Global Journal of Computer Science and Technology
Graphics & Vision
Volume 13 Issue 1 Version 1.0 Year 2013
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Edge Identification During Fire Environment for Robot

By Md: Rabiul Hasan
BGC Trust University Bangladesh

Abstract - It is very important for us to rescue from fatal accidents caused by fire. Recently in Bangladesh more than two hundred garment workers have deceased at Tajrin Fashion Industry. In this work we have performed the edge detection for Robot on the eve of edge identification to save the worker while they will be locked at emergency situations where human interaction will be failed. We have trained the system such a way that a Robot can easily learn the situations. We have used Automated Brained Learning (ABL) for Robot to detect the objects. Our work ensures only the edge detection. Sobel operator and masking is used in this process. To accomplish the work RGB color model and other color model such as YMC color model is analyzed to ensure the better result. We have noticed that RGB color model is better for our ABL process. Besides, YMC color model also generate good result while the fire is over smoked.

Keywords : *automated brained learning, robot, RGB color model, YMC color model, sobel operator, masking.*

GJCST-F Classification: *I.5.m*

Strictly as per the compliance and regulations of:

Edge Identification During Fire Environment for Robot

Md: Rabiul Hasan

Abstract - It is very important for us to rescue from fatal accidents caused by fire. Recently in Bangladesh more than two hundred garment workers have deceased at Tajrin Fashion Industry. In this work we have performed the edge detection for Robot on the eve of edge identification to save the worker while they will be locked at emergency situations where human interaction will be failed. We have trained the system such a way that a Robot can easily learn the situations. We have used Automated Brained Learning (ABL) for Robot to detect the objects. Our work ensures only the edge detection. Sobel operator and masking is used in this process. To accomplish the work RGB color model and other color model such as YMC color model is analyzed to ensure the better result. We have noticed that RGB color model is better for our ABL process. Besides, YMC color model also generate good result while the fire is over smoked.

Keywords : automated brained learning, robot, RGB color model, YMC color model, sobel operator, masking.

I. Introduction

Accidents under fire are very dangerous for human being as well as all other animals. Some time it becomes very difficult for respective personnel to save from fired palace due to unavoidable situations. Here we have concentrate to train the Robot for safety purposes. We know that an image is an artifact that depicts or records visual perception. Images are generally represented as two-dimensional arrays (i.e., matrices), in which each element of the matrix corresponds to a single pixel in the displayed image. Pixel is derived from picture element and usually denotes a single dot on a computer display. For example, an image composed of 200 rows and 300 columns of different colored dots would be represented as a 200-by-300 matrix. Some images, such as true color images, require a three-dimensional array, where the first plane in the third dimension represents the red pixel intensities, the second plane represents the green pixel intensities, and the third plane represents the blue pixel intensities.

Segmentation is the technique of partitioning a image into multiple parts [1-3]. Partitions are different components in image which have the similar properties. The outcome of image segmentation is a set of parts that collectively cover the entire image, or a set of contours extracted from the image. All of the pixels in an area are similar with respect to some properties or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristics. Edge detection is one of the most frequently used techniques in digital image processing [3].

The surroundings of image surfaces in a scene often lead to directed localized changes in intensity of an image, called edges. This examination gathered with a commonly held belief that edge detection is the first step in image segmentation, has fueled a long search for a good edge detection algorithm to use in image processing [4]. This search has designed a principal area of research in machine environment and has led to a steady stream of edge detection algorithms for Robot. Edge detection of an image helps to reduces significantly the amount of data and filters out information that may be regarded as less relevant, preserving the important structural properties of an image. For an image designing model, irregularities in image brightness are likely to correspond to a) Discontinuities in height b) Irregularities in surface orientation c) Changes in Particles properties d) changes in scene illumination e) Grayness ambiguity f) Vague knowledge.

II. Types of Derivatives

In this research activity we have used both first order and second order derivates for edge detections. The measurements of the Gradients in this work are performed base on the equation from 1 to 5 as below. All the equations her are first order derivatives.

$$G(x,y)=\left|\frac{\partial F(x,y)}{\partial x}\cos\theta+\frac{\partial F(x,y)}{\partial y}\sin\theta\right| \quad (1)$$

$$G(j,k)=\sqrt{[G_R(j,k)]2+[G_C(j,k)]2} \quad (2)$$

$$G_R(j,k)=F(j,k)-F(j,k-1) \quad (3)$$

$$G_C(j,k)=F(j,k)-F(j+1,k) \quad (4)$$

$$G_1(j,k)=F(j,k)-F(j+1,k+1) \quad (5)$$

Author : Computer Science and Engineering, BGC Trust University Bangladesh. Roll: 1014023.
E-mail : rabiulhasancsebangladesh@gmail.com

$$G_2(j,k) = F(j,k+1) - F(j+1,k) \quad (6)$$

For second order derivatives we have used following equations. Such as

$$G(j,k) = MAX[\,|G1(j,k)|,\ldots\ldots,|Gm(j,k)|,\ldots\ldots|GM(j,k)|\,]$$

$$Gm(j,k) = F(j,k) \otimes Hm(j,k)$$

$$7$$

$$G(j,k) = Max[\,|\,5\,Si - 3Ti\,|\,]$$

$$i=0$$

$$S\,i = Ai + Ai+1 + Ai+2$$

$$S\,i = Ai+3 + Ai+4 + Ai+5 + Ai+6 + Ai+7$$

$$\nabla 2 = \frac{\partial 2}{\partial x2} + \frac{\partial 2}{\partial y2}$$

$$G(x,y) = -\nabla 2\,\{F(x,y)\}$$

$$G(j,k) = [F(j,k) - F(j,k-1)] - [F(j,k+1) - F(j,k)] + [F(j,k) - F(j+1,k)] - [F(j-1,k) - F(j,k)]$$

III. Data Collections

We have collected data by creating real fire at both day and night environments. We have clustered the data set by applying the Regression analysis and correlation and variance. Regression analysis helps to better fit the data set properly. Regression analysis, in general sense, means the calculation or measurement of the unknown value of one variable from the known value of the other variable. It is one of the most valuable statistical tools which are extensively used in almost all sciences. It is specially used in data classification to study the relationship between two or more variables that are related causally and for the estimation of demand and supply graphs, cost functions, production and consumption functions and so on. The regression equation for our work is as follows.

$Y^* = a + bx$, where constant value of a and b are.

$$b = \frac{n\sum xy - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

$$a = \frac{\sum y - b\sum x}{n}$$

IV. Automated Brained Learning

Automated Brained Learning represents a brain analogy for information processing. These models are biologically exhilarated rather than clear-cut clone of how the brain actually functions. Learning by Brained ideas are usually implemented as system simulations of the massively parallel processes that involve processing elements interconnected in network architecture.

$$y_k^1 = \frac{1}{1+e^{-w^{1kT}x - a_k^1}},\ k = 1,2,3$$

$$y^1 = (y_1^1, y_2^1, y_3^1)^T$$

$$y_k^2 = \frac{1}{1+e^{-w^{2kT}y^1 - a_k^2}},\ k = 1,2$$

$$y^2 = (y_1^2, y_2^2)^T$$

$$y_{out} = \sum_{k=1}^{2} w_k^3 y_k^2 = w^{3T} y^2$$

$$\Delta w_i^j = -c \cdot \frac{\partial E}{\partial w_i^j}(W)$$

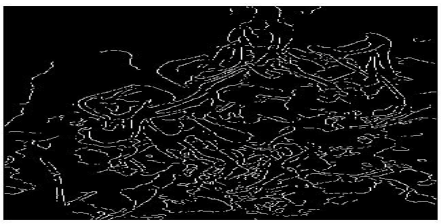
$$w_i^{j,new} = w_i^j + \Delta w_i^j$$

V. Implementation and Result

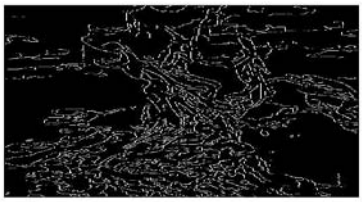
Based on our Brained Learning we have got following result shown at figure 1 at various moments.

(a)

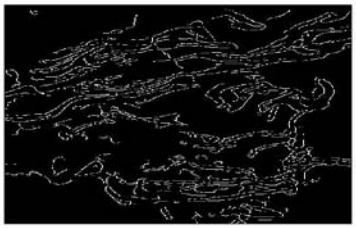
(b)



(c)

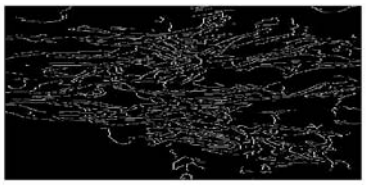


(d)

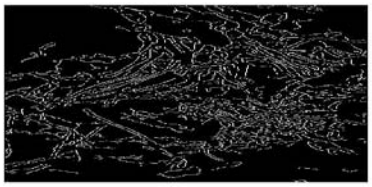


(e)

(f)



(g)



(h)

(I)

Figure 1 : From a to I we see that the edge detection is implemented with ABL process and proper derivatives

VI. Conclusion

We have noticed that our method is working very accurate when the fire intensity is high and it provides poor result at the time of smoked conditions. In future we will try to design algorithm for smoked removal detections.

References Références Referencias

1. Orlando J. Tobias and Rui Seara, "Image Segmentation by Histogram Thresholding Using Fuzzy Sets", *IEEE Transactions on Image Processing,* Vol.11, No.12, 2004, pp. 1457-1465.
2. M. Abdulghafour, "Image segmentation using Fuzzy logic and genetic algorithms", Journal of WSCG, vol. 11, no.1, 2003.
3. N. Senthilkumaran and R. Rajesh, "Edge Detection Techniques for Image Segmentation-A Survey", Proceedings of the International Conference on Managing Next Generation Software Applications (MNGSA-08), 2008, pp.749-760.
4. N. Senthilkumaran and R. Rajesh, "A Study on Edge Detection Methods for Image Segmentation", Proceedings of the International Conference on Mathematics and Computer Science (ICMCS-2009), 2009, Vol.I, pp.255-259.
5. Chan, R.H., Ho, C.W., and Nikolova, M., 2005. Salt and Pepper Noise Removal by Median Type Noise Detectors and Detail–Preserving Regularization. IEEE Transactions on Image Processing, vol. 14, no.10, pp. 1479-1485.
6. Brownrigg, D.R.K., 1984. The weighted median filter. Communication, ACM, vol. 27, no.8, pp. 807-818.

This page is intentionally left blank