until there is no difference in 2 successive rependive stage time. Even though this type different agreeing with the method, the main target is to classify the similar methods of the image or picture into affected tissue. In this proposed system, Image is acquired to as frame method from the MRI video databits. The frame collection from the 1st frame is captured for Initial seed Selection part which will be decided by the User side and then the Grid lines are drawn and generated from the 1st frame of video bits, Region of Interest (ROI) is selected from the roof of the mouth in the hard palate to the epiglottis in the mid-mesial slice, then the new seed will be automatically generated in the video sequences from the generated grid lines from the data base given as input. First frame is segmented using multiseeded methof of 3D region growing algorithm. Three seeds are selected and placed in the pharyngeal airway tract: one in the nasopharyngeal airway path tract, one in the oropharyngeal airway path tract and another in the mid-sagittal slice in the mouth. Except the first frame or slice, all the next frames from the video sequence are given for new seeds generated in the video sequences in the block given. Threshold is relatedly set to differentiate air and affected tissue signals in the ROI, between 8th and 14th percentiles of pixel intensiy value. Seeds are generated at automatically when the video sequence is operated, by dividing segmented airway path tract into five sections and placing two new seeds at the centroid with largest volume of tissue.

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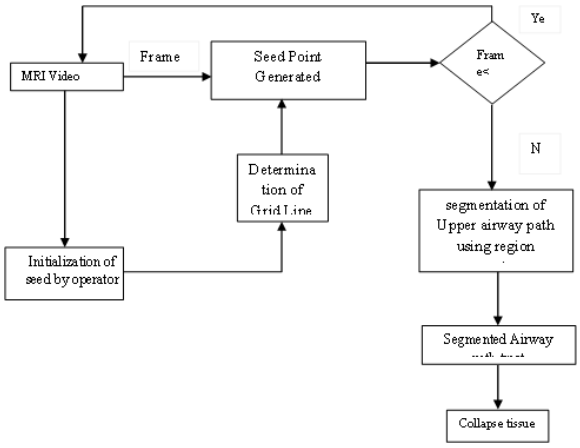

Fig 1. Flow Diagram of Segmentation

The first two initial seeds and 2 new seeds by the segmentation technique are taken for segmentation method. From the constructed or generated grid line airway path tract is found out.Oropharyngeal which is in the lip area and nasopharyngeal which is in the larynx area are tracked and recorded in method to find the collapsed tissue in the pharyngealtract in the upper airway .Collapsed area specifies the collapsed events in the grid lines generated between the lip airway path and larynx airway path tract. We shown a data set of 242 frames with two mins of data base where choosen to show and a long time scan of 10mins per frame to determine the sleep state accurancy disorder occurs .

COSINE COEFFICIENTS

Cosine coefficients is a measure of similarity between two non-zero vectors of an inner product space that measures the cosine of the angle between them. It is used to compare this automated segmentation with manual segmentation. The Cosine Coefficients value ranges from 0 to 1, where the one shows the exact overlap between C and D, and zero signifies no overlap occurs. A Cosine Cofficient of 0.60 or greater of it is considered to be "very good method." in Cosine Coefficients of 0.66 to 0.73 It automatically detect 90 percent of collapse tissue in the events. Sensitivity in this type to seed select method was also evaluated using 10 different approach pairs of seed point.

4. RESULTS AND DISCUSSIONS

Fig:2 illustrates that construction of the central area of grid lines in the interested area of the region in a semi automated method by the user determination with suitable intensity of pixel value determined in black and grey scale image of the pharyngeal airway tract. For single normal image it should be zero, zero to eighty in pixels for black image, eighty to one eighty pixels for grey image and one eighty to two fifty five pixels for white image .

Fig:2(a)provides that by placed seed points in the airway tract, one in the hard palatte, one in the soft palatte, another in the mid -meisal slice since it is a open source implementation method of multi-seed 3D region growing segmentation algorithm

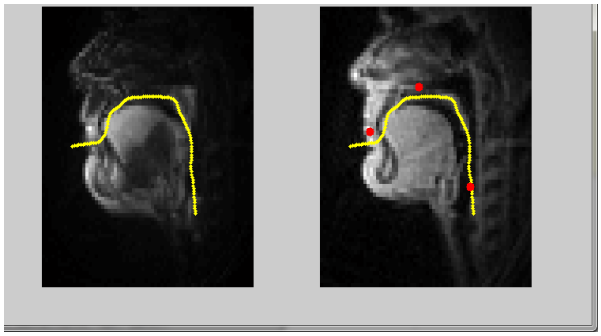

Fig:2 Center points of cartography(grid)
Fig:2(a)Center points of Cartography(grid) lines and land specification

Fig:3 illustrates that input AVI data is sent as matrix format of image consists of image frames or slice as an input database. At one period time, it take only a one frame. The path is fiwxd for input register and output register separately.Dimensional in the N DCT function is smoothened in airway tract. It shows the centre of bin points which shows the centre of grid line of gridline. It finds and show the intensity value of every gridline depends on density of pixel value. Average filter is moved used for smooth the generated grid lines

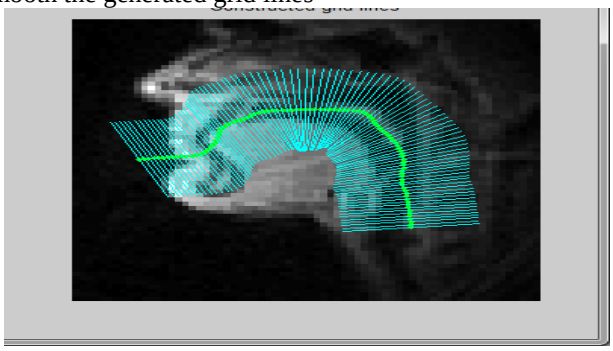

Fig:3 Generated Cartography(grid) lines

Fig:4 illustrates that the determines the airway path tract which already join with lip side airway and nose side airway tract. Smooth is done in this .Smoothing is performed by x in frames, y in grids and z as bits Smoothing of a thing in the Object is Likelihood algorithm.It remodels the airway path tract. The state path is detected dy Viterbi decoding

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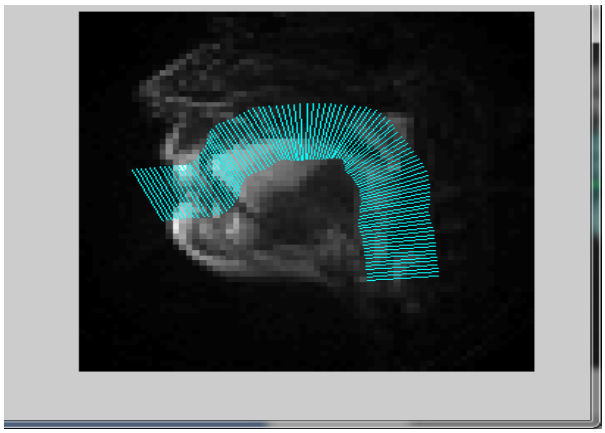

Fig:4 Area of airway pathtract estimation

Fig:5 illustrates that the starting of the path in respiratory path which includes lip and larynx.The obstructive events. for Lip and Larynx will have different bounds. The generated grid line starting in the of lip and larynx . It sets the threshold at 2mm. is computed Eucledian distance is determined by Transition matrix Whch is between adjacent pixels.

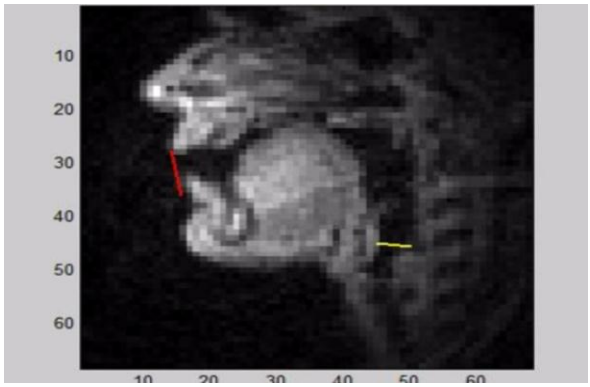

Fig:5 Determination of Lip-pharynx area

Fig:6 shows the identification airway path tract using threshold level in order to separate collapsed from normal signals in the Area of interest.It shows the PCA based reduction in noise, pixel sensitivity in the corrected method which also shows the involment P by Q neighborhood around the pixels near to it.

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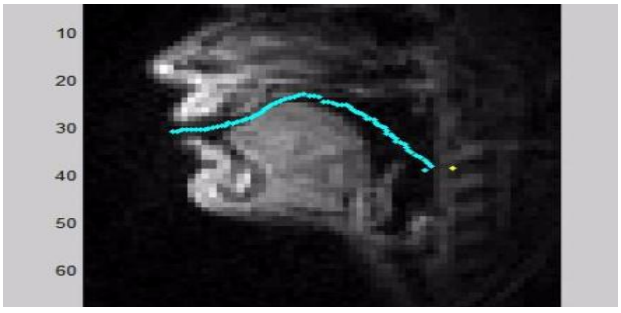

Fig:6 Airway Path Identification

Fig:7 sbows the segment or division of airway path tract with high density signal intensity value to found the obstructive or collapsed events of the pharyngeal airway tract.Collapsed Tissue in airway boundary estimates threshold level at 0.5 where the boundary is found out. smoothing takes maximum number of clusters of frames for pharyngea airway wall boundary tract

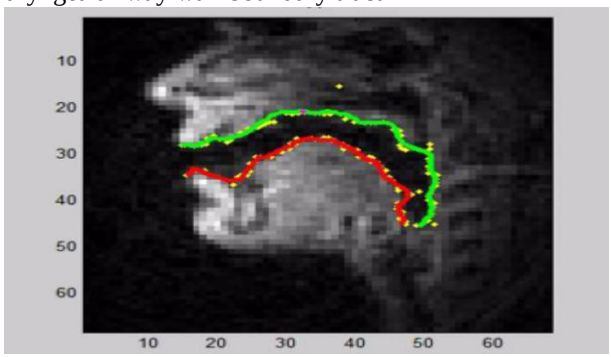

Fig:7 Segment of airway tract

Fig:8 shows that the binary affected or collapsed plot to navigate collapse events and shown the precise and already site, of collapse. Reconstruct pixel in the image using weighted components of the method. the segmentation is set at Minimum Euclidian distance for thousand.

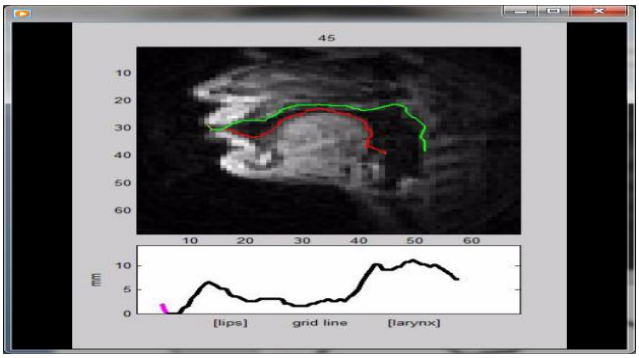

Fig:8 Segmentation with Collapse Plot

Fig. 9 shows the difference between the Coefficient in dice and cosine. In the already method they place Dice coefficient method and they atlast get the answer as point nine which means that detects nighty percent at the collapse plot. In our work system, the use of Cosine method and obtained a value one which means this detects hundrend of affected and collapsed plot.

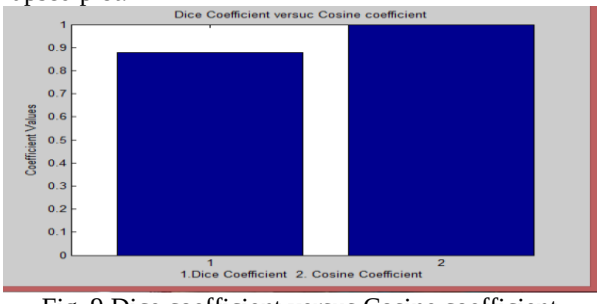

Fig. 9 Dice coefficient versus Cosine coefficient

Fig.10 shows the False acceptance Rate of the already system and the Enhanced Region-Growing Segmentation

method. False acceptance rate is the segmentation error occurred during the process. the proposed system is lesser than the Existing system of the system.

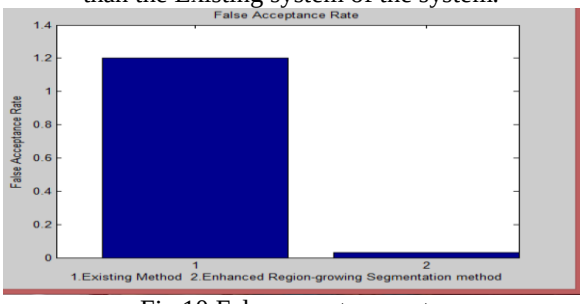

Fig.10 False acceptance rate

Fig.11 shows the % of quality between the Existing Method and the Enhanced method of Region-growing Segmentation type. The quality depends on the identificationof the collapse and affected plot. The quality of the Existing system is eighty five percent with is nice but in the given system we make the quality better in order to get the overall percentage of the quality in the Enhanced Region-growing Segmentation Method is nighty eight percent.Thus the quality is comparably high.

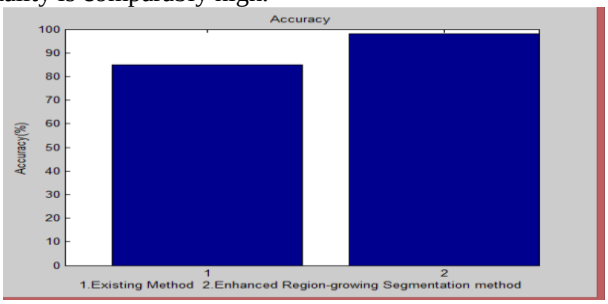

Fig.11 Acceptance of segmentation

5. CONCLUSION

We have performed a method which is very simple and it is a automating segment approach for dynamic MRI of the pharyngeal airway. The proposed method has given very good agreement with manual segmentation. In the first time,it also enables time-efficient detection of collapse tissue and events which shows the visualization of the pharyngeal airway pathtrack for all frames. The binary affected plot makes it easy to move to affected events and the see the allow to observe the exsisting site and appearence of affected and collapse tissue. Identification based on the occurence of 4 joined regions that were larger than point two($0.2cm^{3)}$. When airway is paused, region growing results in a single contiguous region.Region growing methods can provide the normal images which have clear and normal edges with good separation in results. This concept is elegant. We just need a little number of seeds points to represent the property we want, then grow the region. We can determine the seed points and the criteria we want to produce it. We can obtain the multiple value at the same time of input. The segtions of dynamic MRI database can give a previously unavailable anatomical landmarks for clinical usage of doctors such as surgery or oral treatment in the disease of OSA or for patient-specific modeling of the airway collapse tissue.

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