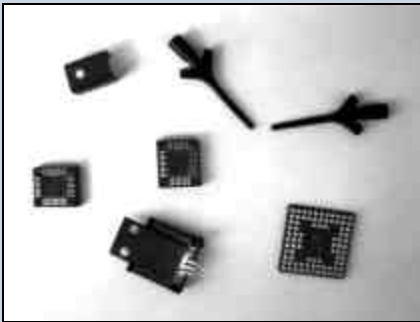
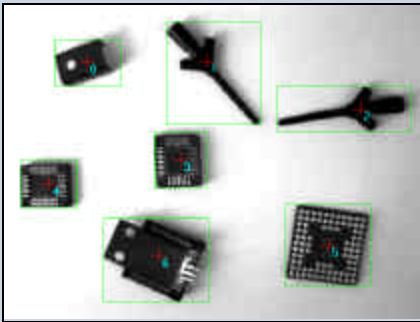
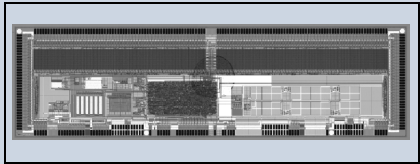
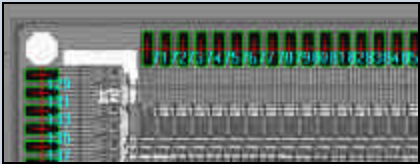
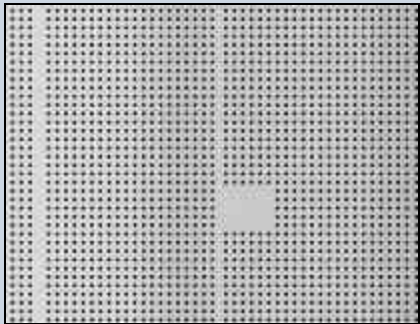
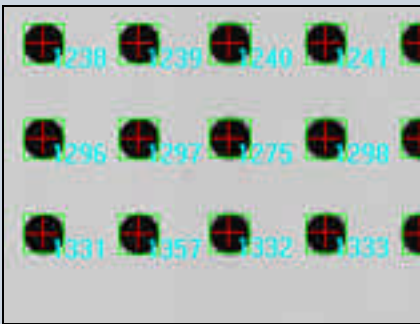


Sapera Processing 5.1: Blob Tool

This report benchmarks the performance of Coreco Imaging's Sapera Processing (V. 5.1) Blob tool. The tests were run on an Intel® Pentium® 4, 2.2GHz processor with 512MB of memory (DDR 333 and running Windows 2000® operating system.

Reference Image	Blob Analysis Results	
		<p>Name: components.bmp Type: Gray scale - 8bit Size: 640x480 pixels</p>
		<p>Name: ic.bmp Type: Gray scale - 8bit Size: 2863x837 pixels</p>
		<p>Name: bga.bmp Type: Gray scale - 8bit Size: 3371x3437 pixels</p>

The Tests

Test 1:

Basic features calculation

The reference image is thresholded. Blobs are extracted from the binarized image. All basic blob features are calculated and blob areas smaller than 100 pixels are removed. The basic calculation includes such features as area, bounding box location and size, centroid, raw perimeter length, number of holes, form factor (ratio of area to the square of perimeter), and elongation.

Test 2:

Moments related features calculation

All the steps corresponding to Test 1, plus, calculation of moments related blob features. The moments features calculation includes all basic features and others such as best-fitting ellipse, ratio of best-fitting ellipse axes, orientation, and roundness.

Test 3:

Perimeter related features calculation

All the steps corresponding to Test 2, plus, perimeter related blob features are calculated. The perimeter features calculation includes all moments features and others such as perimeter points co-ordinates (blob's boundary and holes), and filled area.

Test 4:

Convexity related features calculation

All the steps corresponding to Test 1, plus, convexity related blob features are calculated, with the number of Feret angles set to 30. The convexity features calculation includes all basic features and others such as convex area, minimum bounding box location, size and orientation, minimum, mean, maximum Feret diameters and corresponding angles, convexity (ratio of convex perimeter to raw perimeter), and solidity (ratio of net area to convex area).

Test 5:

Gray scale features calculation

All the steps corresponding to Test 1, plus, gray scale blob features are calculated. The gray scale features calculation includes all basic features and others such as minimum/maximum standard deviation of all pixels of the blob, and gray scale centroid.

The Results

The table below shows the results of all the tests:

Test#	Description	Blobs found	Execution time	
			Global fixed threshold	Global adaptive threshold
(dark blobs on light background)				
Reference Image: components.bmp ⁽¹⁾				
1	Image thresholding and Basic features calculation	7 (13% of image area)	1.12ms	1.23ms
2	Image thresholding and Moments features calculation	7 (13% of image area)	1.13ms	1.25ms
3	Image thresholding and Basic features calculation	7 (13% of image area)	3.19ms	3.30ms
4	Image thresholding and Convexity features calculation	7 (13% of image area)	3.78ms	3.89ms
5	Image thresholding and Gray scale features calculation	7 (13% of image area)	1.93ms	2.05ms
Reference Image: ic.bmp ⁽²⁾				
1	Image thresholding and Basic features calculation	323 (6% of image area)	10.54ms	14.08ms
2	Image thresholding and Moments features calculation	323 (6% of image area)	10.72ms	14.17ms
3	Image thresholding and Basic features calculation	323 (6% of image area)	26.42ms	30.12ms
4	Image thresholding and Convexity features calculation	323 (6% of image area)	44.63ms	48.04ms
5	Image thresholding and Gray scale features calculation	323 (6% of image area)	23.42ms	27.14ms
Reference Image: bga.bmp ⁽¹⁾				
1	Image thresholding and Basic features calculation	2983 (13% of image area)	44.86ms	61.18ms
2	Image thresholding and Moments features calculation	2983 (13% of image area)	45.74ms	62.07ms
3	Image thresholding and Basic features calculation	2983 (13% of image area)	106.09ms	120.71ms
4	Image thresholding and Convexity features calculation	2983 (13% of image area)	341.06ms	351.97ms
5	Image thresholding and Gray scale features calculation	2983 (13% of image area)	114.15ms	129.18ms

Note

- The default parameters were used for the image thresholding
- Global Fixed Threshold Value: 30
Global Adaptive Threshold Lower Offset Value: - 0.8

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