Object corner detection in binary images

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Abstract

Morphological operands are basic and powerful operation in the area of digital image processing. Especially in final steps of image processing task, using this operation will improve performance of algorithms. In this task we have implemented corner detection algorithm by searching different structure elements (SE) in original binary images related to our machine vision course. Our algorithm can detect white corners in black background and vice versa simultaneously.

Keywords: morphological operation, corner detection, binary images

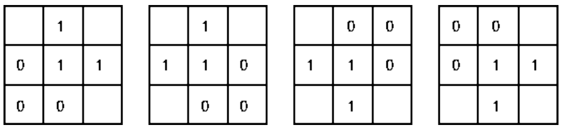
1 Introduction

Corner detection is an approach used within computer vision systems to extract certain kinds of features and infer the contents of an image. Corner detection is frequently used in motion detection, image registration, video tracking, image mosaicking, panorama stitching, 3D modelling and object recognition [1].

In [2, 3, 4, 5] real-time and high-speed algorithms for detecting corners have been proposed but at the following we introduce a Hit or Miss transformation for detecting corners of objects in binary images.

2 Implementation

At the first step we have used for different structure elements proposed for corner detection in fig 1. These structures find soft corners of binary images.



	1	
0	1	1
0	0	

	1	
1	1	0
	0	0

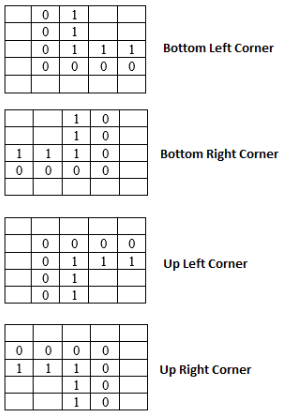
	0	0
1	1	0
	1	

0	0	
0	1	1
	1	

Figure 1: Structure elements for detection soft corners

In these SE 1s correspond to foreground and 0s to the background, blank items are don't care values.

At the second step structure elements in fig 2 have applied to binary images. It's expected that by this SEs we detect ragged corners of objects in images.



Bottom Left Corner

	0	1		
	0	1		
	0	1	1	1
	0	0	0	0

Bottom Right Corner

		1	0	
		1	0	
1	1	1	0	
0	0	0	0	

Up Left Corner

	0	0	0	0
	0	1	1	1
	0	1		
	0	1		

Up Right Corner

0	0	0	0	
1	1	1	0	
		1	0	
		1	0	

Figure 2: Structure elements for detecting ragged corners

Though these SEs are for detecting white corners in black background, we have implemented algorithm in a way that finding corner of corresponding SE in white and black background, thereby algorithm have ability of finding inward and outward corners of objects.

3 Results

3.1 Soft corners

We have tested couple of images using soft structure elements shown in fig 1 and the results in fig 3, 4 are showing that many irrelevant parts of image have detected as

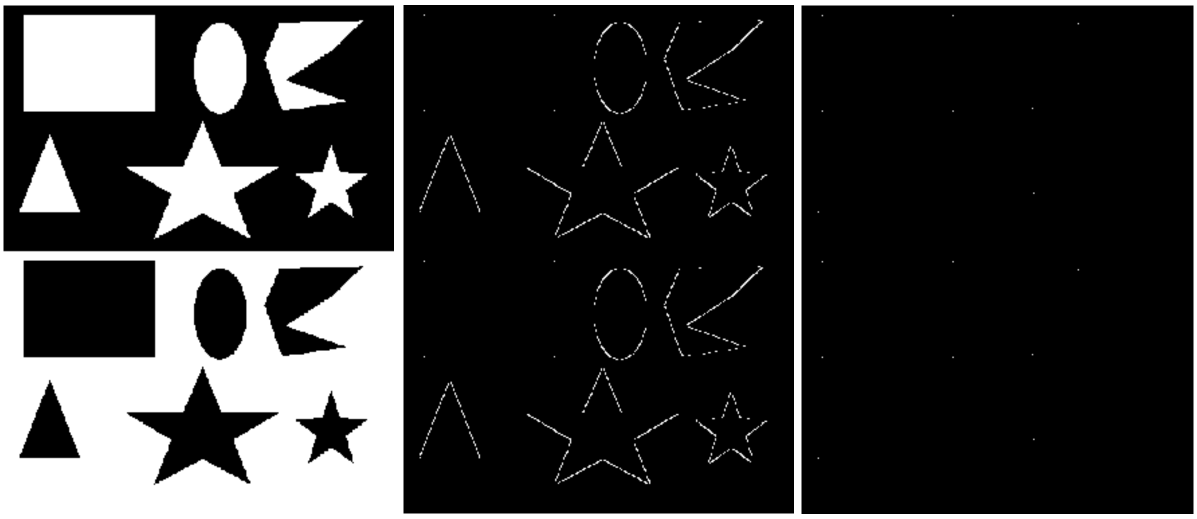


Figure 3: detecting corners, (left) binary image (canter) by soft structure elements (right) by ragged structure

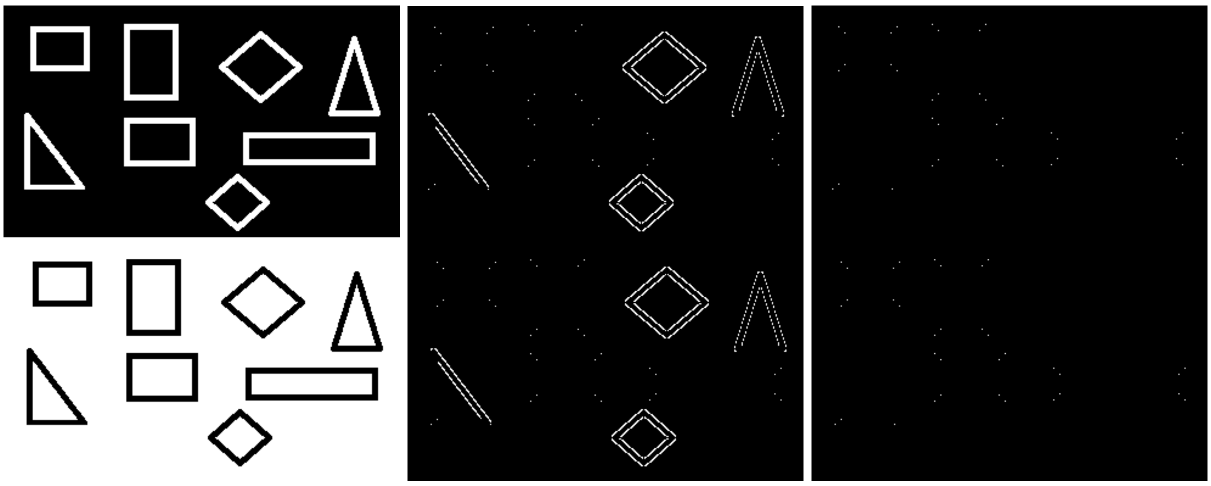


Figure 4: detecting corners, (left) binary image (canter) by soft structure elements (right) by ragged structure

corner, but in fact these points are just uneven contour of objects.

3.2 Ragged corners

As we can see in fig 3, 4, detecting corners by ragged structure elements will result just single points representing conjunction points of two perpendicular line segments. Also there is no sign of detecting uneven contour of objects.

Conclusion

In this task, we have tried two types of structural elements for detecting corners of objects but according to results for corners with different angles it’s obvious that using this method in not useful except in special cases. For detecting various types of corners must employ more complex methods.

References

[1]
https://en.wikipedia.org/wiki/Corner_detection
[2] Wang, Han, and Michael Brady. "Real-time corner detection algorithm for motion estimation." *Image and vision computing* 13.9 (1995): 695-703.
[3] Beus, H. Lynn, and Steven SH Tiu. "An improved corner detection algorithm based on chain-coded plane curves." *Pattern Recognition* 20.3 (1987): 291-296.
[4] Rosten, Edward, and Tom Drummond. "Machine learning for high-speed corner detection." *European conference on computer vision*. Springer Berlin Heidelberg, 2006.
[5] Zhao, Wan-jin, et al. "Adaptive Harris corner detection algorithm." *Computer Engineering* 10.5 (2008): 212-215.