

Review on Edge detection mechanism for Picture matching and Picture reconstruction

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Abstract: Edges are borders between different textures. Edge is also defined as discontinuities in image or picture intensity between two pixels. Edges or border for an image or picture are always important characteristics that offer indication for higher frequency. Detection of edges for an image or picture or picture may help for image or picture or picture segmentation, data compression, & also help for well matching, such as image or picture or picture reconstruction & so on. There are lot of methods to make edge/border detection. Most common method for edge detection is to calculate differentiation of an image.



Keywords: Edge detection, Sobel, Canny, Pixel, Segmentation, Compression, Image intensity

[I] Introduction

Edge detection is an image or picture processing technique for finding boundaries of objects within picture or images. It is working by detecting discontinuities in brightness. Edge/border detection is used for image or picture or picture segmentation & data extraction in areas such as image or picture or picture processing, computer vision, & machine vision. Common edge/border detection algorithms include Sobel, Canny, Prewitt, Roberts methods.

Edge/border detection is name for a set of Mathematical methods which aim at identifying points in a digital image or picture or picture at which image or picture brightness changes sharply , more formally, may have some discontinuities. Particular Points at which image or picture or picture brightness changes sharply are typically organized into a group of curved line segments known as *edges or borders*. Same problem of finding discontinuities in 1D signals is known as step detection & problem of checking

signal irregularity over time is known as change detection. Edge/border detection is a fundamental tool in image or picture processing, machine vision & computer vision, particularly in areas of feature detection & feature extraction.



Fig 1 Before edge detection





Fig 2 After Edge Detection

[II] Edge/Border properties

Edge/Borders extracted from a two-dimensional image or picture or picture of a three-dimensional scene may be classified as either viewpoint dependent or viewpoint independent. A *viewpoint independent Edge/Border* typically reflects inherent properties of three-dimensional objects, such as surface markings & surface shape. A *viewpoint dependent Edge/Border* may change as viewpoint changes, & typically reflects geometry of scene, such as objects occluding one another.

A typical Edge/Border/border might for instance be border between a block of red colour & a block of yellow. In contrast a **line** extracted by a ridge detector, can be little number of pixels of different colour on an otherwise unchanging background. For a line, there can therefore usually be one Edge/Border on the side of line.

[III] Different Edge/Border detection methodologies

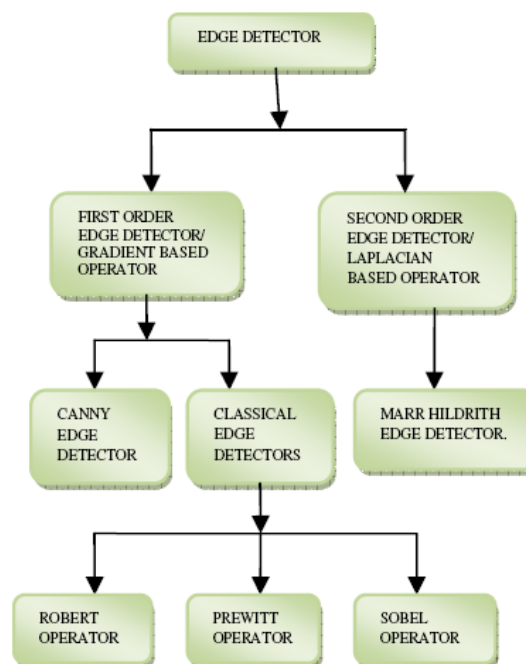


Fig 3 Different Edge/Border Detection Methodology

[IV] SURVEY OF EARLIER WORK

Rapid development of information technology has directly impacted on techniques in image or picture processing techniques & implementation of survey processing systems. This main development has been shifted from mainframe system to PC platform. User now may easily perform all kind operations & processing techniques ranging from small scale to large scale statistical operations. research framework & methodology complies with ADDIE model [4,5]. ADDIE model is generic process traditionally used by instructional designers & training developers. 5 phases that including Analysis, Design, Development, Implementation, & Evaluation represent a dynamic, flexible guideline for building effective training & performance support tools. Our work starts with conducting a survey to new learners/students about their understanding on Biomedical image or picture Processing course to identify any problems or issues of how difficult to them to understand Biomedical image or picture



Processing course. To make meaningful to these new learners, we are going to develop user friendly Biomedical image or picture Processing software package, which new learners may do some Biomedical image or picture Processing analysis through various methods that have been taught in Biomedical image or picture Processing course.

1. A brief experience on journey through hardware developments for image or picture processing & it's applications on Cryptography by Sangeet Saha, Chandrajit pal, Rourab paul.

The importance of embedded applications on image or picture & video processing, communication & cryptography domains have been taking a larger space in current research era. Improvement of pictorial information for betterment of human perception like deblurring, denoising in several fields such as medical imaging, satellite imaging are renewed research thrust.

2. Comparative Study & Implementation of image or picture Processing Techniques Using MATLAB(MATRIX LABORATORY) by Sukhjinder singh, R.k Bansal, Savina Bansal

Image enhancement is aiming at improving quality of image or picture for better visualization. Paper presents 3 methods of image or picture enhancement: - LHE, GHE & DSIHE that improve visual quality of images. they implemented & examined effect of above mentioned techniques that were based on objective image & subjective image or picture quality parameters like PSNR, NAE, , AE ,SC & MOS to measure quality of gray scale enhanced images. Comparative analysis is being carried out.

3. A Study on image or picture Edge/border Detection Using Gradients by Pinaki Pratim Acharjya, Ritaban Das, Dibyendu Ghoshal

Study on image or picture edge/border detection using gradients was presented in this paper. In image or picture processing & image or picture analysis edge/border detection is one of most common operations. Edge/borders form outline of an object & it is boundary between an object & background.

4. ALGORITHM & TECHNIQUE ON VARIOUS EDGE/BORDER DETECTION: A SURVEY by Rashmi, Mukesh Kumar, & Rohini Saxena

An edge/border can be defined as a set of connected pixels that forms a boundary between two disjoints regions. Edge/border detection is a method of segmenting an image or picture into regions of discontinuity. Edge/border detection performs an important role in digital image or picture processing & practical aspects of our life.

5. Mie Sato et al., (2000) have experimented gradient magnitude based region growing algorithm for accurate segmentation.

They express that undesirable partial-volume effect that lies on boundary between a high intensity region & a low intensity region and makes unerring boundary determination a difficult task. New approach to segmentation is required for removing adverse effect on boundary, that is unwanted especially from point of view of volume rendering.

6. Stoyan Donchev. (2000) has performed adaptive threshold-gradient method for segmentation of areas & objects of grey scale images.

Segmentation of an image, i.e., separation of object from its background is most important procedures in image or picture processing. 2 basic types of segmentations that exist at present realized with respect to intensity & to intensity gradient & two basic types of segments areas & borders. Term area usually denoted topologically joined regions of image or picture which have comparatively homogeneous distribution of intensity, while term border relates to zones where intensity changes sharply, or in other



words, zones with greater value of intensity gradient.

7. Philip L. Worthington (2002) has proposed enhanced canny edge/border detection using curvature consistency.

Edge/borders are often considered as primary image or picture artifacts for extraction by low-level processing techniques, & starting point for many computer vision techniques. As a result, reliable edge/border detection has long been a research goal.

8. Nasir Salman (2006) has put forward a work in image or picture segmentation based on watershed & edge/border detection techniques.

A combination of K-means watershed segmentation method & Difference In Strength map was used to perform image or picture segmentation & edge/border detection tasks. An initial segmentation is obtained based on K-means clustering technique. Starting from this two techniques are used, first is watershed technique with new merging procedures based on mean intensity value to segment image or picture regions & to detect their boundaries. second is edge/border strength techniques to obtain accurate edge/border maps of images/graphics without using watershed method.

9. Chi Chang-Yanab, et al., (2008) have done a study on methods of noise reduction in a stripped image.

Through their analysis they have found out by image or picture spectrum that its difference may help us to choose different methods to do noise reduction while information of image or picture is reduced to be least.

10. Wenshuo Gao, et al., (2010) have proposed an improved sobel edge/border detection.

Combining sobel edge/border detection operator & soft-threshold wavelet de-noising is done for edge/border detection on images which include white Gaussian noises. In recent years, a lot of edge/border detection methods have been

proposed. commonly used methods which combine mean de-noising & Sobel operator median filtering & cannot remove salt & pepper noise very well.

[V] MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, & programming in an easy-to-use environment where problems & solutions are expressed in familiar Mathematical notation. Typical uses include: MATRIX & computation.

MATLAB (**matrix laboratory**) is a multi-paradigm numerical computing environment & fourth-generation programming language. Developed by MATH Works, MATLAB allows matrix manipulations, plotting of functions & data, implementation of algorithms, creation of user interfaces, & interfacing with programs written in other languages, including C, C++, Java, Fortran & Python.

[VI] OBJECTIVES OF RESEARCH

Main Objective of research is to highlight the benefit of canny edge/border detection over traditional edge/border detection schemes.

After analyzing all these edge/border detection techniques, it is found that canny gives optimum edge/border detection. Following are some points throwing light on advantages of canny edge/border detector as compared to other detectors discussed:

1. **Less Sensitive to noise:** If we compare to classical operators such as Prewitt, Robert & Sobel canny edge/border detector is less sensitive to noise. Use of Gaussian filter is made which removes noise at a great extent as compared to above filters. LoG operator is highly sensitive to



the noise because differentiate twice as compare to canny operator.

2. Remove streaking problem: classical operators' like Robert uses single thresholding technique but it results into streaking. Streaking means, if edge/border gradient just above & just below set threshold limit it removes useful part of connected edge/border, & leave the disconnected final edge/border.

To overcome from this drawback canny detector uses 'hysteresis' technique which uses two threshold values $_789$ & $_5_65$ as discussed above in canny algorithm.

3. Adaptive in nature: Classical operators have fixed kernels so cannot be adapted to a given image. While performance of canny algorithm depends on variable.

[VII] FUTURE SCOPE OF RESEARCH

In this research we will study & evaluate different edge/border detection methods. We have seen that canny edge detector will give better result as compared to others with some positive points.

It is less sensitive to noise, adaptive in nature, resolved problem of streaking, provides good localization & detects sharper edges as compared to others. It is known as optimal edge detection technique hence lot of work & improvement on this algorithm has been done & further improvements are possible in future because an improved canny algorithm may detect edges in coloured image or picture without converting in gray image, improved canny algorithm for automatic retrieval of moving object in image or picture guidance.

It finds practical application in Runway Detection & Tracking for Unmanned Aerial Vehicle, in brain cable insulation layer measurement, MRI

image, Real-time facial expression recognition, edge detection of river regime, Automatic Multiple Faces Tracking & Detection. Canny edge detection technique can be used in license plate reorganization system that is an useful part of intelligent traffic system, finds practical application in traffic management system, public safety & military department. It also finds applications in medical field as in x – rays,ultrasound etc.

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