A Comparison of Image Segmentation Using LOT, ROR, and Enhanced ROR

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ABSTRACT:

The image segmentation is used to change or simplify the image representation for the purpose of easy understanding or quicker analysis. Image segmentation is a process of segmenting an image into groups of pixels based on some criterions. Image segmentation is the process of partitioning a digital image into multiple segments. The purpose of image segmentation is to partition an image into meaningful regions with respect to particular application. The image segmentation is used for various applications such as medical images, Satellite images, content based image retrieval, machine vision, Recognition Tasks and Video Surveillance. There are so many methods used for segmentations such as compression based methods, thresholding, and clustering. The clustering methods can be divided into two parts namely supervised and unsupervised. Supervised clustering involves predefining the cluster size for segmenting whereas unsupervised segmentation segments by its own cluster values. The spine segmentation is used to get validate cluster extraction and vertibri output. Comparing the three methods the accuracy level is differ from other methods. The advantages of each method are the speed of time is achieved.

Keywords:

Fuzzy C-Means (FCM), K-Means, Adaptive K-means, Adaptive Fuzzy-k-means (AFKM), Supervised, Unsupervised, Vertebral, Robust OutlyingnessRatio (ROR).

I. INTRODUCTION

Image segmentation is the process of partitioning a digital image into multiple segments. The image segmentation is often meted out in two days that specially supervised and unsupervised. The supervised clustering involves predefining the cluster size for segmenting the images [1, 2]. The unsupervised segmentation segments by its own cluster values. The vertebral column is also known as the backbone orspine. The spine is formed from individual bones called vertebrae. The distinguishes unsupervised learning from supervised learning and reinforcement learning clustering algorithms have successfully been applied as a digital image segmentation technique in various fields and applications. The spine segmentation is used to convert cluster to binary and separated by valid cluster [10,11,12].

The advantages of clustering base methods are,

a. Clustering define relation of the pixel which can be used for many applications.
b. User can define the segmentation number.
c. More flexible to extract particular gray values.

The unsupervised learning also encompasses many other techniques that seek to summarize and explain key feature of the data. The unsupervised learning is based on data mining methods used to preprocess data.

II. RELATED WORKS

Fuzzy c-means of supervised learning of clustering techniques used on established outstanding results in semi-automated segmenting medical images in a robust manner. The k-means algorithm heavily relies on the initial centroids.The adaptive k-means clustering algorithm is capable of segmenting the regions of smoothly varying intensity distributions. The Adaptive Fuzzy –k means (AFKM) clustering is

used for image segmentation which could be applied on general images, specialimages [4, 7, 8, and 9].

III. METHOODOLOGY

Supervised Learning LOT : I

The preprocessing includes the input image is getting for high frequency noise removal and removal of blurring effect [3, 5, 16], then the user can define the value which depends on accuracy user needed for segmentation.

ROR Processing

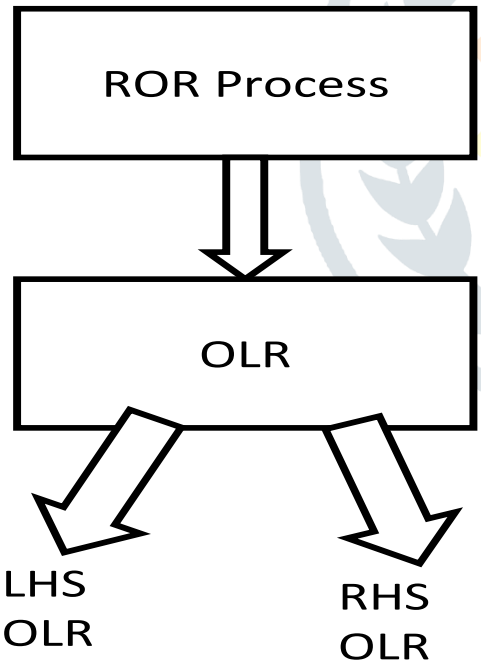
MED = MEDIAN(Y)

MAD = MEDIAN (|Y-MED|)

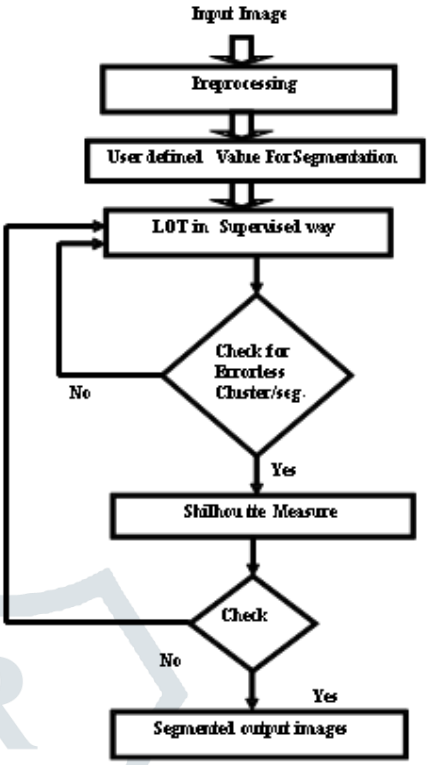
MADN =MAD/0.6457

ROR= |Y-MED/MADN|

ROR TREE

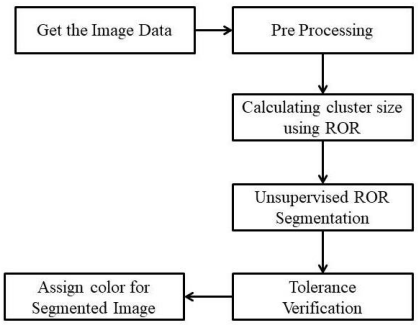


SYSTEM OVERVIEW: I



Unsupervised Learning: II

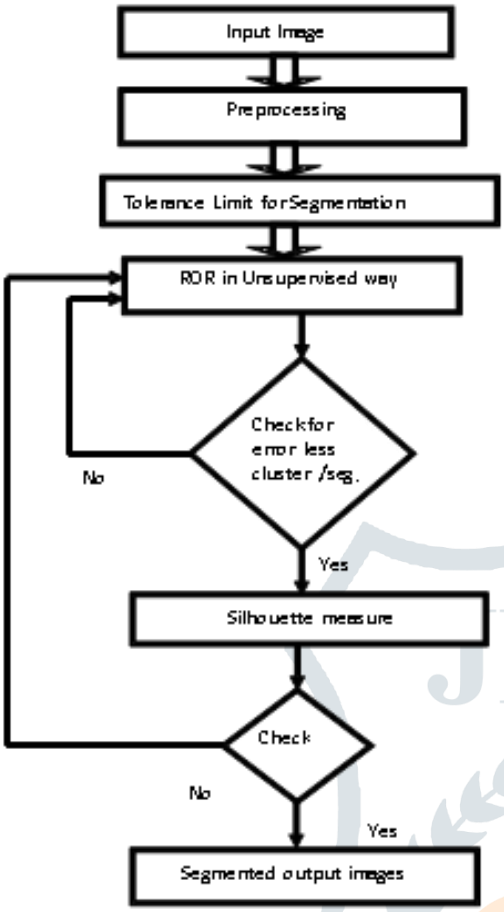
The pre-processing includes cropping the image, resizing the image and sharpening the image. Cropping involves selecting the required area needed in the retina image and cropping it. Resizing image is based on the cropped area the image is resized to fit to that cropped area. The Sharpening image cropped is adjusted for its contrast and brightness to enhance its appearance and to visualize the layers more perfectly [6, 17].

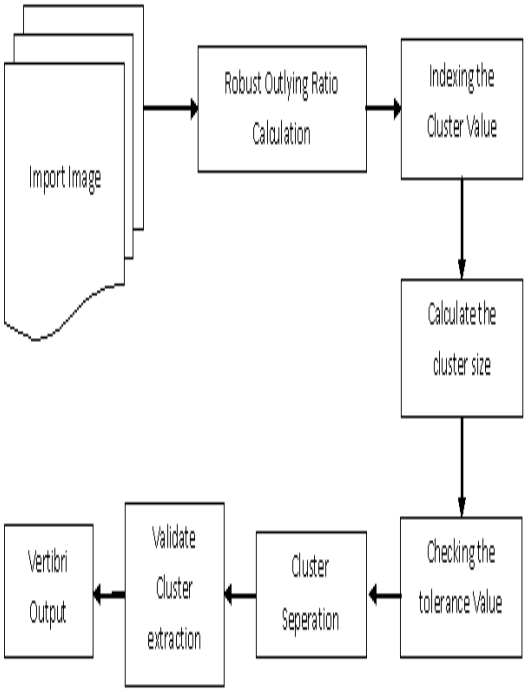


Methodology Diagram

SYSTEM OVERVIEW:

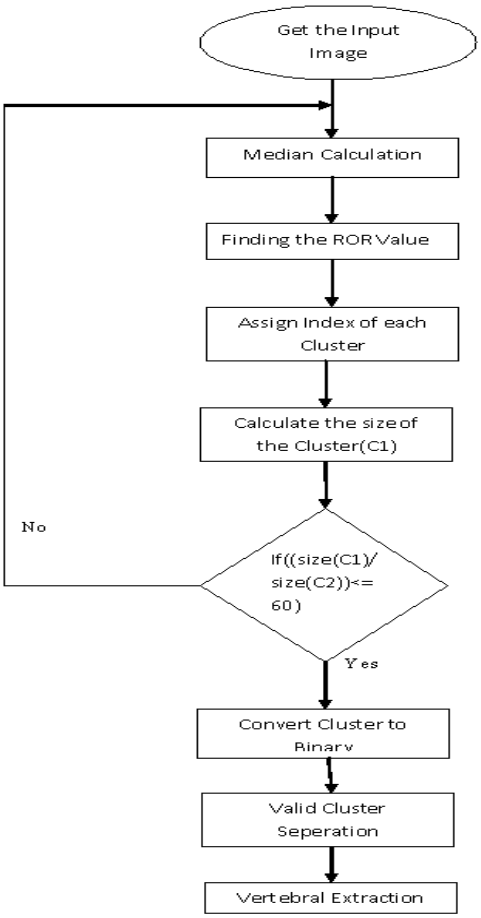
Unsupervised Learning ROR: II





Methodology Diagram

SYSTEM OVERVIEW III



Spine Segmentation for Enhanced ROR: III

The following preprocessing steps are,

Cropping the image.

Resizing the image.

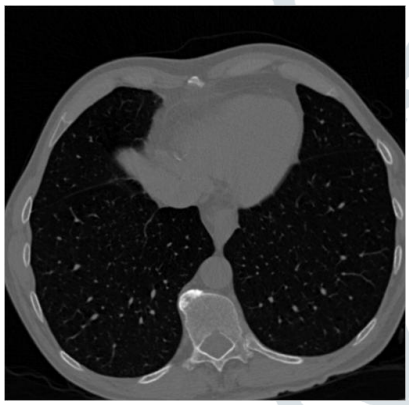
Sharpening the image.

Cropping involves choosing the desired space required within the tissue layer image and cropping it. Resizing the image is supported the cropped space the image is resized to suit thereto cropped space. Sharpening the image is used to the image cropped is adjusted for its distinction and brightness to reinforce its look and to envision the layers a lot of absolutely [13, 14, 18].

IV. RESULTS AND DISCUSSIONS

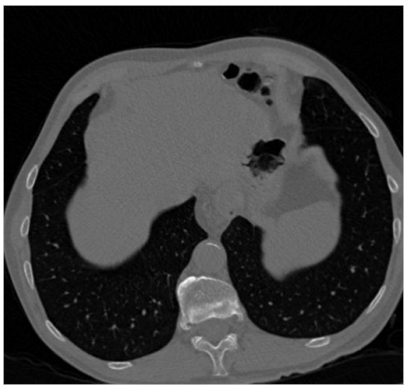
The table below shows that the comparison results of different methods of segmentation such as supervised learning, unsupervised learning and spine Segmentation of the accuracy.

Original Image

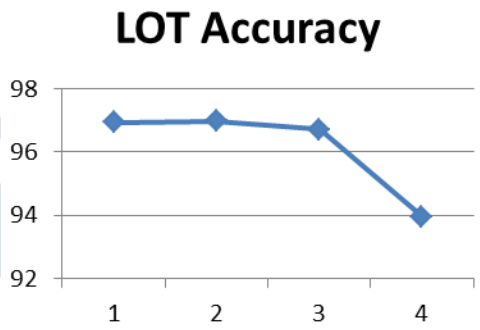


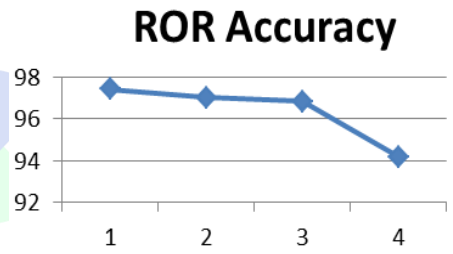
Supervised LOT Image

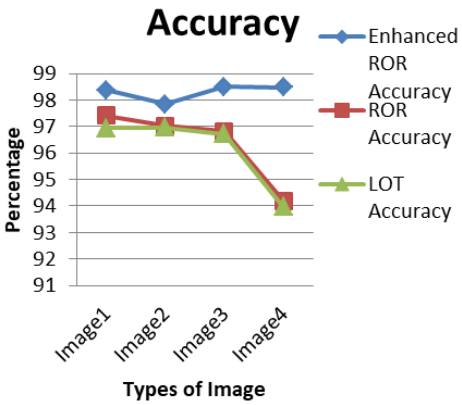
C) Unsupervised ROR Image



d) Unsupervised Enhanced ROR Image







Graph shows that comparing three methods of Accuracy

V. CONCLUSION

The three proposed work has been presented and a comparison of image segmentation using LOT, ROR, and enhanced ROR. The proposed method of supervised learning for segmentation with the user dependency to get semi automated generated of the segmented output images. The other two methods of unsupervised learning and spine segmentation without the user dependency to get automatically generated of the segmented output images. Compare to the other methods the spine segmentation output of the accuracy was better than the supervised and unsupervised segmentation. The accuracy is achieved for four different types of images.

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SUPERVISED SEGMENTATION - LOT METHOD

S.no	Image	Size of Image	TP	TN	FP	FN	Sensitivity	Specificity	Accuracy
1	Image1	512	4015	248432	7712	243	0.942931	0.969892	96.94511
2	Image2	512	4824	248564	7673	239	0.9527948	0.970055	96.97206
3	Image3	512	5285	247787	8357	236	0.9572541	0.967374	96.71603
4	Image4	512	4835	240767	15470	312	0.9393822	0.939626	93.9621

UNSUPERVISED SEGMENTATION - ROR METHOD

S.no	Image	Size of Image	TP	TN	FP	FN	Sensitivity	Specificity	Accuracy
1	Image1	512	4134	249532	6612	124	0.9708783	0.974186395	97.41323
2	Image2	512	4975	248564	7673	88	0.982619	0.970055066	97.02985
3	Image3	512	5381	247987	8157	140	0.9746423	0.968154632	96.82915
4	Image4	512	4963	241237	15000	184	0.964251	0.941460445	94.19092

SPINE SEGMENTATION - ENHANCED ROR METHOD

S.no	Image	Size of Image	TP	TN	FP	FN	Sensitivity	Specificity	Accuracy
1	Image1	512	4258	254523	1621	0	1	0.993671529	99.3775
2	Image2	512	5063	253227	3010	0	1	0.988253063	98.84807
3	Image3	512	5521	254830	1314	0	1	0.994870073	99.49783
4	Image4	512	5147	254888	1349	0	1	0.994735343	99.4839

S.no	Image	Enhanced ROR Accuracy	ROR Accuracy	LOT Accuracy
1	Image1	98.37750094	97.41323031	96.94510795
2	Image2	97.84806736	97.02985075	96.97206276
3	Image3	98.4978312	96.82915178	96.71603004
4	Image4	98.48390108	94.19092217	93.96213999

Table shows that comparing three methods of Accuracy