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TEXTURE SEGMENTATION IN MEDICAL IMAGING FOR RED SPOT BLOTCHES ANALYSIS IN HUMAN BODY

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Abstract: In an Image, the sort of regions are analyze in segments by image texture. Color intensity in the image provide unusual pattern of information about the image. Texture Interpretation describes the regions on the behalf of the texture of an image. Texture description of an image used sort of properties of an image, for determine the quality such as smoothness, roughness, etc. based on intensity of pixels in that particular image. Texture Segmentation is a powerful concept for analysis of image when it is very rich in texture properties. So based on the property pixels of image, analysis are done by filters. So in this paper, aim is to analyze the red spot blotches at human body based on the properties of image. In this paper discussion is carry on, use the filters analysis, to study and analyze the different segmentation available in image.

Keywords: Segmentation Analysis for Red Spot Blotches, Texture Segmentation.

I. INTRODUTION

Images represent the various regions in a scene. Generally surfaces are homogeneous in nature that has some property such as brightness, color contrast, smoothness and roughness. The color property of the image varies in an image surface, so it can easily classify based on the pixel value of the color [1]. Intensity of the color can be computed for the various image operations, such as segmentation of image based on texture of the image. Image texture is a measurement that is used for the computation of image property based on different texture. Texture analysis of an image gives distributed arrangements of the intensity of the pixel in an image. Based on the property of an image implementation of the algorithm can be chosen for particular operation on a selected image. Algorithm also can be applied for the texture and non-textured elements of the image for further analysis [4]. This paper fully describe about the segmentation of Red spot blotches image based on color intensity distribution of an image. The textured elements easily segmented on the basis of their pixel value from non-textured region of an image. The segmentation of an image based on pixel value may be inferior quality so 2D model approach can be used, that is called texels analysis. Texel is a measurement of texture space [5]. In this paper, red spot blotches image is considered for the segmentation analysis on the basis of color property of the image. For the analysis purpose texture filters are used, texture filter scheme used in this paper is Nearest-neighbor interpolation (NNI) statistical approach.

II. LITERATURE REVIEW

In this section of the paper review is carry on related work done in this field. Segmentation analysis and modeling of an image is discussed mathematically. Representation of texton and texels are described in salient blobs and canny edges [2]. Prior work in the field of segmentation does not explain nature of an image and boundary region of image. The histogram method of the image analysis provides the local window response that gives the texture information about the image. Segmentation analysis is done by feature of the image, threshold analysis of an image and region growth [3]. A shift variant method is also used for the analysis of an image on the basis of wavelet representation of image. Since texture is a stable property of the image, the down sampling can be reduced for the roughness representation [1].

III. NEAREST-NEIGHBOR INTERPOLATION TECHNIQUE

Interpolation is a mathematical technique that is used for the creating the new points between a range of known data points. In image segmentation analysis, two pixel values can be filled by the new points. In other words, within the two pixels new points are filled. Interpolation is a function of neighbor's data points. In NNI interpolation resulted pixels takes the value of new pixel that falls within the range of neighbors. So that output pixel never be continues in nature.

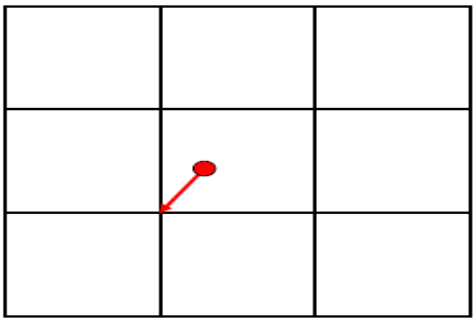

Fig 1.1 Non continuous pixel representation

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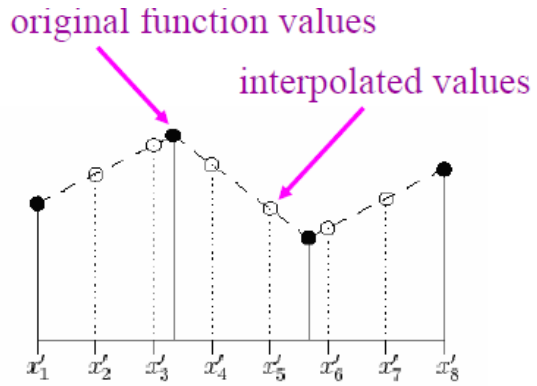
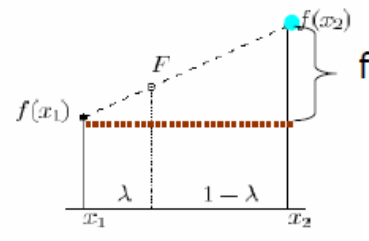


Fig 1.2 Basic interpretation of NNI

To calculate the interpolated values



$$\frac{F - f(x_1)}{\lambda} = \frac{f(x_2) - f(x_1)}{1}.$$

Fig 1.3 Calculation of Interpolated values (1D)

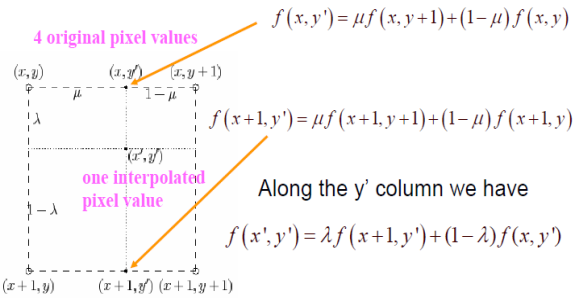
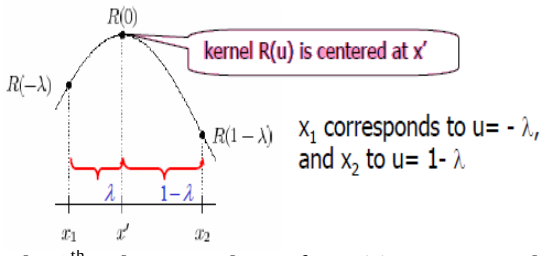


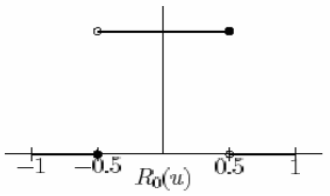
Fig 1.4 Interpolation representation (2D)

Let f(x') is the interpolated value for the pixel values x_1 and x_2, for $x_1 \le x' \le x_2$, Assume that x'- x_1 , now computation of the interpolation kernel R(u)

$$f(x') = R(-\lambda) f(x_1) + R(1-\lambda) f(x_2)$$



Consider 0^{th} order interpolation f_n, $R_0(u)$, now interpolated values between the two pixels represented by the function $R_0(u)$. $R_0(u)$ is the NNI for the kernel R (u) is given below



$$R_0(u) = \begin{cases} 0 & if\ u \le -0.5 \\ 1 & if\ -0.5 < u \le 0.5 \\ 0 & if\ u > 0.5 \end{cases}$$

.

Def: Consider a gray scale image I_1, p is pixel value of image, then p is local maxima of I_1 if and only if $I_1(p) \ge I_1(q)$, q denote the neighbor pixel of I_1. After the intensity calculation of the image colors apply the edge detection algorithm for segment analysis inside an image. Calculating the intensity of color in an image gives the clear picture of the color distribution in an image. Below Fig. 1.5 gives color distribution in input image.

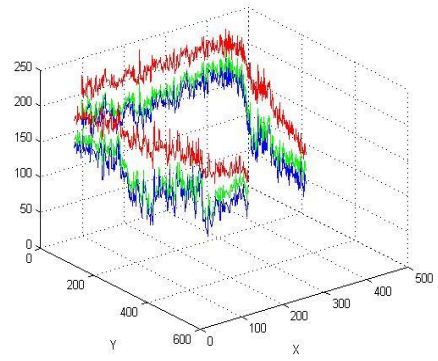


Fig 1.5 Color Intensity Distribution in Input image

IV. ALGORITHM DISCUSSION

A voronoi representation of texels in in R^2 is given in Fig. 1.5 and Fig. 1.5 b. Consider the n dimension representation of voronoi for the point x that is nearest neighbor to the x_k. x_k represents the sample point. So now voronoi representation is associated with NNI. P(x) is the interpolated value represented as f_k for the sample point x_k that is given below.

$$p(\mathbf{x}) = f_k \mid k = \arg\min_j \|\mathbf{x} - \mathbf{x}_j\| \quad (1)$$

So the NNI gives the point x that is nearest to the x_k.

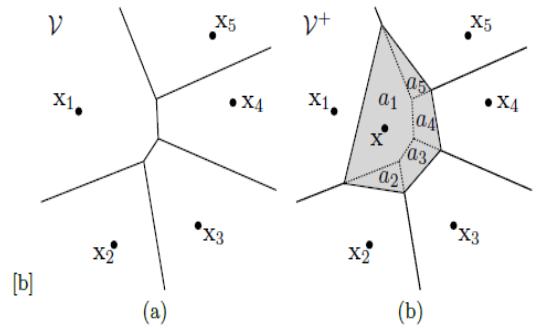


Fig 1.5 (a) x_k in voronoi representation, (b) Nearest neighbor x in voronoi polygon

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Let's consider a set X with values (x_1, x_2,…x_k) represents the sample points for voronoi plot V, and V^+ represent the voronoi plot for augmented set X^+ with values (x_1, x_2,…x_k). Now assume that $a_k(x)$, represents the intersection area of polygon in V^+ for the x_k in the V.

$$q(\mathbf{x}) = \frac{\sum_{k=1}^{K} a_k(\mathbf{x}) f_k}{\sum_{k=1}^{K} a_k(\mathbf{x})} \quad (2)$$

When K goes very high in samples $a_k(x)$ in equation (2) tends to zero, an d sum also will be in limit that contain only samples of neighbor's subset. If the point x belongs to the outside of the set X then $a_k(x)$ in equation (2) becomes infinite. So the interpolated value q(x) will be bounded with the min and max value of f_k in sample.

Sequence flow of Implementation:

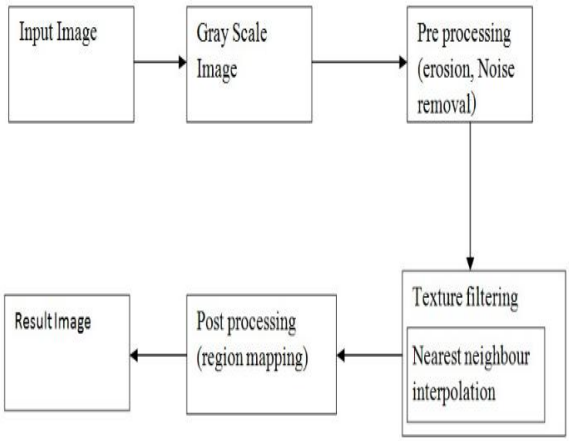

Fig 1.5 Sequence Flow of Algorithm Implementation

V. RESULT AND DISCUSSION

For applying the texture filter at the input image Fig 1.6, follow a sequence diagram of algorithm implementation. Input image contains the red spot blotches occur on the human body. By using the NNI algorithm, texture filtering is performed on the input image and produced a result as segmented image, Fig 1.7 represents the gray scale image and Fig 1.8 represents the color intensity based on NNI algorithm. Fig 1.9 represents the texture segmented result image.

Fig 1.6 Red Spot Blotches Input image

Fig 1.7 Gray scale image

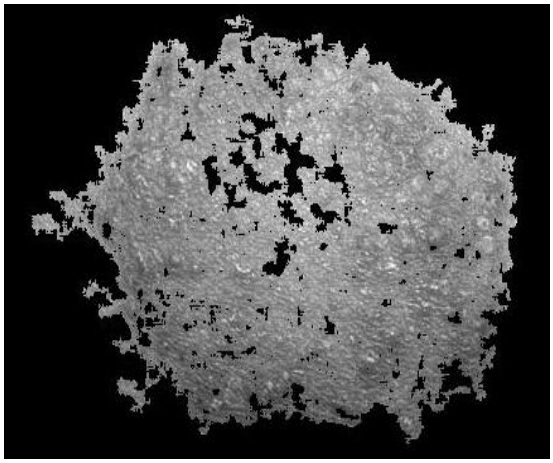

Fig 1.8 NNI generated image

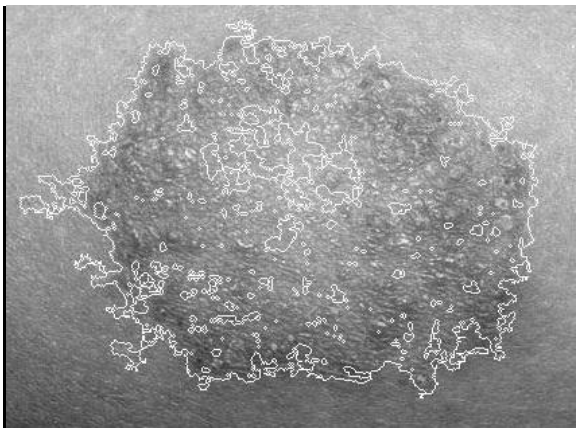

Fig 1.9 Texture Segmented Image (output image)

VI. CONCLUSION

In this paper, the algorithm used for the texture segmentation is NNI that gives the segmentation result based on the color intensity of the image. Pixels of the color image have different values for different colors. NNI used as a texture filtering or the input image and produce a segmented output image. Interpolation has the capability to apply on the 3D image construction and segmentation modeling. By applying the texture filtering algorithm, result image gives the sufficient information about the segmentation. So, texture filtering gives the satisfactory result for the image texture segmentation.

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BIOGRAPHIES

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