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Augmentation of RGB Satellite Imagery by means of Vector Field Method

Mr. Sagar Laxman Kute[1], Prof. Sushant J. Pawar[2]
[1,2]*Dept. of Electronics & Telecommunication Sandip & Research Centre Nasik, India*

Abstract: ***A Multispectral image is modeled as vector field with a number of dimensions equal to the number of bands in the image. In this model pixel is defined as vector formed by a number of elements equal to the number of bands. It is often necessary to enhance multispectral radiance or reflectance data to create an image that is suitable for visual interpretation.***

A general method is needed that works for any number of bands, with no parameters and a reasonable computing time. To fulfill such goal contrast stretch models a multispectral image by means of vector field. The dimension of this filed equals the number of bands of the image. Such a evaluation includes qualitative and quantitative analysis which will show clear improvements compared to state-of-art methods.

Keywords: Edge detection, multispectral image, edge enhancement, vector operator.

I. INTRODUCTION

Edge detection has been helpful for gray-level and color images using a number methods. Edge detection is a common image processing approach that often forms the first stage of image interpretation, and recent attention has been given to the development of color edge detection operators. The advantage of color edge detection schemes over gray scale approaches is easily demonstrated by considering the fact that those edges that exist at the boundary between regions of different colors cannot be detected in gray scale images if there is no change in intensity. This paper has a new color edge detector that has a single channel form equivalent to the morphological gradient [2] and, thus, avoids the need for any image smoothing which is perceptually not a well-defined operation for color images.

Gradient estimation is an essential task in image processing and scene analysis. The gradient in grey scale images can be thought of as the change in the gray-level, but in color images, the “color gradient” is defined based on the change in the color vector. In other words, besides the intensity of a color pixel, its hue and saturation must be taken into account. Various types of gradient estimators for color images have been proposed in the literature. From a general point of view, these methods can be divided into two major categories: directional difference (or gradient vector based) operators and nondirectional difference (or gradient magnitude based) operators. Edge is one of the most fundamental and important features of image. Edge detector is one of the most important tools in image processing [3]. Efficient and accurate edge detection will directly work on the understanding of machine vision system to objective world.

A synthetic method is discussed to detect edges in color images with an improved Kuwahara filter to smooth the original image and after that an auto threshold algorithm and thinning technique are applied to generate the final edge detection image. Image processing and computer vision have robust methods for feature extraction and the computation of derivatives of scalar fields. Furthermore, interpolation and the effects of applying a filter can be analyzed in detail and can be advantages when applying these methods to vector fields to obtain a solid theoretical basis for feature extraction. By means of a vector field we model a multispectral satellite image. The dimension of this fields is equals the number of the bands of the image. vector operators upon these fields can be applied. Results obtained are compared with the conventional edge operators Evaluation includes qualitative and quantitative analysis and it shows a clear improvement with respect to conventional edge operators.

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Table 1 Basic parameters of multi spectral images.

	ASTER	IKONOS
Acquisition date	July 7, 2003	June 14, 2006
Pixel size (m^2)	15 · 15	4 · 4
Dimension (pixels)	500 x 500	1200 x 1200
Bands (µm)	1) 0.52-0.60 2) 0.63-0.69 3N) 0.76-0.86 3B) 0.76-0.86	1) 0.45-0.52 2) 0.52-0.60 3) 0.63-0.69 4) 0.76-0.90

In a multispectral image, the information content of the edges varies through bands. Both images cover a portion of mexico city where the runways of an airport are clearly visible. One image is formed by the visible and near infrared (VNIR) bands of the advanced spaceborne thermal emission and reflection radio meter sensor (ASTER) on board terra satellite.(FIG 1). The Four bands of the IKONOS sensor (fig 2) from the other image. These images are not precisely orthorectified.

Fig 1. First principal component of ASTER Image.

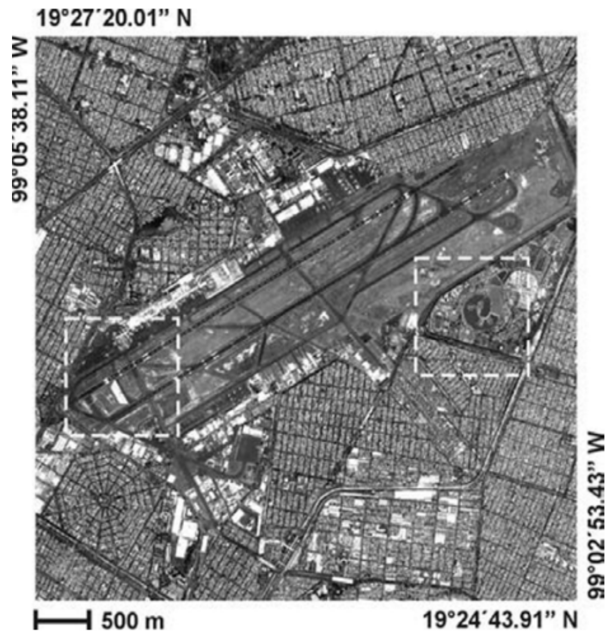

Figure 2. First principal component of IKONOS image.

The rest of the paper is organized as follows. We provide details of our system's architecture flow in Section II. Section III depicts the obtained results and its discussion and Conclusion is then given in Section IV.

II. SYSTEM ARCHITECTURE

Below fig shows the architecture of the proposed method. Initially a multispectral image of n band is given as input, then n dimensional vector is constructed after that multispectral gradient and laplacian methods are applied in parallel. On the generated vector field apply FT then IFT and we get the multispectral lapacian.

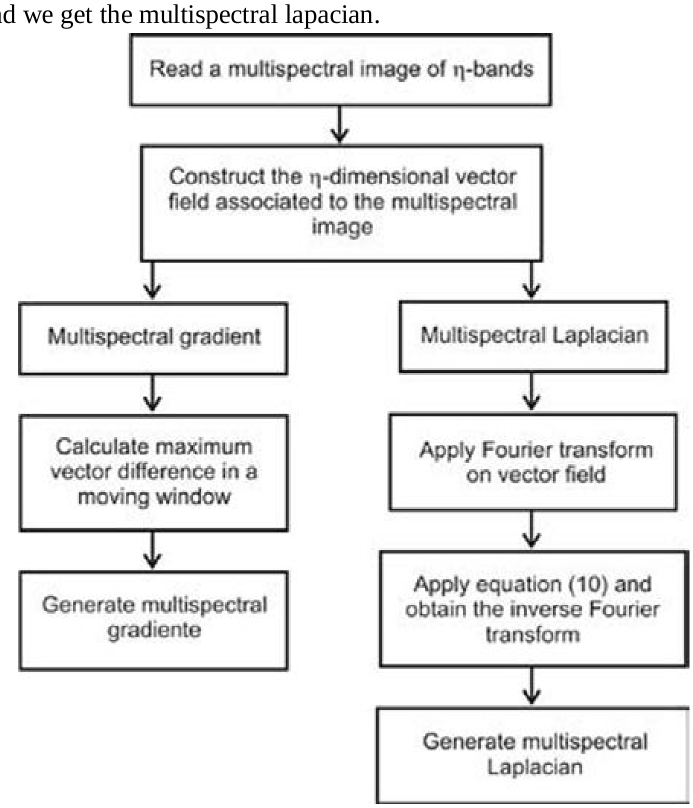

Fig. 3: Flow Chart of Proposed System

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A. Qualitative evaluation

We display in a high-resolution monitor the edge enhanced images. We display as well the first principal components of both the images. Visual Inspection is carried out. On the grounds of previously published work on qualitative image evaluation each edge-enhanced image was rated according to the following qualitative criteria: general quality, sharpness, contrast, and noisiness the number of gray levels and edges were evaluated. Most of the variance is accumulated by the first principle component of the images. The edge enhancement with this component is compared. The reason for of this comparison is to evaluate, according to the criteria, the degree of edge enhancement with respect to the original edge information content of the images.

B. Quantitative evaluation

Several indicators to perform a slope of an edge are used. Slope – the more steepness the better the definition of the slope. Widening – a width as close as possible to the original edge the better. Spatial location – the closest of the enhanced edge to the original location the better. Contrast – the highest the contrast the better. With the help of a cursor, a line of the image is selected. There are many types of edges in the images. To obtain a coherent quantitative evaluation of edges, we considered three types that occur frequently in the images.

III. RESULTS

Two mosaics were prepared to show the results of Canny and Cumani operators we applied a histogram saturation transformation to the images of the mosaics for visuals appreciation purposes. An inspection of results shows an enhancement similar to the sober operator(fig4). There are two limitations to the Canny and Cumani operators. The first one is that they carry a number of parameters that need to be defined by experimental procedure. The second one is that they work for RGB color generalization exists for an arbitrary number of bands of a multispectral image.

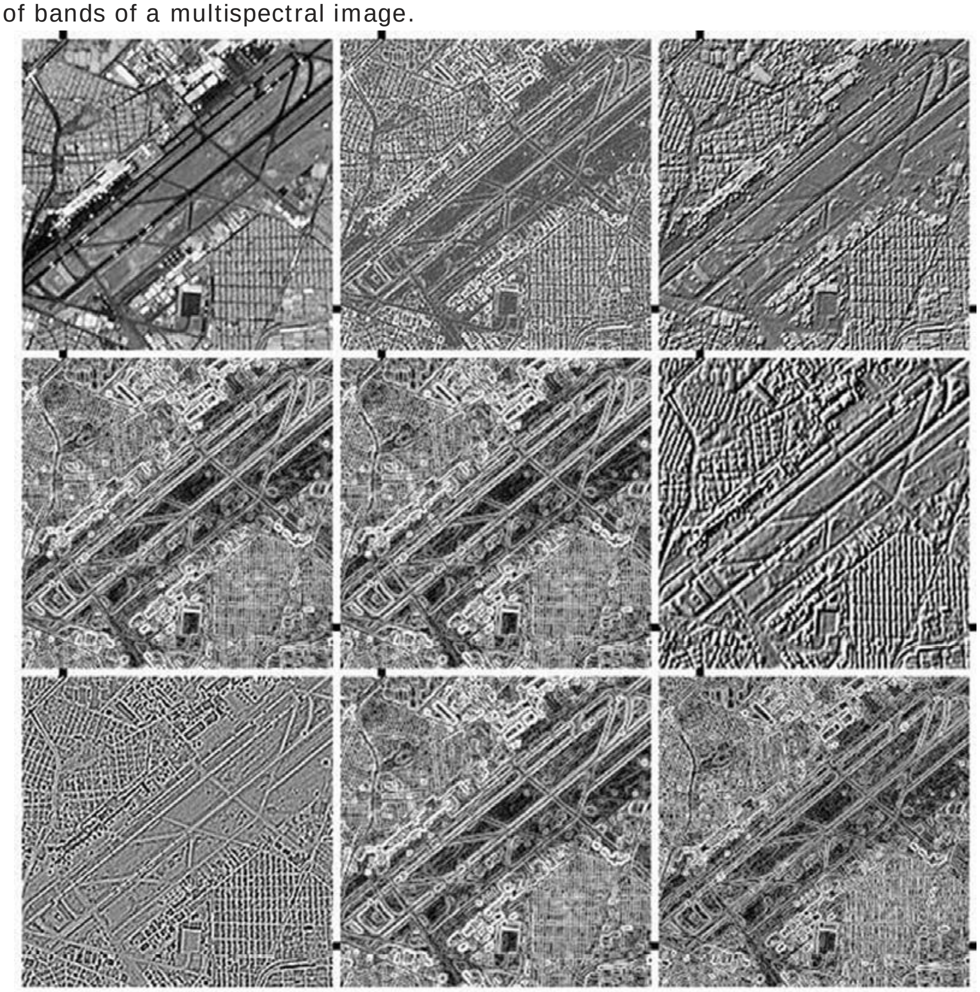


Fig. 4: Mosaic ASTER A

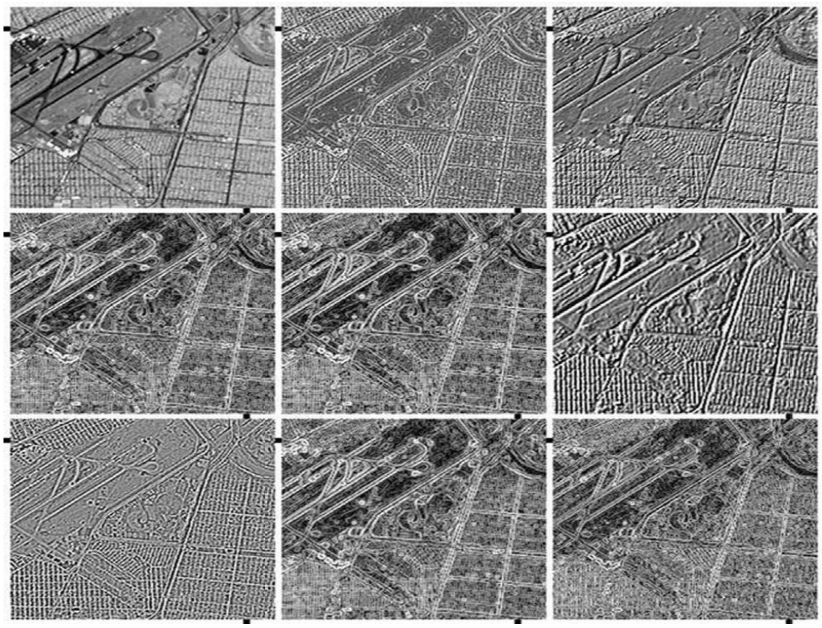


Fig.5 Mosaic ASTER B

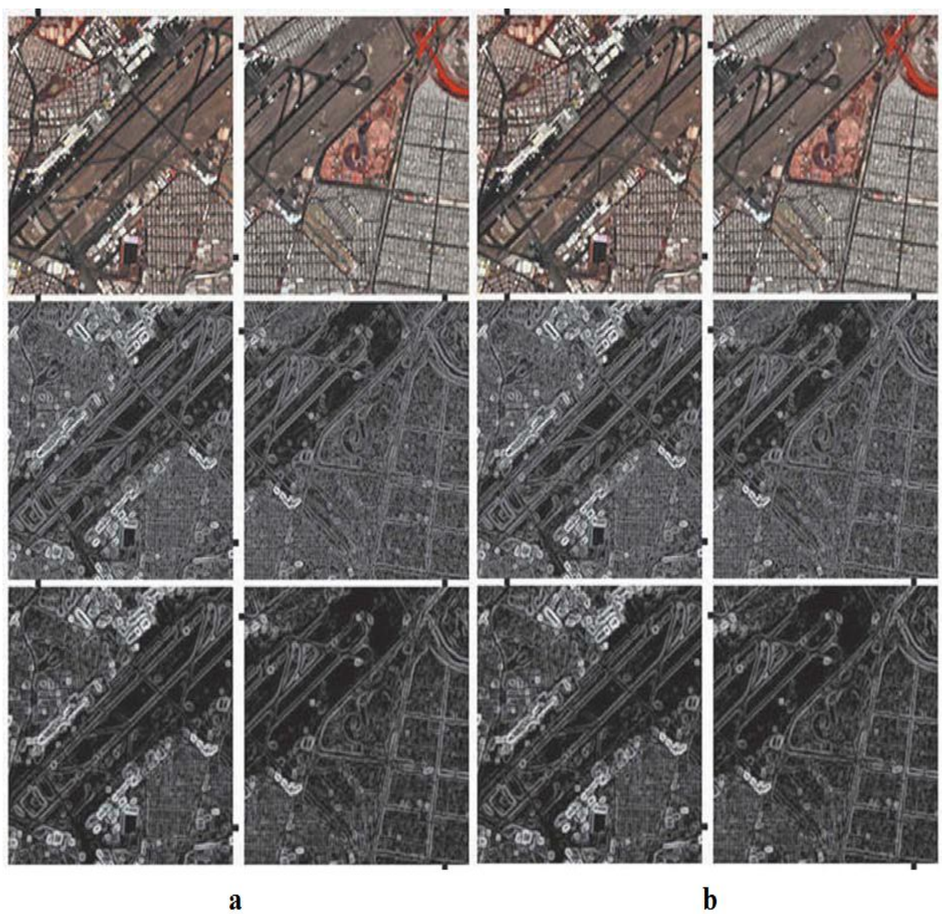


Fig.6 (a) First row, RGB color composite of the first three band of aster image. Second row edge enhancement from canny operator, third row edge enhancement from cumani operator. (b) First row RGB color composite of the first three bands of IKONOS image, second row edge enhance of canny operator, third row edge enhance from cumani operator.

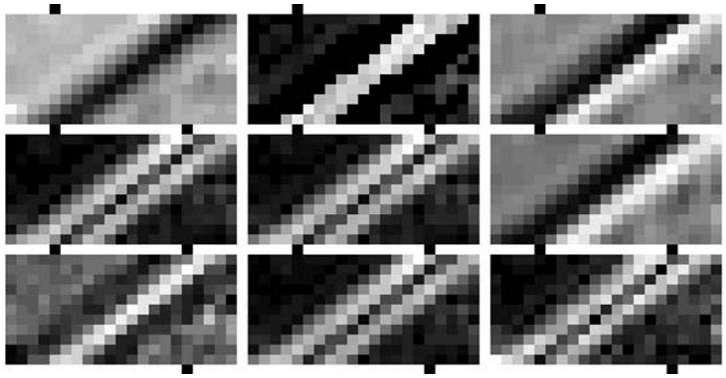


Fig.7 Mosaic of strips from line 91 column 118 and angle 135 from Aster image

IV. CONCLUSION AND FUTURE SCOPE

Two methods to extract edges from multispectral images are designed and discussed in this research. Such methods require the modeling of the original multispectral image as a vector field. Upon this vector field, two vector operations are applied to extract the edge content originally distributed through the bands of the images. These methods are parameter-free. A qualitative and quantitative evaluations shows that that our methods perform better than widely used edge enhancement procedures. The basic reason for this is that our methods extract the edge-content distributed through the original bands of a multispectral image.

REFERENCES

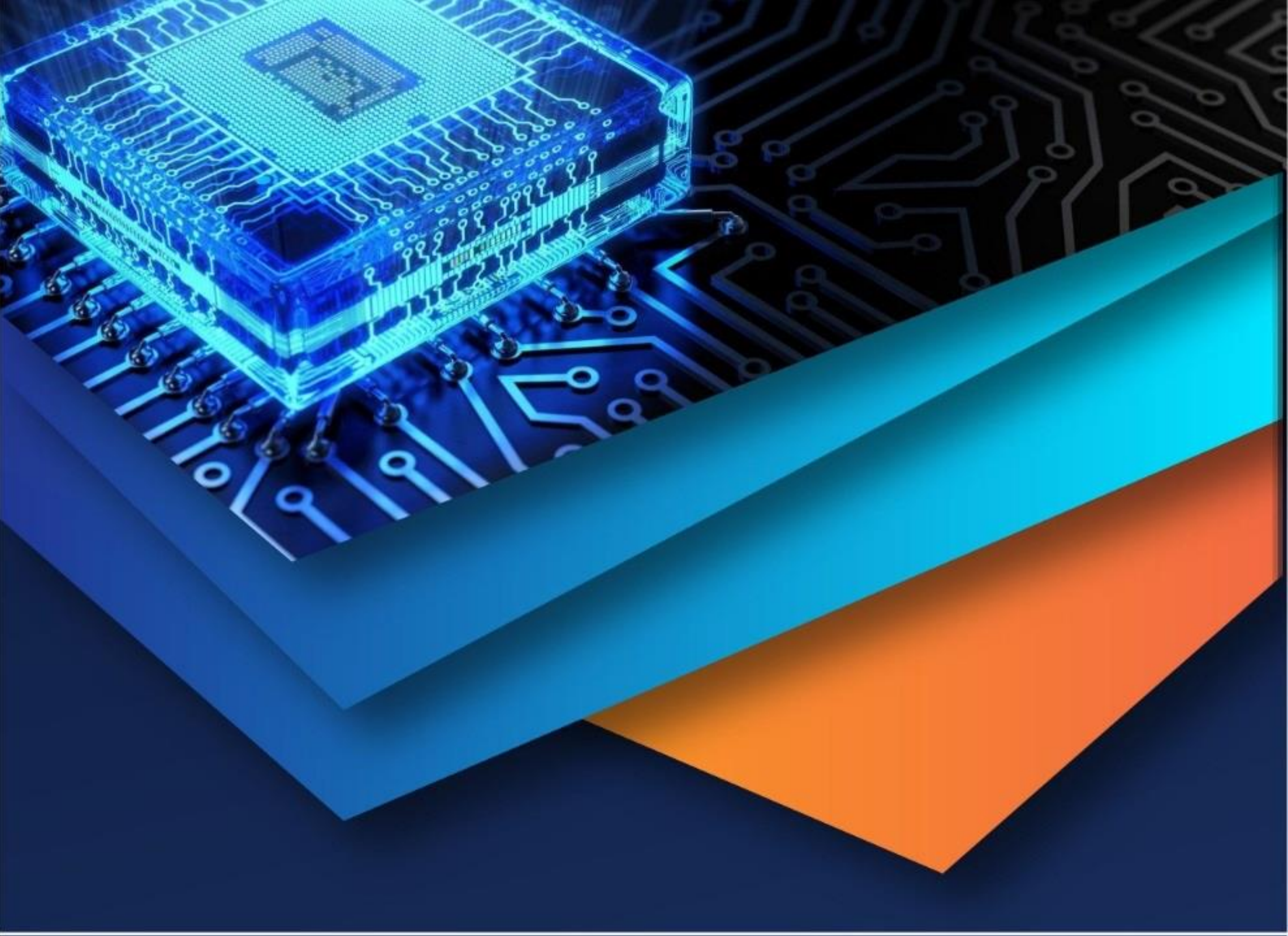
[1] Jorge Lira, Alejandro Rodriguez, "Multispectral satellite image Augmentation by means of vector operators", Elsevier journal of Satellite Imaging May 2016, Volume 53, Issue 3, Pages 289–308.

[2] Chen X., Chen h., 2010, A novel color edge detection algorithm in RGB color space, IEEE 10th international conference on signal processing, Beijin, China, PP. 793- 796

[3] K. Bowyer, C. Kranenburg and S. Dougherty, "Edge detector evaluation using empirical ROC curves," Proceedings. 1999 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (Cat. No PR00149), Fort Collins, CO, 1999, pp. 359 Vol. 1.

[4] Nezhadarya, Ehsan, and Rabab Kreidieh Ward. "A new scheme for robust gradient vector estimation in color images." IEEE Transactions on Image Processing 20.8 (2011): 2211-2220.

[5] Evans, Adrian N., and Xin U. Liu. "A morphological gradient approach to color edge detection." IEEE Transactions on Image Processing 15.6 (2006): 1454-1463.



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