

Prediction Of Uterus Tumour Using Region Growing Algorithm

¹Damini Gandhe, ²Sayali Jagtap, ³Pooja Kadam, ⁴Prof. K. R. Choudhari

^{1,2,3UG} Student, ⁴Professor, ^{1,2,3,4}Department of Electronics and Telecommunication Engineering, Bharati Vidyapeeth's College of Engineering for Women, Pune, Maharashtra, India.

¹gandhedamini@gmail.com, ²sayalij148@gmail.com, ³poojakadam28396@gmail.com, ⁴kalyani4sp@gmail.com

Abstract—In this project we are predicting uterus cancer using region growing algorithm. This project is aimed to show the longitudinal use of routinely collected -clinical data from history and ultrasound evaluation of the endometrium developing an region growing algorithm to predict the risk of endometrial carcinoma for the women. Here, we are taking 3 ultrasound images as a clinical input data .after taking input resizing of image is done. In resizing, size of image is adjusted such that we get required size of image .the required size of image is suitable for further pre-processing steps. Then we are doing image pre-processing. we are going to use methods of image pre-processing like Contrast Stretching and Weiner filter. We are going to segment input image using region growing algorithm. Noise is removed using morphological processing by comparing input image and segmented image. Image is segmented using region growing algorithm by setting threshold. Hence, after performing all these operations we are predicting whether tumour will be cancerous or non-cancerous.

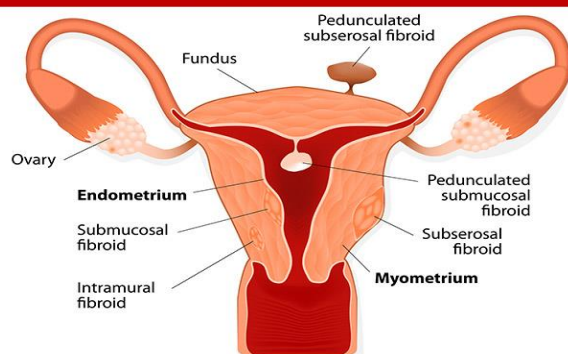
Keywords— Image segmentation, fuzzy logic, Single seeded region growing algorithm, Grow formula, connected pixel, Random index.

I. INTRODUCTION

Uterine cancer is the most common cancer of woman's reproductive system. Uterine cancer begins when healthy cells in the uterus change and grow out of control, forming a mass called a tumour. A tumour can be cancerous or benign.

segmentation method since it involves the selection of initial seed points.

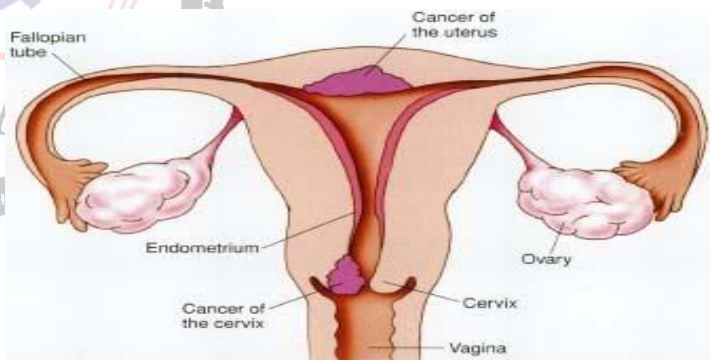
UTERINE FIBROID



Here, we are going to apply region growing algorithm for **prediction** of mass whether it is cancerous or non-cancerous.

The main goal of segmentation of is to partition an image into regions. In thresholding method of segmentation achieve goals by looking at the boundaries between regions based on discontinuities in gray scale and colour properties. Region-based segmentation is a technique for determining the region directly.

The region growing is a simple region based image segmentation method. it is also classified as a pixel based image



The **Region-Growing** method is the seeded region growing method. This method takes a set of seeds as input along with the image. The seed marks each of the objects to be segmented. The regions are iteratively grown by comparison of all unallocated neighbouring pixels to the regions. The difference between pixel intensity value and the region's mean, is used as a measure of similarity. The pixel with the smallest difference measured in this way is assigned to the respective region. This process continues till all pixels are assigned to a region. Because seeded region growing requires seeds as additional input, the segmentation results are dependent on the choice of seeds. After segmentation important step is Feature Extraction.

Here, we are extracting statistical features i.e. Area, GLCM, Major, Minor, Fourier transform etc. Prediction is next step in

our project which will state different parameters of tumour along with growth rate.

II. PAST WORK

Carmelo Militello et.al,[1] proposed a method for detecting fibroids from uterus using region growing algorithm. The implemented approach gives the quantitative and qualitative evaluation of the treatment providing the volume and the three-dimensional (3D) model of the treated fibroid area

Setu Garg et.al,[2] proposed a System in which a cervical cancer is detected using a watershed algorithm. It is practical and efficient method to find cervical cancerous area.

Quanquan Zheng et.al,[3] proposed a method here which use level set to segment and extract calcifications. It is good to segment and extract features from uterus ultrasound images that are a group of database with typical characteristics from Ultrasound Diagnosis Department of Lanzhou local Hospital. It is helpful to make a correct scheme for patients in hospitals.

Abhishek Basak et.al,[4] proposed a concept of a wearable ultrasonic assembly for point-of-care autonomous diagnostics of malignant growth. They have shown that the proposed POC diagnostic system can reliably detect an anomaly at a much smaller size (mostly stage 1) than typically achieved through conventional symptomatic detection.

J. Saranya et.al, [5] proposed a system in which instead of doing the segmentation manually, this work proposes a new method for segmenting the fibroid in the uterus. The performance of this method is also commendable.

Detection of Breast Masses in Mammograms by Density Slicing and Texture Flow-Field Analysis [6] we propose a method for the detection of masses in memo graphic images that employs Gaussian smoothing and sub sampling operations as pre-processing steps. The mass portions are segmented by establishing intensity links from the central portions of masses into the surrounding areas. We introduce methods for analyzing oriented flow-like textural information in mammograms. Features based on flow orientation in adaptive ribbons of pixels across the margins of masses are proposed to classify the regions detected as true mass regions or false-positives (FPs).

III. PRESENT SYSTEM

Present system consists of:

A. Software

MATLAB 2009a: To create GUI, to run matlab code for different tasks like feature extraction, segmentation etc. , to create database

B. Working

Input:

Three ultrasound images are taken as a input. This input is gives to the next block i.e. pre-processing block.

Pre-processing:

steps used in pre processing block-

- Resizing
- Contrast stretching

- Wiener filtering

In pre-processing block, firstly input image is resized to required size i.e. 250*250.then contrast stretching is done of resized image. Contrast stretching means making changes in the brightness levels of pixels. This mapping is called as threshold function and it produces high contrast ratio.As a result of stretching, enhancement is less Harsh.

Input image is smoothened by using weiner filter.the goal of weiner filter is to compute a statistical estimate of an unknown signal using a related signal as an input and filtering that known signal to produce the estimate as an output.

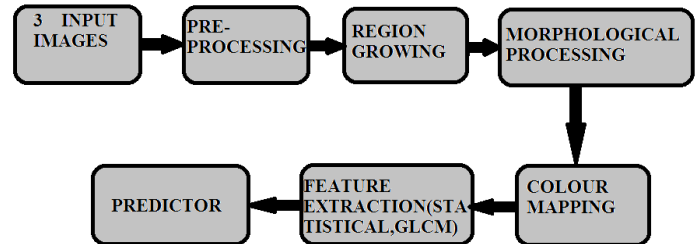


Fig.1 Block Diagram

Segmentation:

We have used Region Growing algorithm for segmentation of Pre-processed image. Image is segmented using region growing algorithm by setting threshold. Region growing is a procedure in which pixels are grouped into larger regions based on predefined condition. Approach used by this algorithm is Random. In region growing algorithm initial step is to select seed point i.e. a pixel from where we begin and grow regions from this seed pixel.

This procedure goes on recursively until no new pixel is accepted. All the pixels of current region are assigned as unique label. Now a new seed pixel is chosen and the same procedure is repeated. We continue doing this until all the pixels are assigned to some region or other.

Morphological Image

Morphological image processing is an area of non-linear image processing which deals with the geometrical structure of an image. Morphological operation rely only on relative ordering of pixel values, not on their numerical values, and therefore are especially suited to processing of binary images. Noise is removed using morphological processing by comparing input image and segmented image.

Color Mapping

Color mapping is a function that maps the colors of one image to the colours of another image. Color mapping block multiplies the pre-processed image and output image got after morphological processing. Color mapping maps the region of tumour.

Feature Extraction

Feature extraction starts from an initial set of measured data and builds derived values intended to be informative and non-redundant, facilitating the sub-sequent learning and generalization steps and in some cases leading to better human interpretation. Here we are extracting features like statistical, geometrical, major, minor and GLCM.

Extracted Texture Features are Contrast, Dissimilarity, Entropy, Energy and Homogeneity. Geometrical features calculated are Major . Minor Axis. Along with above features Maximum Probability is also calculated.

Predictor

After performing all these operations, we are predicting whether detected region will be cancerous or non-cancerous. This block also predicts the stage of cancer. By calculating geometrical features of three stages, growth rate can be predicted. The method of calculating distance for prediction is Manhattan Distance.

This can be calculated as-

Take the sum of absolute values of the differences of the coordinates.

For example-

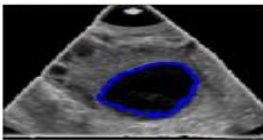
If $x=(a,b)$ and $y=(c,d)$, The Manhattan Distance between x and y is

$$|a-c| + |b-d|$$

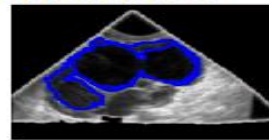
IV. RESULTS

REGION GROWING SEGMENTATION RESULTS :

BENIGN



MALIGNANT



NORMAL

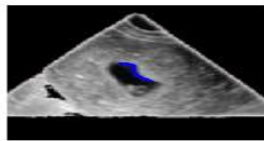


TABLE OF FEATURE EXTRACTION

FEATURES \ TYPES	BENIGN	MALIGNANT	NORMAL
P_SUM	11640	226800	7220
P_MEAN	2.50E-05	2.50E-05	2.50E-05
P_VAR	1.51E-07	5.45E-09	2.01E-07
CONTRAST	124.805	5599.469	8.95125
DISSIMILARITY	9.72629	64.1385	2.1313
ENERGY	0.00606	0.000243	0.00806
ENTROPY	5.25479	8.794707	4.92539
HOMOGENITY	0.1549	0.035494	0.48972
MAX PROBABILITY	0.0122	0.001116	0.01634
MAJOR AXIS	26.5727	182.3127	42.0269
MINIMUM AXIS	16.3367	90.08592	7.09158

V. CONCLUSION & DISCUSSION

We have proposed a method for detection and prediction of tumour in ultrasound image of uterus using region growing algorithm. The threshold value used in the method is 0.6 that predicts all the malignant and benign parts of uterus in ultrasound .We have created data base of 80 images which

consists of stages of cancer predicted periodically.The database consist of 30 malignant, 30 benign and 20 normal. The

	Benign	Malignant	Normal	Total
Benign	24	4	2	30
Malignant	5	21	4	30
Normal	2	3	35	40

accuracy of proposed algorithm is79.16%.

ACCURACY:

$$ACC(BENIGN)= 24/30= 0.8$$

$$ACC(MALIGNANT)= 21/30= 0.7$$

$$ACC(NORMAL)= 35/40= 0.875$$

$$TOTAL ACCURACY=$$

$$\{\sum ACC (BENIGN) + ACC (MALIGANAT) + ACC(NORM)\}/3 *100 = 79.16\%$$

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