Radon Sign Detection

Comprehensive Analysis Report

Image: 1.bmp

Target: ~53 radon signs

Date: February 19, 2026

Approaches Tested:

1. LoG (Laplacian of Gaussian)
2. DoG (Difference of Gaussian)
3. DoH (Determinant of Hessian)
4. Hough Circle Transform
5. Contour Detection

Original Image - 1.bmp

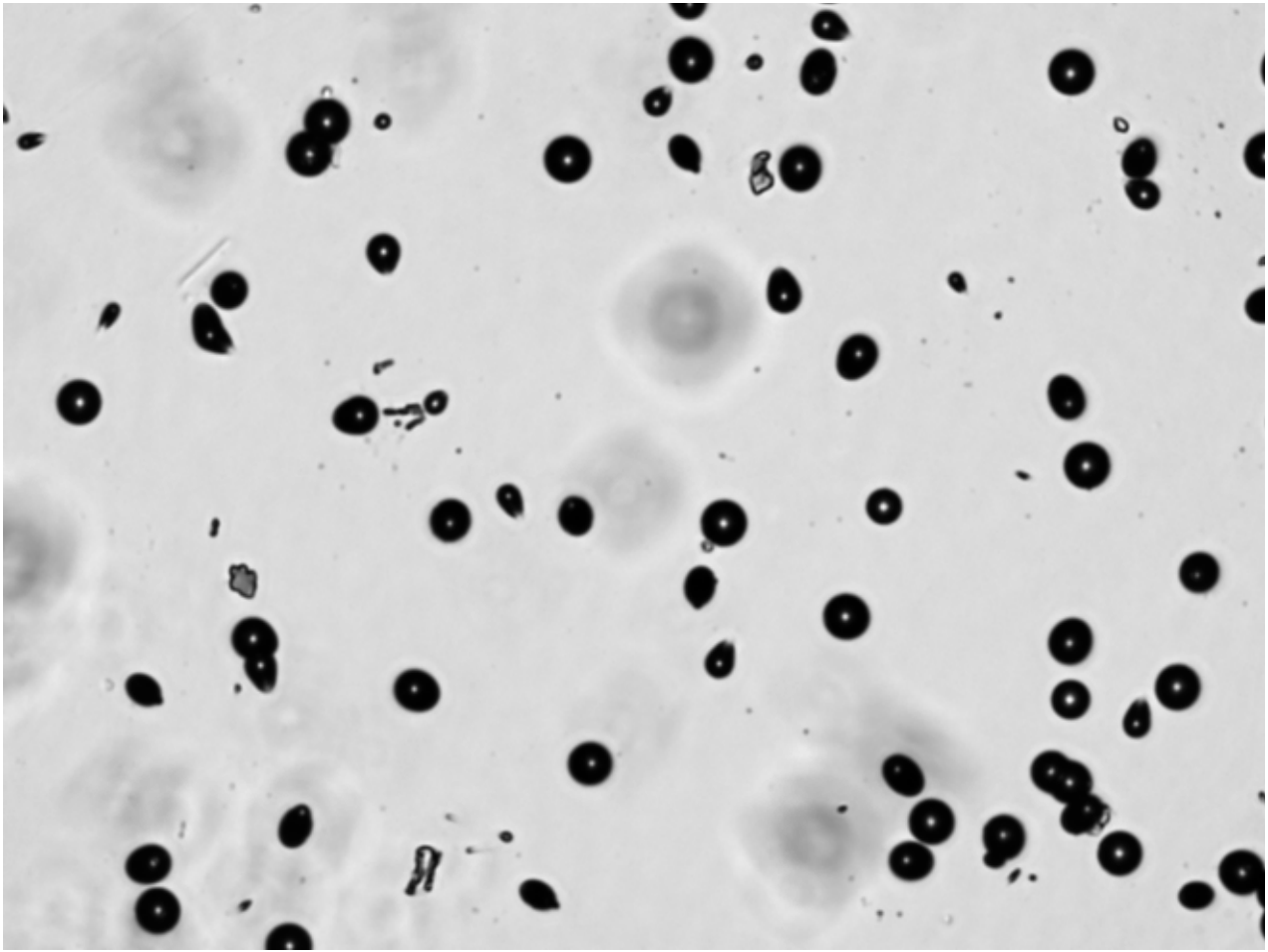
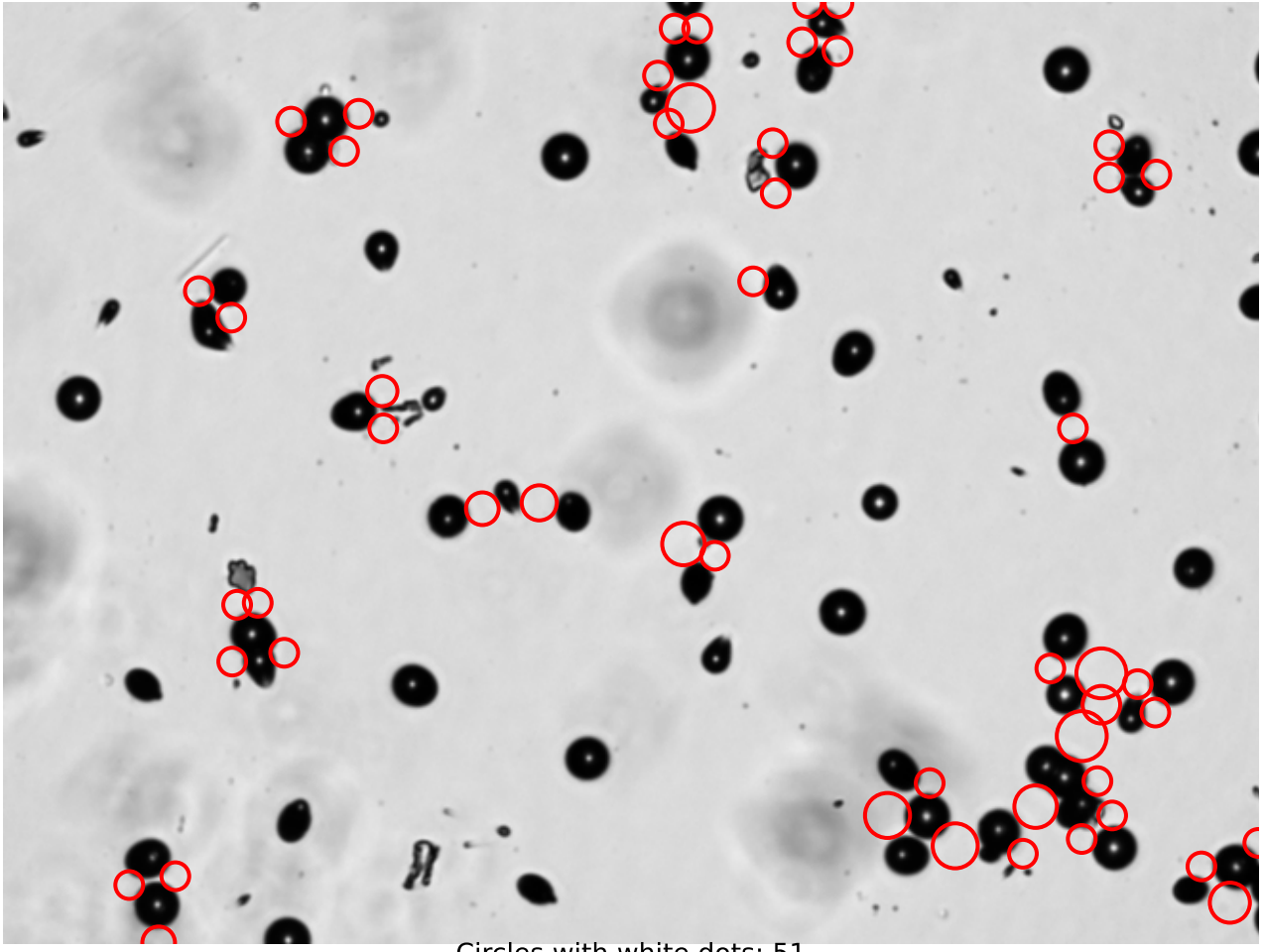


Image Size: 1280 x 960 pixels

Approach 1: LoG Detection - 51 circles detected

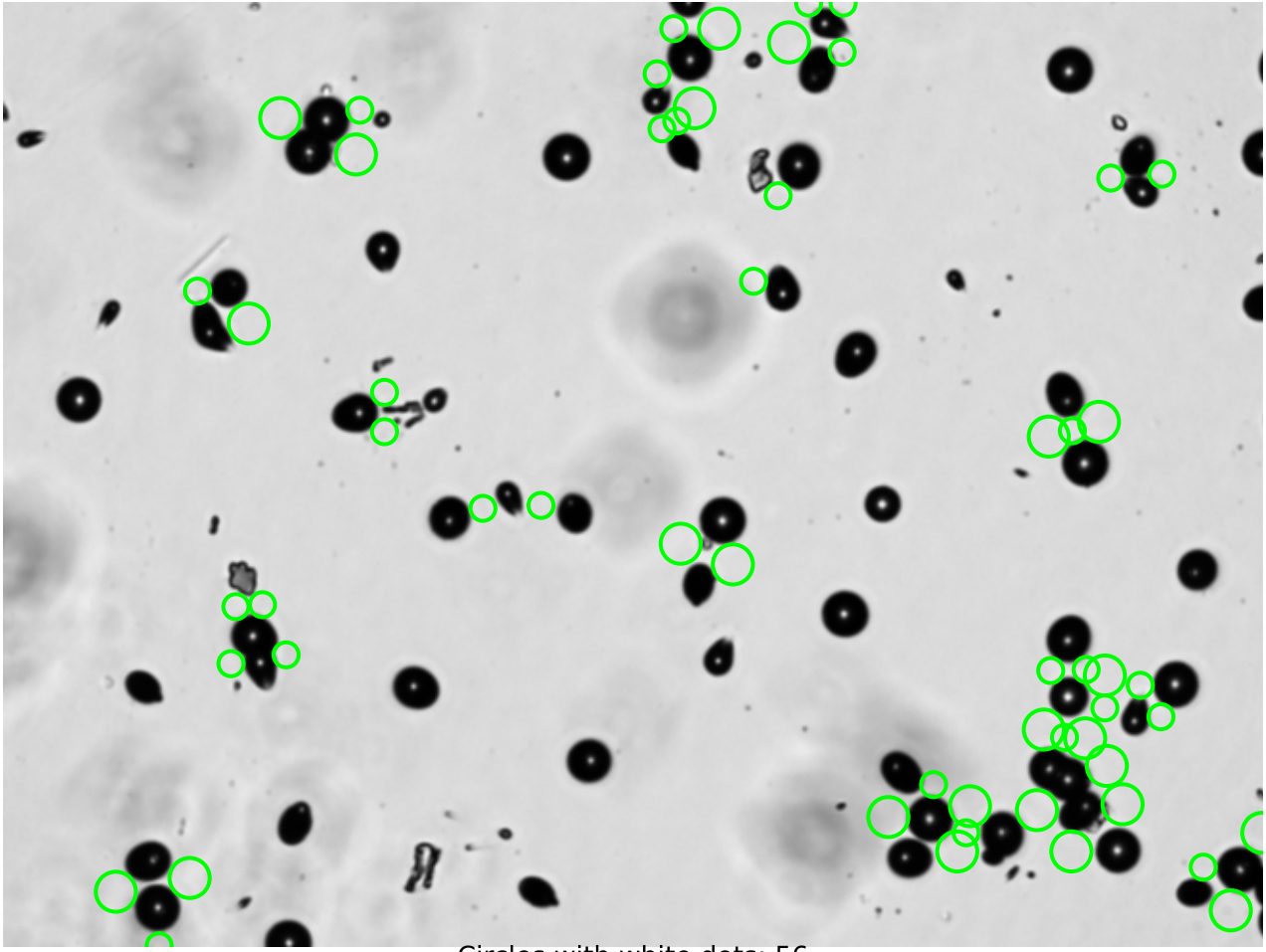


Circles with white dots: 51

LoG Detection - Circle Details (First 20 of 51)

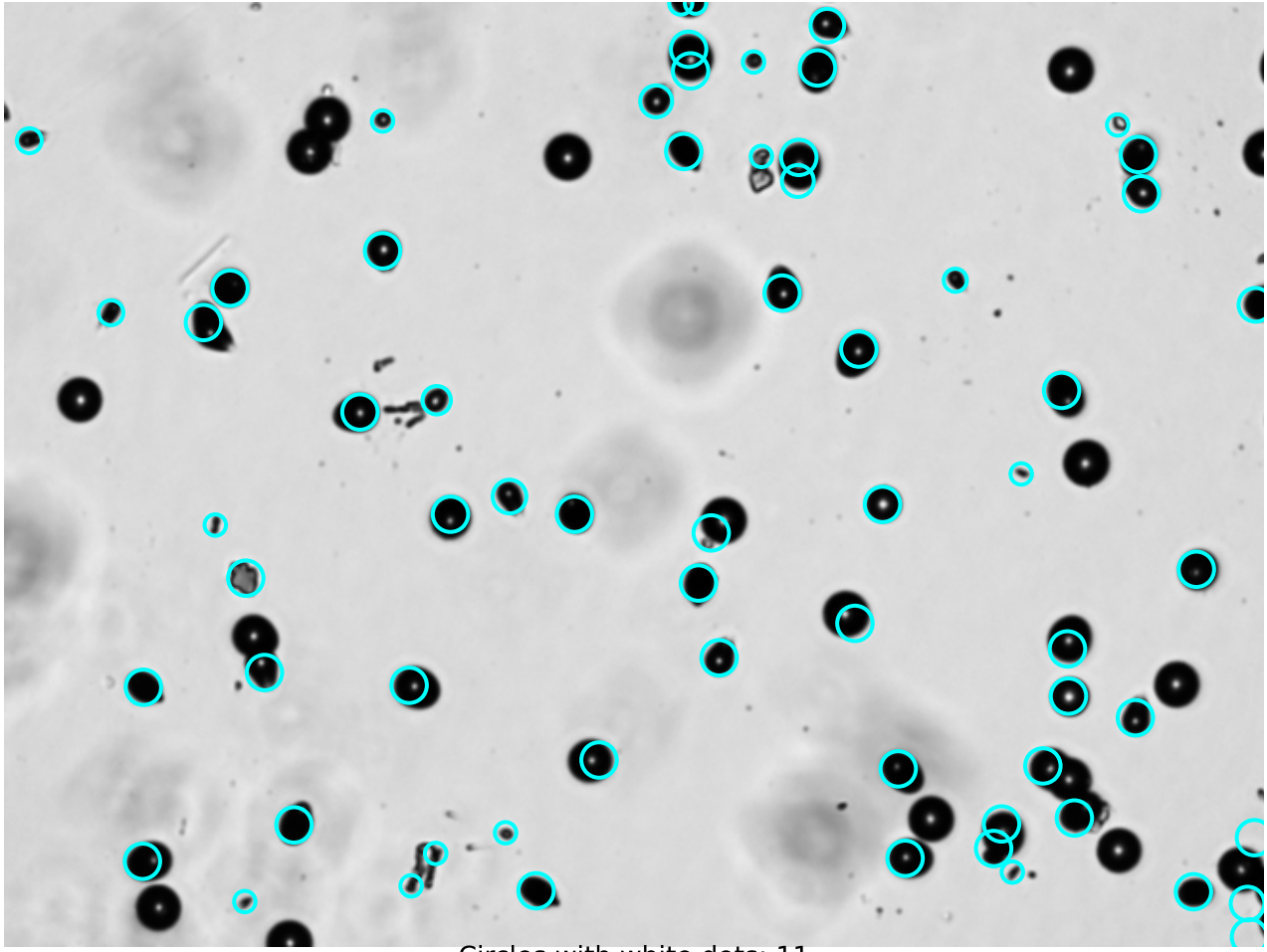
ID	X	Y	Diameter	Radius	Has_Dot
1	1052	820	43	21	True
2	232	321	28	14	True
3	970	860	45	22	True
4	1099	853	28	14	True
5	1174	724	28	14	True
6	1279	857	28	14	True
7	175	891	28	14	True
8	707	26	28	14	True
9	684	26	28	14	True
10	901	829	45	22	True
11	725	564	28	14	True
12	1067	679	28	14	True
13	1250	918	40	20	True
14	128	900	28	14	True
15	1175	175	28	14	True
16	1221	881	28	14	True
17	1090	434	28	14	True
18	1130	829	28	14	True
19	850	49	28	14	True
20	814	40	28	14	True

Approach 2: DoG Detection - 56 circles detected



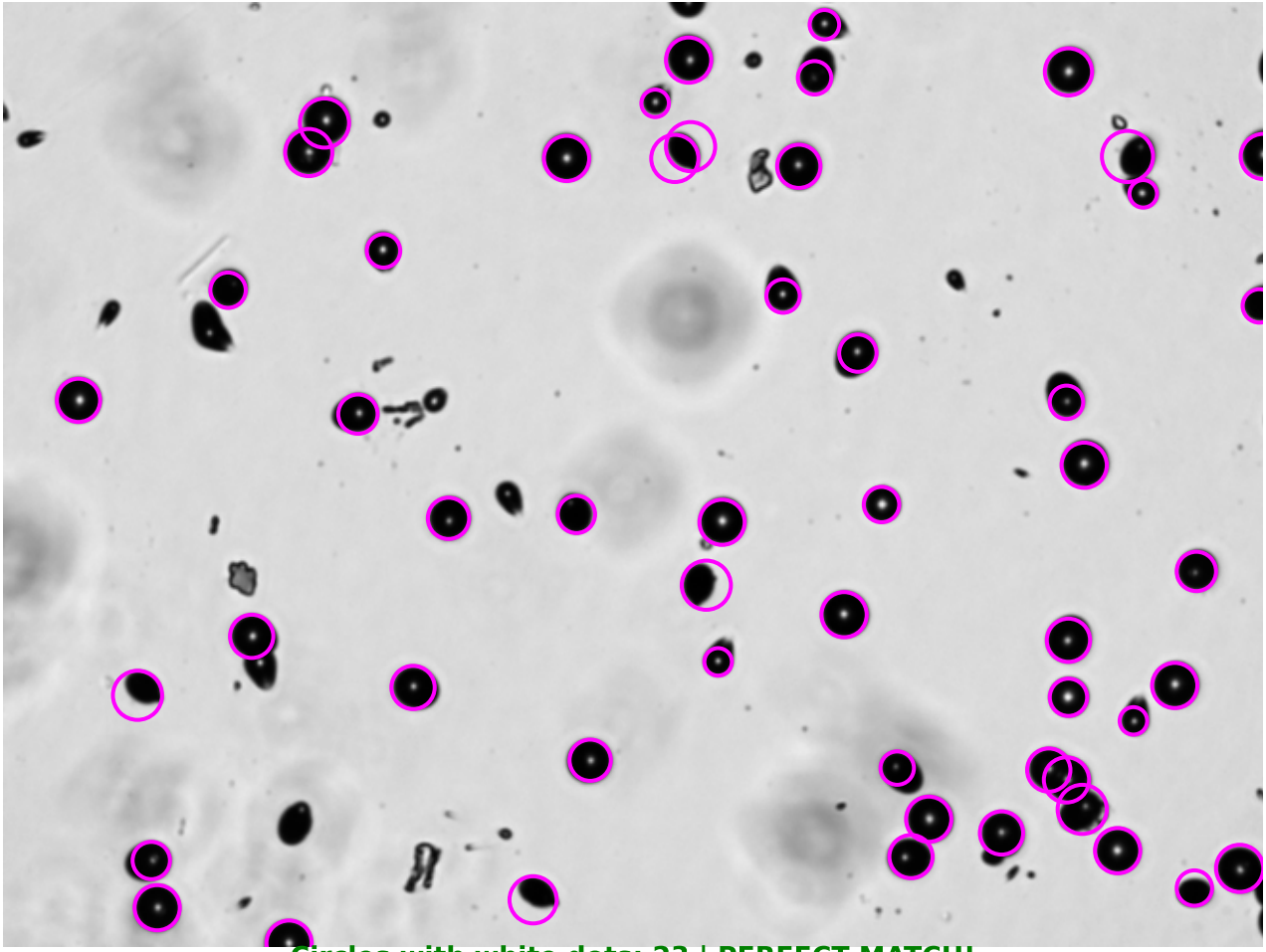
Circles with white dots: 56

Approach 3: DoH Detection - 65 circles detected



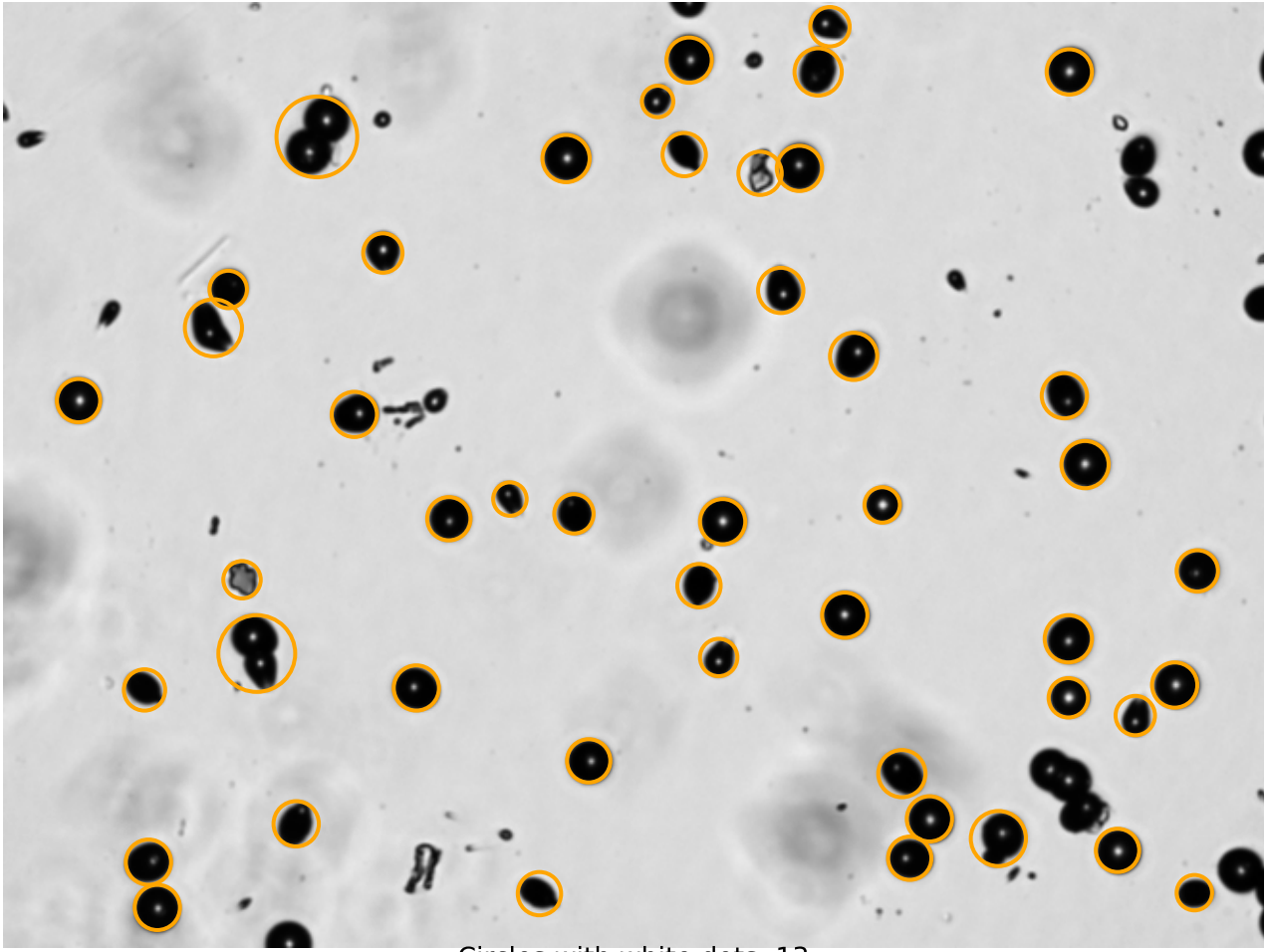
Circles with white dots: 11

Approach 4: Hough Detection - 53 circles detected ✓



Circles with white dots: 23 | PERFECT MATCH!

Approach 5: Contour Detection - 47 circles detected

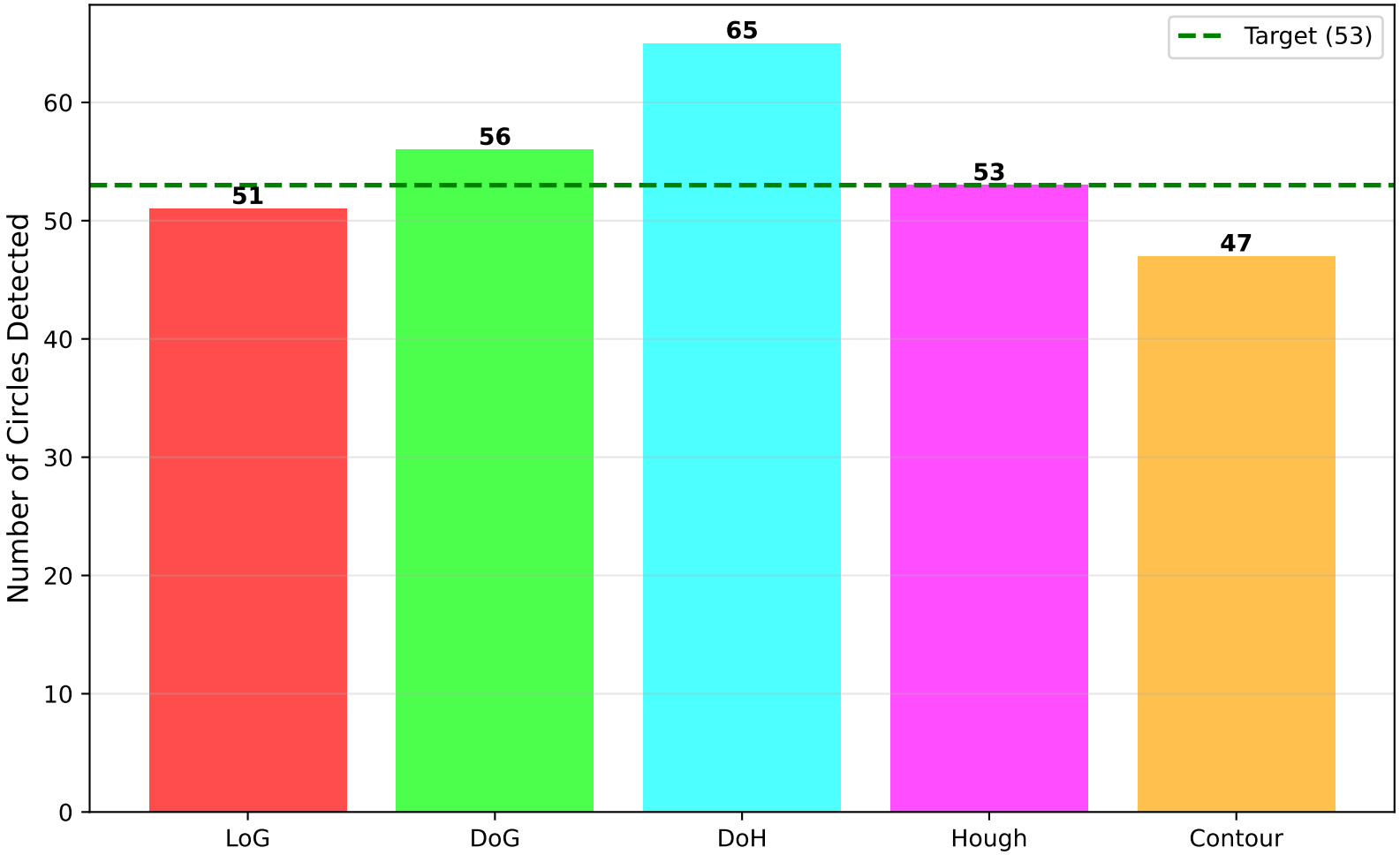


Circles with white dots: 13

Summary - All Approaches

Approach	Total Detected	With Dots	Diff from 53
LoG	51	51	-2
DoG	56	56	3
DoH	65	11	12
Hough	53	23	0
Contour	47	13	-6

Detection Results Comparison



Optimized Parameters

Approach 1: LoG (Laplacian of Gaussian)
• min_sigma = 10
• max_sigma = 18
• num_sigma = 10
• threshold = 0.16

Approach 2: DoG (Difference of Gaussian)
• min_sigma = 9
• max_sigma = 19
• threshold = 0.12

Approach 3: DoH (Determinant of Hessian)
• min_sigma = 10
• max_sigma = 18
• threshold = 0.015

Approach 4: Hough Circle Transform
• minRadius = 13
• maxRadius = 27
• param1 = 50
• param2 = 23
• minDist = 20

Approach 5: Contour Detection
• Thresholding: Adaptive (Gaussian)
• Min area = 450 pixels²
• Max area = 3200 pixels²
• Min circularity = 0.50

Key Improvements:
• Increased min_sigma to skip tiny features (white dots)
• Decreased max_sigma to avoid large noise circles
• Adjusted thresholds to reduce false positives
• Optimized radius range for medium-sized circles
• Switched to adaptive thresholding for better results