A BIG DATA BASED EDGE DETECTION METHOD - A SURVEY

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ABSTRACT:

In Today's era Big Data is one of the most well-known research area that try to solve many research problems. The focus is mainly on how to come out those problems of Big Data and it could be handling in recent systems. Image mining and genetic algorithm is used to automate the process of images, patterns, data sets and etc. Image mining is used to extract the hidden images from the set of images. Genetic algorithm is also quite effective in solving certain optimization and intelligence problems and it is used in many applications, including image pattern recognition. The survey paper reviews of Big Data with edge detection methods on various types of images.

Keywords: Edge Detection, Big Data, Image mining.

1. INTRODUCTION

Big Data is used both structured and unstructured data that is so large it is difficult to process using traditional database and software techniques. A data is classified as Big Data if it effectively satisfies any one of the requirements of Big Data, namely; Volume, Velocity and Variety. On the other hand, Big Data also arises with many challenges, such as difficulties in data capture, data storage, data analysis and data visualizations. Big data sets are used for minimizing risk, identifying unfamiliar objects and uncover hidden patterns. Data mining and Big Data are related to each other.

Both containing more number of data's and the data's are extracted from the different data sets. Here, we have taken Big Data as an image. The clustering technique is used for grouping the images. After clustering the images, applies edge detection based genetic algorithm techniques like selection, crossover and mutation. In edge detection images are converted into gray scale images. For extracting the images, mining techniques will be used. Image mining is used to extract the images patterns from the large set of images, which draws the basic principles from concepts in databases, machine learning, statistics, pattern recognition and 'soft' computing.

In image processing, edge detection is the one of the image processing technique for identifying the objects within the images. There are many techniques used in edge detection but genetic algorithm is determined by a fitness function define to evaluate a solution's ability to deal with a given task, ending up in bringing out a best possible solution. These paper discuses various techniques used for Edge Detection based Genetic Algorithms.

2. LITERATURE REVIEW

[1] Author discussed, that canny method can produce equally good edge with the smooth continuous pixels and thin edge. Sobel edge detection method cannot produce smooth and thin edge compared to canny method. But same like other method, Sobel and Canny methods also very sensitive to the noise pixels. Sometime all the noisy image cannot be filtered perfectly. Unremoved noisy pixels will affect the result of edge detection. From the analysis, it was shown that between Sobel and Canny edge detection algorithms, response given by canny edge detection was better than result of Sobel detector used in these MRI images.

[5] Author proposed an optimized edge detection algorithm suitable for the face recognition task. The main idea of the proposed method is to boost the significant edges and then apply successive thinning algorithms. The two advantages of this method over other gradient based systems is its ability to find missing

and broken edges more accurately and suppress the less significant edges. Possible future work is to enhance the thinning algorithm such that it is able to suppress the noise in post processing stage more effectively.

[9] Author tested the proposed method on different images. It produced stable and fairly good results. Consistent acceptable outputs over different kinds of real life images have proved robustness of the presented scheme. Thus, the proposed method may be handy for any computer vision task where extraction of edge maps is required for a large set of images for feature extraction or for any other work. The next venture will be comparing those algorithms with the proposed one and analyze the performance on the basis of parameters like computing time, execution complexity and accuracy of the system output in presence of noise.

3. IMAGE EDGE DETECTION

Edge detection is used or image division and data abstract in other field like image processing and machine vision. The use of edge detection method is to reduce unnecessary information in the images and also extract the significant characteristics of the images such as corners, lines and curves. Edge generally occurs between objects and backgrounds, objects and objects, primitives and primitives. Edge is a boundary between two homogeneous regions. In image processing, then improving those detected regions of the image which contains edge keenness of the image will improve and image will be fair.

The main idea of edge detection is

First ,use edge improving operator to focus the regional edge of the image then ,specify the pixel ,"edge strength" and set the threshold to abstract the edge pointset.The edge that detected may not be continuous because of the noisy and blurring image.

[3]. The following flow chart describes the steps for image processing in edge detection Fig2.

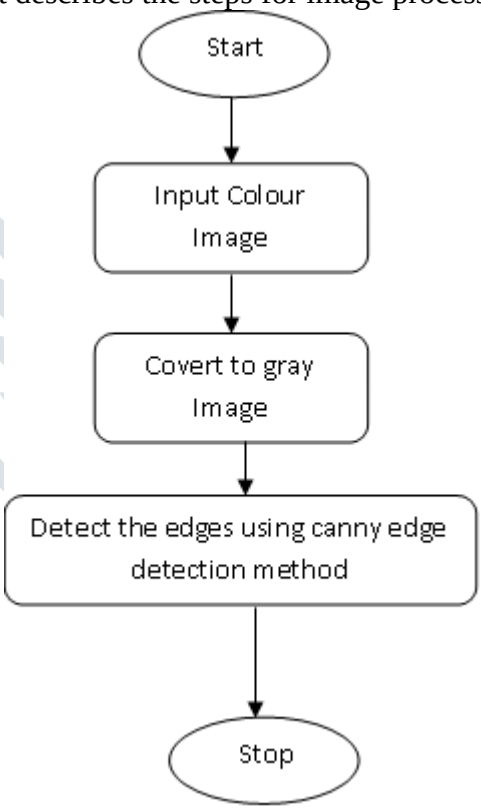

Fig 1: Flow chart for image edge detection

4. EDGE DETECTION METHODS

The edge detection uses

- Gradient
- Zero-crossing methods.

4.1. GRADIENT METHOD

The gradient method is one of the methods in image processing techniques. The gradient method detects the edges by looking for the maximum and minimum in the first derivative of the image [1]. Some of the gradient methods are [15][16].

- Prewitt Operator
- Sobel Operator
- Canny Edge Detection
- Roberst Edge Detection

4.1.1. PREWITT OPERATOR

Prewitt operator is used for detecting edges horizontally and vertically. It is limited to 8 possible directions; however knowledge shows that most direct direction estimates are not much more perfect. In Fig3, This gradient based edge detector is estimated in the 3x3 neighborhood for eight directions.

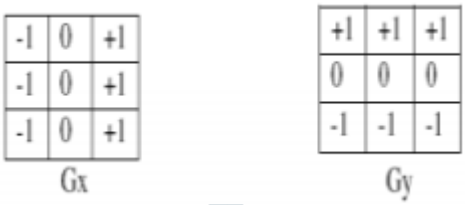

Fig 2: Prewitt Operator

4.1.2. SOBEL OPERATOR

Sobel edge detection detects all edges of the images which also has some advantage of providing both a differencing and smoothing effect. It is implemented as the sum of two directional edge enhancement operations. The operator consists of a pair of 3×3 convolution kernels as shown in Fig4. The sobel operator is very similar to Prewitt operator. It is also a derivate mask and is used for edge detection. It also calculates edges in both horizontal and vertical direction.

Fig 4: Sobel Operator

4.1.3.CANNY EDGE DETECTION

Canny used the multi stage algorithm to detect the wide range of edges in the images. The algorithm runs in 5 separate steps:

1. **Smoothing:** Blurring of the image to remove noise.
2. **Finding gradients:** The edges should be marked where the gradients of the image has large magnitudes.
3. **Non-maximum suppression:** Only local maxima should be marked as edges.
4. **Double thresholding:** Potential edges are determined by thresholding.
5. **Edge tracking by hysteresis:** Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge.

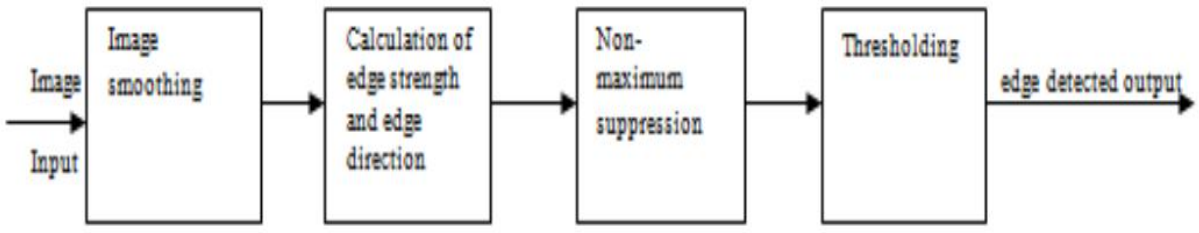

Fig5: Block diagram for Canny's edge detection

4.1.4. ROBERTS EDGE DETECTION

In fig5, it performs a simple, quick to compute, 2-D spatial gradient measurement on an image. This method emphasizes regions of high spatial frequency which often correspond to edges. The input to the operator is a grayscale image the same as to the output is the most. Common usage for this technique. This is very similar to sobel operator.

+1	0
0	-1

Gx

0	+1
-1	0

Gy

Fig 6: Roberts Detection

4.2. ZERO-CROSSING METHOD

- Laplacian Operator.

4.2.1. LAPLACIAN OPERATOR

Laplacian Operator is also a derivative operator which is used to find edges in an image. Laplacian is a second order derivative mask. It can be further divided into positive laplacian and negative laplacian. The Laplacian L(x,y) of an image with pixel intensity values I(x,y) is given by:

$$L(x,y)= \frac{\partial^2 I}{\partial x^2} + \frac{\partial^2 I}{\partial y^2}$$

All these masks find edges. Some find horizontally and vertically, some find in one direction only and some find in all the directions.

5. CONCLUSION

Edge detection forms a pre-processing stage to remove the redundant information from the input image, thus dramatically reducing the amount of data to be processed while at the same time preserving useful information about the boundaries. Here we are dealing with comparison of the edge detection technique in modeling type by using the Big-data. We are concentrating only how the edge detection technique works. This technique of detecting the edge gives good result .by comparing this Canny's gives better results in case of noise condition. The computations are complex. There are many other type of edge detection methods are there to improve the detection of edges in case of noise.

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