

A Comparison of Various Edge Detection Techniques for Kannada Text Image Document

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Recent developments in Kannada text matching have brought a new research field in image processing which comprises Kannada text matching using edge detection techniques. The principal aim is to identify the edges of the given Kannada text from given Kannada text image. Edge detection is the part of segmentation in image processing. The goal of segmentation is to simplify and change the representation of an image into something that is more meaningful and easier to analyze. The edge function is used to detect edges, which are those places in an image that correspond to text boundaries. To find edges this function looks for places in the image where the intensity changes rapidly. Edge returns a binary image containing 1's where edges are found and 0's elsewhere. Different edge detection methods Sobel, Prewitt, Roberts, Laplacian of a Gaussian (LOG), Zero Cross, & Canny are applied on Kannada text images. The application of this method is to detect the edges by using different types of edge detection techniques for Kannada text image. The results are analyzed compared & evaluated through the visual inspection Method.

Keywords-Kannada Text image, Detecting Edge and Various Edge Detection methods

INTRODUCTION

Image-processing techniques have been developed for matching the Kannada text image. Edge detection plays a crucial role in identifying the Kannada text in image. The threshold and edge detection method of image processing has been holden the important status in the image segmentation application because of its intuitive and the simplicity. The goal of segmentation is to simplify and change the representation of an image into something that is more meaningful and easier to analyze. Segmentation subdivides an image into its constituent regions or

objects. Image segmentation algorithms generally are based on one of two basic properties of intensity values, i.e. discontinuity and similarity. In first category, the approach is to partition an image based on sudden

changes in intensity such as edges in an image. Edge detection is by far the most common approach for detecting meaningful discontinuities in intensity values; such discontinuities are detected by using first & second order derivatives. The first order derivative of choice in image processing is the gradient. The second order derivatives of choice in image processing are generally computed using Laplacian. For Sobel, a Prewitt & Roberts method the edge function finds edges by thresholding the gradient for the log. By default edge function automatically computes the threshold to use. For Sobel & Prewitt methods, we can choose to detect horizontal edges, vertical edges or both. Laplacian of a Gaussian (LOG) finds edges by looking for zero crossing after filtering with a Gaussian filter. Zero crossing finds edges by looking for Zero crossing after filtering with a user-specified filter. Canny finds by looking for local maxima of the gradient. The gradient is calculated using the derivative of a Gaussian filter. The method used two thresholds to detect strong & weak edges, and includes the weak edges in the output only if they are connected to strong edges. Therefore; this method is more likely to detect true weak edges. Sobel edge detector method is somewhat difficult than Prewitt edge detector. Prewitt edge detector method is slightly simpler to implement computationally than the Sobel detector. But it tends to produce somewhat noisier results. Robert edge detector is one of the oldest & simplest edge detectors in digital image processing. It is still used frequently in hardware implementations where simplicity & speed are dominant factors. This detector is used considerably less than the others. Due to in part to its limited functionality (i.e. it is not symmetric and can not be generalized to detect edges that are multiples of 45). Log smoothes the image (thus reducing noise) and it computes the Laplacian, which yields a double edge image. Zero crossing edge detector Based on same concept as the LOG method but the convolution, is carried out using a specified filter. Canny edge detector is the most powerful edge detector provided by function edge. The basic objective of this paper is to detect the Kannada text edges in the given Kannada text images. The result, which we have achieved are more useful for matching Kannada text images for easy analysis, which saves the processing time.

EDGE DETECTION

Kannada scripts are very complex and have a very small coiled edge which plays an important role in identifying the character. When these edges are located correctly,

they can provide an orientation and location to match the Kannada text form a given image. Therefore we are using different types of edge detection algorithm to identify Kannada text edges from a Kannada text image. By visual inspection we are comparing, which edge detection algorithm is providing the best result.

In order to facilitate this discussion, an example Kannada text image is used. One way to find the edges of an image is through the use of MATLAB®. In particular, the use of the edge function (a function available in MATLAB®) allows the edges in an image to be determined.

METHODOLOGY

For detection of edges in medical images, we have proposed the following algorithm.

1. First take an intensity Kannada text image
2. Convert into Gray Scale
3. Apply edge detection technique.
4. Apply direction if necessary (Horizontal/Vertical, both by default)
5. See the results and
6. Compare the resultant edge detected kannada text images.
7. End.

The Kannada text images have been taken as input images and converted into grayscale. This is necessary as the edge function only accepts black and white images as a parameter. We have applied different edge detection techniques like Sobel, Prewitt, Canny, Log, Zero cross & Roberts. We have checked these methods and the resultant images by Visual Inspection Method.

Analysis and Result.

The first step is to get the Kannada text image. Figure 1 Kannada text image was taken & converted into gray scale and applied various edge detection techniques



Figure 1

SOBEL EDGE DETECTION

In the Sobel method (Figure 2), notice that the majority of the edges in each character of Kannada text image are missing. Some of the edges in Kannada characters are having bridge because of it can't be identified, and hence it is not complete. Given these results, it would be difficult to identify and understand characters Kannada text .

Sobel Edge Dectection [auto]

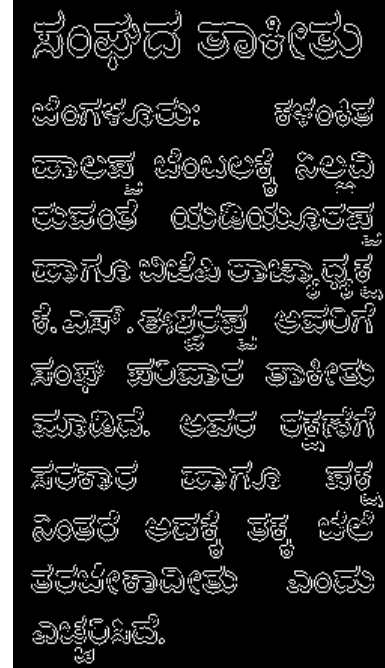


Figure.2

PREWITT EDGE DETECTION

The result of the Prewitt method (Figure 3) is virtually identical to the result obtained by the Sobel method. Therefore, the use of this method would also make the recognition of Kannada text difficult.

Prewitt Edge Dectection [auto]

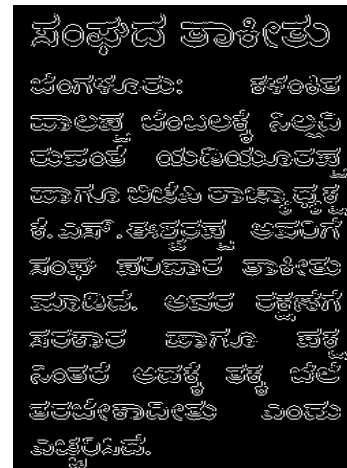


Figure 3

ROBERT EDGE DETECTION

In the Roberts method (Figure 4), notice that the majority of the edges in the characters are missing. The only small edges that can be seen of each characters. As with the Prewitt and Sobel methods, the Roberts method does not yield the results needed for identifying Kannada characters and a complete Kannada text.

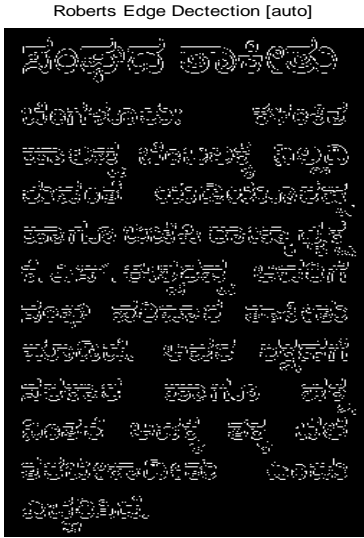


Figure 4

LAPLACIAN OF GAUSSIAN METHOD

The Laplacian of Gaussian method (Figure 5) method that yields significant results. Notice that outer edges of Kannada characters are identified correctly but inner most coiled edges are not been identified. For example: In KI character smallest inner most coiled edge 0 in not identified.

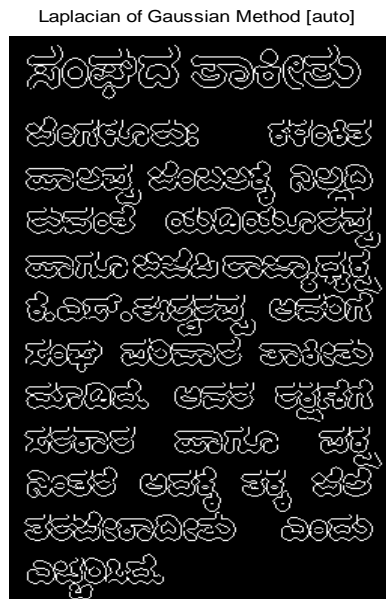


Figure 5

ZERO-CROSS EDGE DETECTION

The Zero-Cross method (Figure6) yields results virtually identical to the Laplacian of Gaussian method. Again,

smallest the innermost coiled curve is not been identified which will again does not yield good result.



Figure 6

CANNY EDGE DETECTION

Notice that the Canny method (Figure 7) yields the best overall results. Although there is minute lost of some smallest inner most curve, each Kannada character edges are almost complete in this image. Therefore, Kannada characters or texts can be easily be easily recognized.

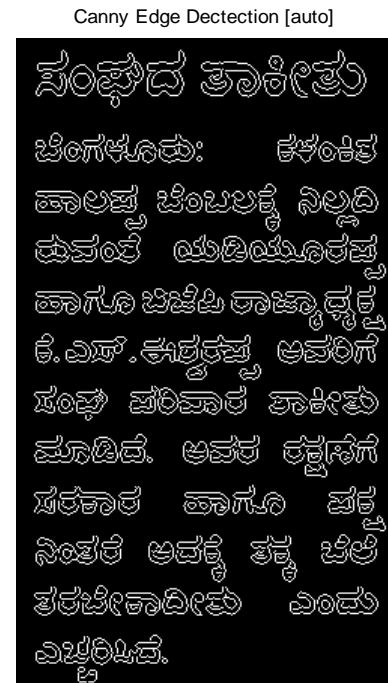


Figure 7

The resulting images show that not all of the methods would be ideal an application. For example, the Sobel, Prewitt and Roberts methods all yield little information

about the Kannada characters. However, the Laplacian of Gaussian, Zero-Cross and Canny methods all result in detailed edges of the Kannada text. In particular, the Canny method gives the greatest detail of the face.

CONCLUSION

In this work Kannada text images have been studied for detecting edges of Kannada characters using various types of edge detection methods. Sobel, Canny, Prewitt, Roberts, Zero cross, Log have been tested to detect the edges. The result is analyzed, compared through visual inspection method. Through this work it is observed that the choice of edge detection method on the Kannada text image Canny edge detection method is the best method. From this experimental work it is also observed that Zero Cross and LOG edge detection methods also gives best results for all the Kannada text images

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