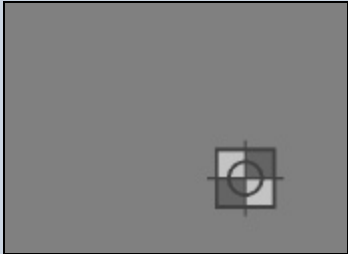
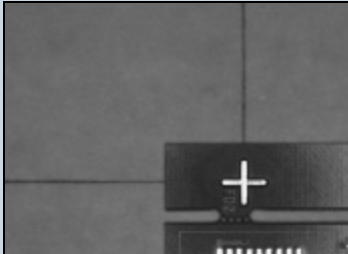



Sapera Processing 5: The Search Tool

Below are the results of tests run on the Search Tool for area-based (correlation) and edge-based search methods. The tests were run on a P4 2.2GHz with 512MB of memory and running the Windows XP operating system.

Reference	Template Image
	Name: Fiducial ROI from reference image: (260, 180, 380, 300) => size 120 x 120
	Name: Cross ROI from reference image: (280, 200, 360, 280) => size 80 x 80
	Name: Bracket ROI from reference image: (140, 110, 420, 320) => size 280 x 210

The Tests

Test 1:

Horizontal shifting

The reference image is horizontally shifted by an amount of 0.007 pixel on a width of 4 pixels (approx. 550 steps). We measure the execution time and the horizontal accuracy.

Test 2:

Vertical shifting

The reference image is vertically shifted by an amount of 0.007 pixel on a height of 4 pixels (approx. 550 steps). We measure the execution time and the vertical accuracy.

Test 3:

Horizontal/vertical shifting

The reference image is horizontally and vertically shifted by an amount of 0.17 pixel on a square of 4 x 4 pixels (approx. 550 steps). We measure the execution time and the accuracy in both axes.

Test 4:

Horizontal/vertical shifting and rotation

The reference image is shifted as in test 3 and then rotated by an amount of 0.11 degree each step. The rotation range is -30 to 30 degrees. We measure the execution time and the accuracy in any directions.

Test 5:

Horizontal/vertical shifting and rotation and scaling

The reference image is horizontally shifted by an amount of 0.007 pixel on a width of 4 pixels (approx. 550 steps). We measure the execution time and the horizontal accuracy.

The Results

The table below shows the results of all the tests for both the area-based (correlation) and edge-based (geometric) search methods.

Test	Area Search			Edge Search		
	Fiducial	Cross	Bracket	Fiducial	Cross	Bracket
1	X: 0.036 (4.81ms)	X: 0.018 (4.51ms)	X: 0.027 (15.3ms)	X: 0.021 (6.81ms)	X: 0.027 (12.8ms)	X: 0.030 (6.05ms)
2	Y: 0.030 (4.81ms)	Y: 0.021 (4.53ms)	Y: 0.033 (15.3ms)	Y: 0.021 (6.77ms)	Y: 0.072 12.8ms	Y: 0.30 (5.95ms)
3	X: 0.042 Y: 0.033 (4.73ms)	X: 0.039 Y: 0.024 (4.37ms)	X: 0.042 Y: 0.036 (15.6ms)	X: 0.021 Y: 0.021 (6.84ms)	X: 0.024 Y: 0.069 (13.1ms)	X: 0.030 Y: 0.027 (6.07ms)
4	X: 0.036 Y: 0.024 A: 0.444 (34.2ms)	X: 0.042 Y: 0.027 A: 0.465 (51.77ms)	X: 0.084 Y: 0.330 A: 0.441 (161ms)	X: 0.282 Y: 0.165 A: 0.012 (8.39ms)	X: 0.273 Y: 0.138 A: 0.030 (18.9ms)	X: 0.270 Y: 0.171 A: 0.015 (7.73ms)
5	X: 0.120 Y: 0.105 A: 3.006 S: 0.036 (461ms)	X: 0.072 Y: 0.048 A: 2.97 S: 0.033 (433ms)	X: 1.29 Y: 0.681 A: 3.057 S: 0.036 (2152ms)	X: 0.222 Y: 0.228 A: 3.087 S: 0.030 (10.2ms)	X: 0.210 Y: 0.189 A: 3.072 S: 0.030 (31.0ms)	X: 0.204 Y: 0.234 A: 3.084 S: 0.030 (12.6ms)

Note 1

The values (X, Y, A and S) represent the accuracy of the horizontal position, vertical position, angle and scale respectively. The accuracy is calculated as 3 sigmas (three times the standard deviation).

Note 2

The values (X, Y, A and S) represent the accuracy of the horizontal position, vertical position, angle and scale respectively. The accuracy is calculated as 3 sigmas (three times the standard deviation).

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