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A Review on Marker Controlled Water Shed using Image Processing Techniques

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Abstract: ***This paper focuses on the modifications made on the marker controlled water shed method of segmentation. Since watershed transformation leads to over segmentation, marker controlled techniques are employed to achieve desired segmentation results. Markers can be specified by the user or automatically generated. Automatically generated markers yields better result than that specified by user. All segments touched by a marker will be merged together such that over segmentation is avoided. The result of fuzzy c means clustering is considered as marker, then watershed transform is applied to get final segmented image. Morphological operations are carried out on the image to obtain the fore ground and background markers on the image.***

Key Words: Boundaries, components, elements, EMF, algorithm, markers

I. INTRODUCTION

Segmentation aims at separation of region of interest from the image, even though several segmentation techniques are available, to segment overlapping objects watershed transform is used. To enhance the performance of watershed technique, information about foreground and background are provided through markers. Edge can be detected through sobel, prewitt, laplacian of Gaussian or zero cross operators. Canny edge detector can also be used to detect the edges. Soft computing techniques such as Fuzzy logic can also be used to detect edges. After the detection of edges, the distance from edge is used as a topographic surface, then water shed transform is applied on the result obtained from distance transform. Markers can be generated through edge mark fill (EMF) algorithm, EMF + algorithm and by considering spectral information in the image.

II. GAETANO 2015

A. Edge Mark And Fill Algorithm

In high resolution images the region seeds are due to edge profile minor irregularities or due to the discrete geometry of the problem. The seeds should be merged if they are closer to each of them and there is no edge in between them to avoid unfit segments. In EMF algorithm these seeds are identified and linked before applying watershed transform.

B. Morphological markers

Dilation of each region seed s is done with a circular structuring element .The radius of structuring element is obtained as the difference of distance between the seed and the closest edge. Such markers do not touch the edges, but closer seeds will overlap. The union of all basic markers generates a final map. Morphological operations can be done to identify region boundaries which are missing in the edge map.

C. Spectral markers

Spectral markers were generated independently for each and every closed region obtained after performing edge detection and dilation. A spectral activity measure was computed for each and every closed region. Further segmentation was done on the regions whose activity measure was greater. UN supervised binary tree structured MRF algorithm was used for local segmentation. Later connected components of the classes were obtained.

D. Emf +

Global information was used in spectral markers and the connected components were obtained as spectral markers. Initially water fit marker erosion is done. The spectral marker was not applied on the portion of image not covered by the dilated edges. Then spectral segmentation was done. Morphological markers and spectral markers were added up to get the final marker image.

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Edges were extracted from the PAN and MS components, and the edges from MS component s were up sampled and thinned to coincide to the target higher resolution. MS edges close to PAN edges were removed thus avoiding double edges. The terminal parts of MS edges where they meet PAN edges were also removed. Thus the two PAN and MS edges were merged in a single HR edge map. This solution, all based on morphological filtering, exploits edge information at both resolutions. Testing was done on IKONOS dataset and ROSIS data set.

E. Parvati

By performing morphological operations markers were generated. This method was tested on the aerial image, MR medical image and a high resolution satellite image. The foreground markers were obtained by erosion based gray scale reconstruction followed by dilation based gray scale reconstruction. the regional maxima and minima were used to obtain good foreground markers. The foreground markers were then superimposed on the original image. the edges of the markers were cleaned using edge reconstruction. From the superimposed binary image the back ground markers are obtained based on the Euclidean distance. The gradient image is altered by morphological reconstruction with foreground and background markers, and then watershed transform is applied.

F. Gaetano 2012

Local maxima were found in each and every connected components of the skeleton. the local maxima is declared as seeds and dilation operator was applied to each seed using a structuring element .the overlapping circles were joined and these regions were used as markers for the final watershed. The VHR optical images were used to test the performance. Both under and over segmentation is avoided in this method.

G. Wavelet based

To denoise the image wavelet transform was used. The marker pixel was generated considering the gradient based image. The image is clustered and it is indicated as the hexagonal grid's vertex. The clusters were spatially regularized by modifying the distance .the small islands within the cluster were cleaned to generate the image of marker pixel. Watershed transform was performed on the gray level image. To generate segmented marker pixel, the marker pixel image and watershed image were added. The marker pixels generated in this method have regularity property.

III. CONCLUSION

This paper focuses on the works carried out in the field of image segmentation using markers. De-noising is done as a preprocessing step in wavelet based segmentation technique. Markers were generated by performing erosion and dilation operations in morphological segmentation method. Spectral information is used in addition to morphological operations to extract more details from the image by Gaetano and etal. This work can be done with the recent transforms to enhance the result.

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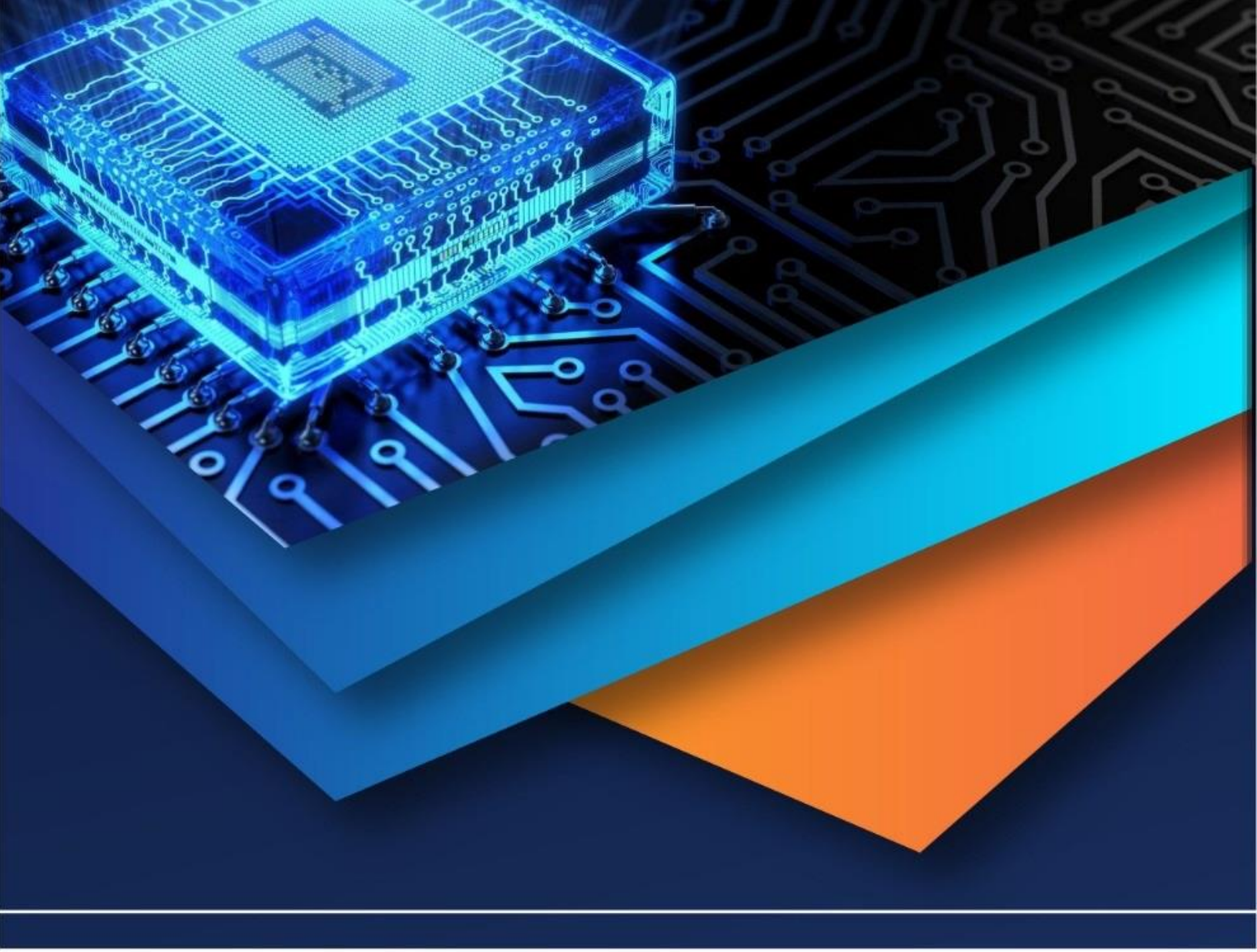

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