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Shape Base Image Retrieval

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Abstract: Content based image retrieval (CBIR), a technique which uses visual contents to search images from the large scale image databases, is an active area of research for the past decade. It is increasingly evident that an image retrieval system has to be domain specific. In this paper, various edge detection method are discussed.Edges are detected in areas of the image where the intensity level fluctuates sharply, the more rapid the intensity change the stronger the edge[1]. A good edge detection stage makes the formation of extended boundaries and object recognition easier; errors due to a poor edge detector soon become magnified as more processing is performed, so care must be taken in choosing the right edge detector (or operator) for the job.In this paper, an efficient and robust shape-based image retrieval system is proposed. We use the Prompt edge detection method to detect edge points, which is compared with the Sobel edge detection method.

Keywords: Canny, Laplacian, Prewitt, Robert, Sobel.

INTRODUCTION

Content-based image retrieval (CBIR),a technique which uses visual contents to search images from large scale image data bases has been an active research area for the last decade. Advances in the internet and digital imaging have resulted in an exponential increase in the volume of digital images. The need to find a desired image from a collection of databases has wide applications, such as, in crime prevention by automatic face detection, finger print, medical diagnosis, to name a few.Early techniques of image retrieval were based on the manual textual annotation of images, a cumbersome and also often a subjective task. Texts alone arenot sufficient because of the fact that interpretation of what we see is hard to characterize by them. Hence, contents in an image, color, shape, and texture,started gaining prominence.There are four important feature components for content-based image retrieval: color, texture, shape, and spatial relationship. Among these features, shape contains the most attractive visual information for human perception. An important step before shape extraction is edge point detection.Shape does not refer to the shape of an image but to the shape of a particular region that is being sought out. Shapes will often be determined first applying segmentation or edge detection to an image. Other methods use shape filters to identify given shapes of an image. In some case accurate shape detection will require human intervention because methods like segmentation are very difficult to completely automate.Here the paper discuss shape extraction using edge detection masks like Sobel, Roberts, Prewitt and Canny gradient operators.

What is Edge-Abrupt change in intencity of pixel called edges.Various physical events cause intensity changes.-Geometric events object boundary (discontinuity in depth and/or surface color and texture) surface boundary (discontinuity in surface orientation and/or surface colorand texture)- Non-geometric events specularity (direct reflection of light, such as a mirror)shadows (from other objects or from the same object) inter-reflections.Edge detection is a very important in image analysis. As the edges give idea about the shapes of objects present in the image so they are useful for segmentation, registration, and identification of objects in a scene. An edge is a jump in intensity. The cross section of an edge has the shape of a ramp.An ideal edge is a discontinuity (i.e., a ramp with an infinite slope). The first derivative assumes a local maximum at an edge. The various gradient operators used for edge extraction are Sobel, Prewitt, Roberts and Canny.All the method uses bellow step for edge detection

(1) Smoothing: suppress as much noise as possible, without destroying the true edges.
(2) Enhancement: apply a filter to enhance the quality of the edges in the image(sharpening).
(3) Detection: determine which edge pixels should be discarded as noise and which should be retained (usually, thresholding provides the criterion used for detection).
(4) Localization: determine the exact location of an edge .

Edge Detection

Edge detection is a necessary preprocessing step in most of computer vision and image understanding systems. The accuracy and reliability of edge detection is critical to the overall performance of these systems. Earlier researchers paid a lot of attention to edge detection, but up to now, edge detection is still highly challenging. In this section, we will briefly illustrate two common edge detection methods, and point out their drawbacks. In addition, we introduce a simple and efficient method for edge detection.

Edge detection using derivatives

Firstly describes changes of continuous functions using derivatives.An image is a 2D function, so operators describing edges are expressed using partial derivatives. Points which lie on an edge can be detected by:(1) detecting local maxima or minima of the first derivative (2) detecting the zerocrossing of the second derivative.There are many ways to perform edge detection. However, the most may be grouped into two categories, gradient and Laplacian[2]. The gradient method detects

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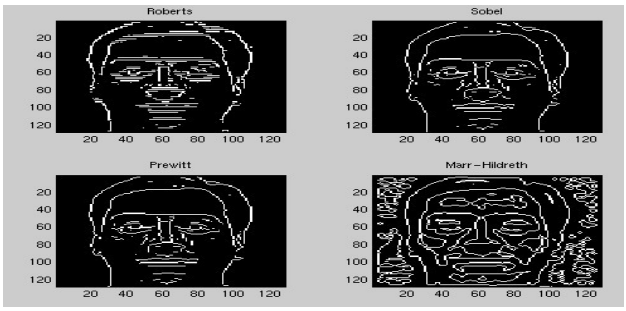
the edges by looking for the maximum and minimum in the first derivative of the image. The Laplacian method searches for zerocrossings in the second derivative of the image to find edges[5]. This first figure shows the edges of an image detected using the gradient method (Roberts, Prewitt, Sobel) and the Laplacian method (Marrs-Hildreth).



Notice that the facial features (eyes, nose, mouth) have very sharp edges. These also happen to be the best reference points for morphing between two images. Notice also that the Marr-Hildreth not only has a lot more noise than the other methods, the low-pass filtering it uses distorts the actual position of the facial features.

Laplacian Edge Detection

In morphing algorithm which operates on features automatically extracted from target images. Following steps to be followed

Step 1: Start with an image of a good looking team member. Since no such images were available.

Step 2: Blur the image. Since we want to select edges to perform a morph, we don't really need "every" edge in the image, only the main features. Thus, we blur the image prior to edge detection. This blurring is accomplished by convolving the image with a gaussian (A gaussian is used because it is "smooth"; a general low pass filter has ripples, and ripples show up as edges)

Step 3: Perform the laplacian on this blurred image. To remove these false edges we find a zero crossing of the laplacian, we must also compute an estimate of the local variance of the test image, since a true edge corresponds to a significant change in intensity of the original image. If this variance is low, then our zero crossing must have been caused by ripple.

Step 4: Find the zero crossings of the laplacian and compare the local variance at this point to a threshold. If the threshold is exceeded, declare an edge. Step 5: Median Filter the image. We apply a median filter because it removes the spot noise while preserving the edges. This yields a very clean representation of the major edges of the original image.usually edge occur in boundary of region.Reduce unnecessory information from the image.extract important feature of image like corner,line or curve.There are various type image step,ramp,ridge and roof.comonly used method for edge detection are 1)clasical grediant detection 2)Gausian based filter 3)wavelet used for different sacle 4)Fuzzy logic and nueral network

Canny Edge Detection

The Canny edge detection algorithm is known to many as the optimal edge detector. Canny's intentions were to enhance the many edge detectors.Edges in images are areas with strong intensity contrasts – a jump in intensity from one pixel to the next[4]. Edge detecting an image significantly reduces the amount of data and filters out useless information, while preserving the important structural properties in an image.

In order to implement the canny edge detector algorithm, a series of steps must be followed. Canny Edge Detection is a popular edge detection algorithm. It was developed by John F. Canny in

1. It is a multi-stage algorithm and we will go through each stages.

2. Noise Reduction Since edge detection is susceptible to noise in the image, first step is to remove the noise in the image with a 5x5 Gaussian filter.

3. Finding Intensity Gradient of the Image.Smoothened image is then filtered with a Sobel kernel in both horizontal and vertical direction to get first derivative in horizontal direction (*Gx*) and vertical direction (*Gy*).

Gradient direction is always perpendicular to edges. It is rounded to one of four angles representing vertical, horizontal and two diagonal directions.

Non-maximum Suppression

After getting gradient magnitude and direction, a full scan of image is done to remove any unwanted pixels which may not constitute the edge. For this, at every pixel, pixel is checked if it is a local maximum in its neighborhood in the direction of gradient.

Hysteresis Thresholding

This stage decides which are all edges are really edges and which are not. For this, we need two threshold values, minVal and maxVal. Any edges with intensity gradient more than maxVal are sure to be edges and those below minVal are sure to be non-edges, so discarded. Those who lie between these two thresholds are classified edges or non-edges based on their connectivity. If they are connected to "sure-edge" pixels, they are considered to be part of edges. Otherwise, they are also discarded.

CONCLUSION

From the survey it is concluded that a wide variety of CBIR algorithms have been proposed in different papers. The selection feature is one of the important aspects of Image Retrieval System to better capture user‟s intention. It will display the images from database which are the more interest to the user. The purpose of this survey is to provide an overview of the functionality of content based image retrieval systems.Image Retrieval is gaining momentum among researchers working in image processing and computer vision areas because of the wide number of applications. Image retrieval using shape features is the theme of work presented here. Using Roberts, Sobel, Prewitt and Canny gradient operators four variations in discussed.

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