Verdict of Objects in Medical Images using Marker-Controlled Watershed Image Segmentation

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ABSTRACT
Image processing is a computational method for various reconstructing process used in the images. Segmentation refers to the procedure of splitting a digital image into many segments. Medical imaging is the system and development used to create imagery of the human body for clinical purposes or medical science. Image gradient is a function which is used to take information from images. A watershed transform is a basin-like landform plain by highpoints and ridgelines that fall into lower elevation and waterway valley and it is used to perform some morphological operations. Purpose of this work is segmenting the medical image using marker controlled watershed segmentation, and comparing the results of directly applying watershed transformation and marker controlled watershed transformation.

General Terms
Digital Image Processing, Medical Image Segmentation.

Keywords
Images, Medical image, Segmentation, Watershed transform.

1. INTRODUCTION
The segmentation is the method of separating images into region where deal to its quality e.g., items and color present in the images. These regions have a number of important in sequence concerning object [3] and are sets of pixels. The outcome of segmentation is in the type of images that are added meaningful, easier to study and to understand. Watershed transformation can be called as region based segmentation technique. The future algorithm existing here in this paper is added easy than morphological based image reconstruction [5].

The proposal explanation of this change is quite simple: if we consider image as a topographic view [3], where the depth of each position is straight linked to its gray level. Now consider the rain is frequently lessening on ground then the watersheds are the draw round separate the catchment basin that form. The watershed transform is computed on the gradient of original image. The catchment basin boundaries [3] are placed at high gradient point. The watershed transformation is broadly used in many field of image processing similar to medical image segmentation. The majority of important drawback of watershed segmentation is the over segmentation. When the watershed transform is useful to the catchment basins from the gradient of the image, the outcome of the watershed contains a amount of little regions. It makes a resulted segmentation hardly useful. So use the markers in the image will decrease number of minima [6] in the image. Thus the marker controlled segmentation is used for watershed segmentation. In this work explain the marker controlled watershed segmentation for medical images.

2. METHODOLOGY

The proposed work is given

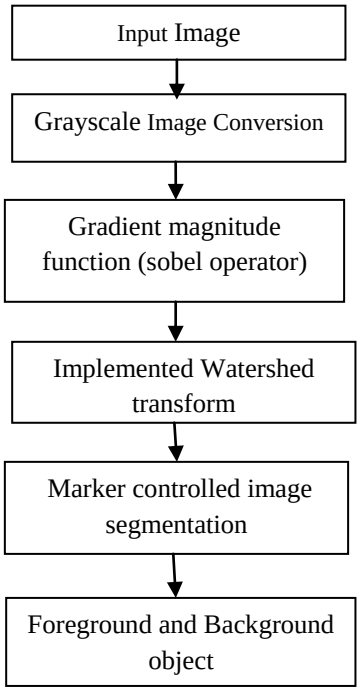


Fig 1.System Architecture

2.1 GRAYSCALE CONVERSION

Grayscale is a digital image is an image in which the assessment of every pixel is a solitary sample, that is, it carries only amount information [10]. Images of this sort, also known as black-and-white, are collected completely of shade of gray, changeable from black at the weakest intensity to white at the strongest. Convert RGB image to grayscale image

A=rgb2gray (image name)

2.2. GRADIENT MAGNITUDE FUNCTION

This function uses the Sobel edge masks, imfilter, and some simple arithmetic to compute the gradient magnitude. The gradient is high at the borders of the objects and low (mostly) inside the objects. The code is

[Gmag, Gdir] = ingredient (I, method)

2.3 WATERSHED TRANSFORMATION

Watershed transform is a segmentation method in arithmetic morphology. In geography, a watershed is the edge that divides areas tired by dissimilar river system. The watershed transform is a morphological [11, 12] gradient-based segmentation technique. The gradient chart of the picture is measured as a release map in which special gradient principles communicate to diverse heights. If we continue pouring water, the water level will increase more the catchment basins (CB).

When two different corpse of water meet, a dam is built between them. The development continues awaiting all the points in the map is immersed. Finally the entire picture is segmented by the dams which are then called watersheds and the segmented regions are referred [13] to as catchment basins (CB). A catchment basin (CB) is the geographical area challenging into a river or reservoir. The watershed algorithms apply these ideas to gray-scale image processing in a way that can be used to explain a variety of image segmentation problem.

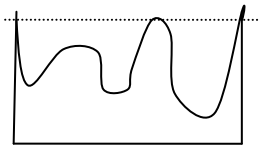


Figure 2: Gray level profile of image data

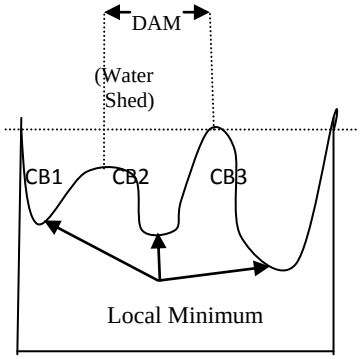


Figure 3: Watershed segmentation-local minima Define Catchment basins; local maxima define the watershed lines

3. MARKER CONTROLLED WATERSHED SEGMENT

Watershed algorithm [4] is an extremely good quality technique for image segmentation, but this technique suffers from over segmentation problem. An advance used to manage over segmentation is based on the idea of controlled marker. The idea of markers is an excellent move toward to control over segmentation [11]. The markers are related part of an image. There are interior markers and outside markers where interior markers are related with object of interest and outside markers [2] are related with the background. This is a very helpful technique for managing of watershed transform to overcome the over segmentation problem. In this technique [3], the set of the catchment basins of the grayscale image purpose f with values in [*lmin*, *lmax*] is equal to the set Y*lmax* obtained after the following recursion:

Ylmax= Tlmax (f), where Tl is the threshold set at level l

Yl+1=U {MINl+1, IZTl+1(f) Yl}, lmin≤ l ≤ lmax (1)

Where, MINl is the union of all regional minima at altitude l and

IZA (b) = Umx=yIZA (Bx) (2)

IZA (BJ¬) = {P € A I ∀∀K € [1,

m] {x}: dA (P, Bk) <dA (P, Bk)} (3)

DA (a, b) = minb€B dA (a, b) (4)

Where,
dA (a, b) , represents the geodesic distance between a and b within A.

Now the recursion definition will be:

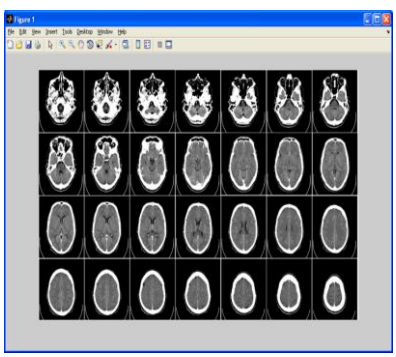
Ylmin-1 = Tlmin-1 (r)
Yl+1 = IZT+1(r) (X1), lmin ≤l ≤ lmax (5)

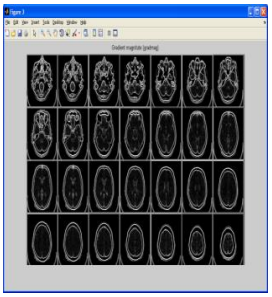
The steps of marker controlled watershed segmentation,

STEP 1: Insert the original image as input.
STEP 2: Convert the image into gray scale.
STEP 3: Find out the gradient magnitude.
STEP 4: Mark the foreground objects.
STEP5: Mark the background objects.
STEP 6: Estimate the watershed transform.

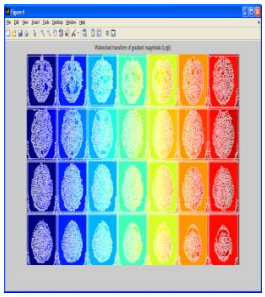
4. EXPERIMENTAL RESULTS

Input Image:



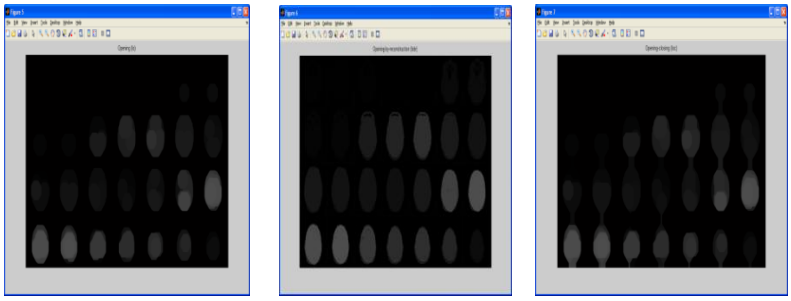


Gradient magnitude



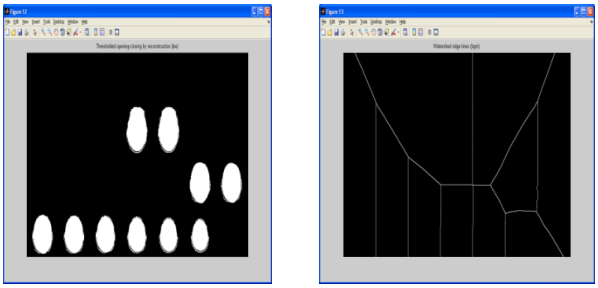
Watershed Transform using gradient

MARK THE FOREGROUND OBJECTS:



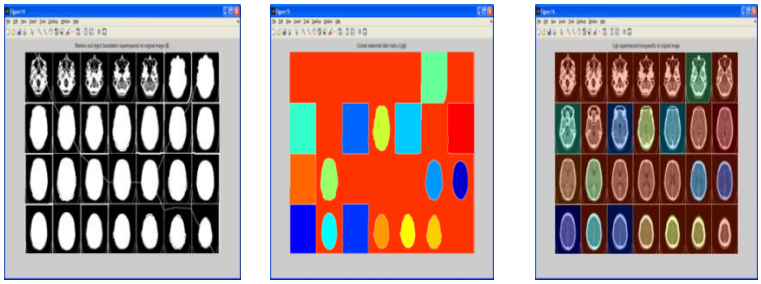
Foreground objects using morphological operations

MARK THE BACKGROUND OBJECTS:



Background objects in the original image

SEGMENTED RESULT:



Mark the object boundaries, colored watershed labels and transparency on original image

5. CONCLUSION

This part describes the conclusion of this analysis paper. The segmentation refers to the procedure of partitioning a digital image into several segments (sets of pixels, also known as super pixels). The watershed transform is an accepted segmentation method from the field of mathematical morphology. The objective of this paper is defining the marker controlled watershed algorithm for the medical images. The results are shown above in section IV. Here the work has been done only for the brain images. In order to bring out the foreground and background objects in an image using. Image to overcome came the over segmentation in medical images. The technique can also be used for the other medical images.

6. REFERENCES

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