Camera calibration using adaptive segmentation and ellipse fitting

Authors:
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Input image

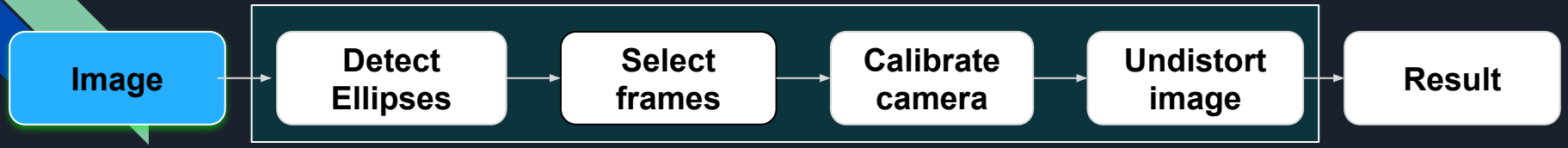
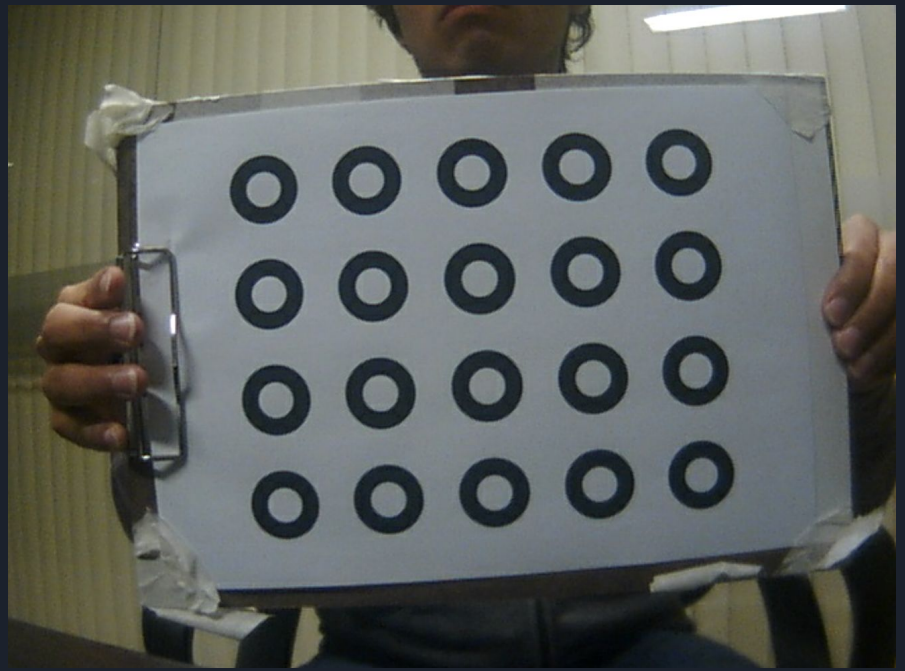
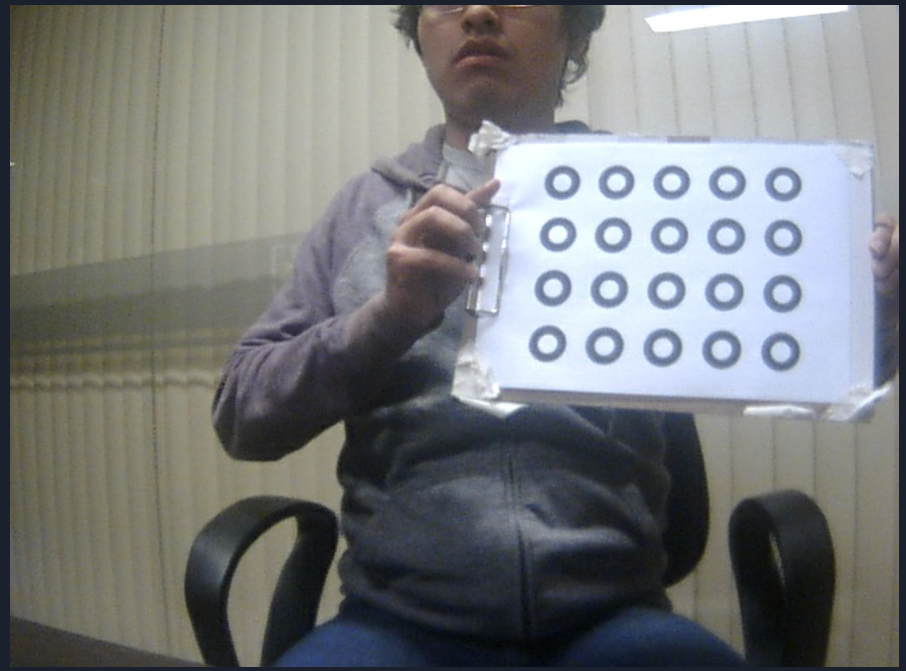


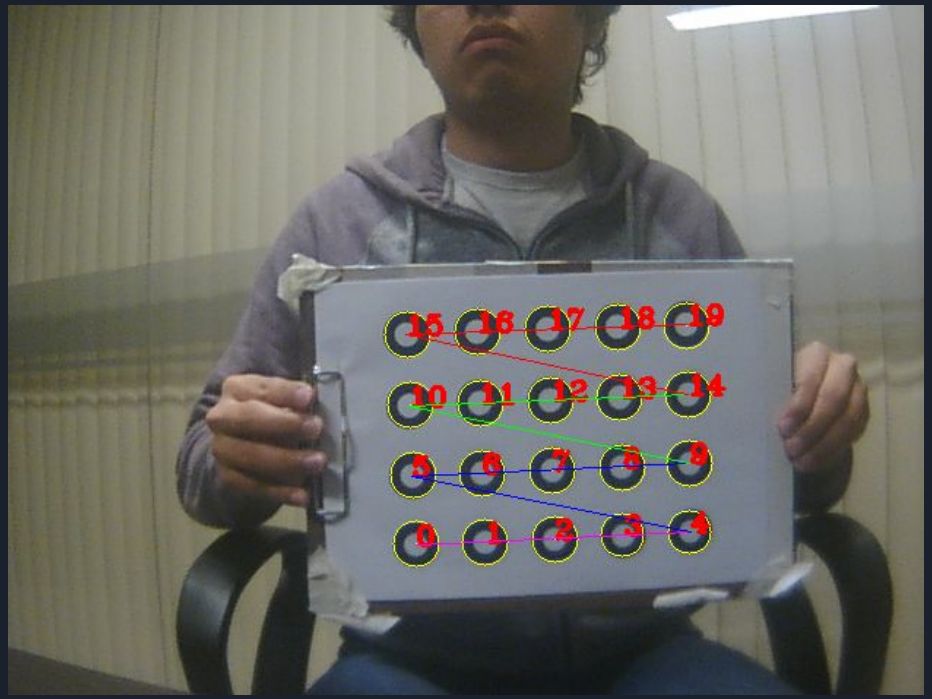
Image
Detect Ellipses
Select frames
Calibrate camera
Undistort image
Result

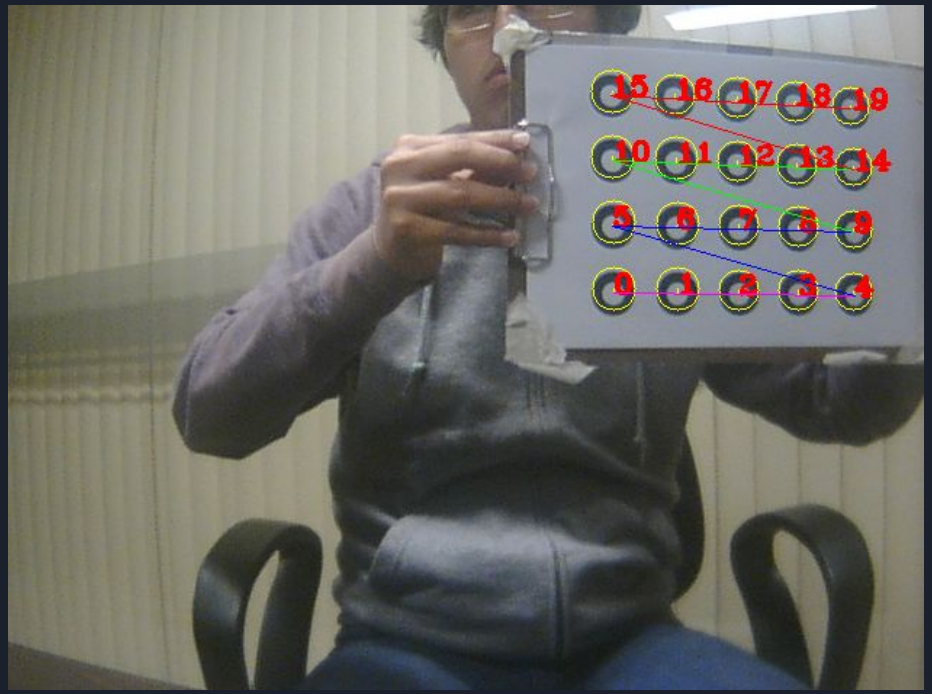




Process

Image → **Detect Ellipses** → Select frames → Calibrate camera → Undistort image → Result





Process

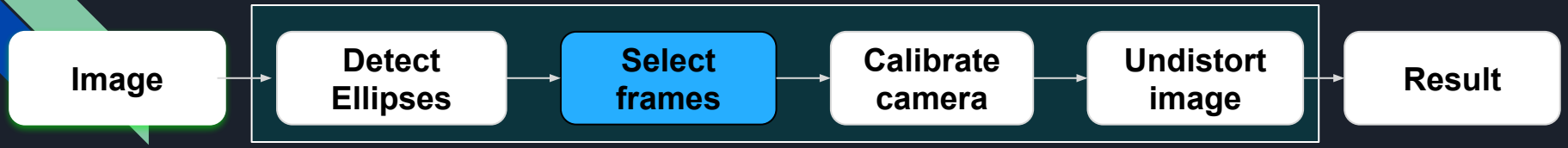
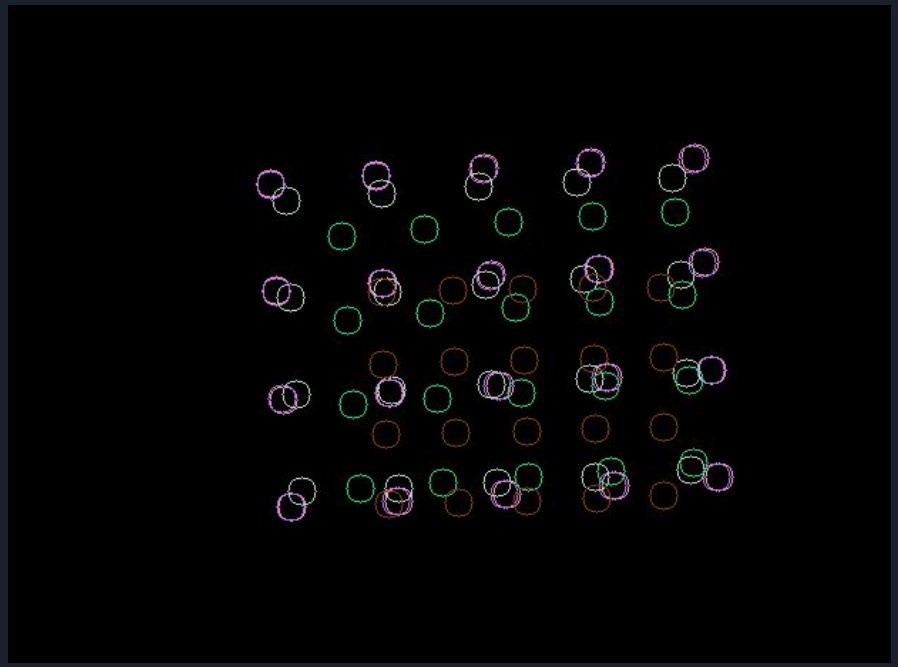
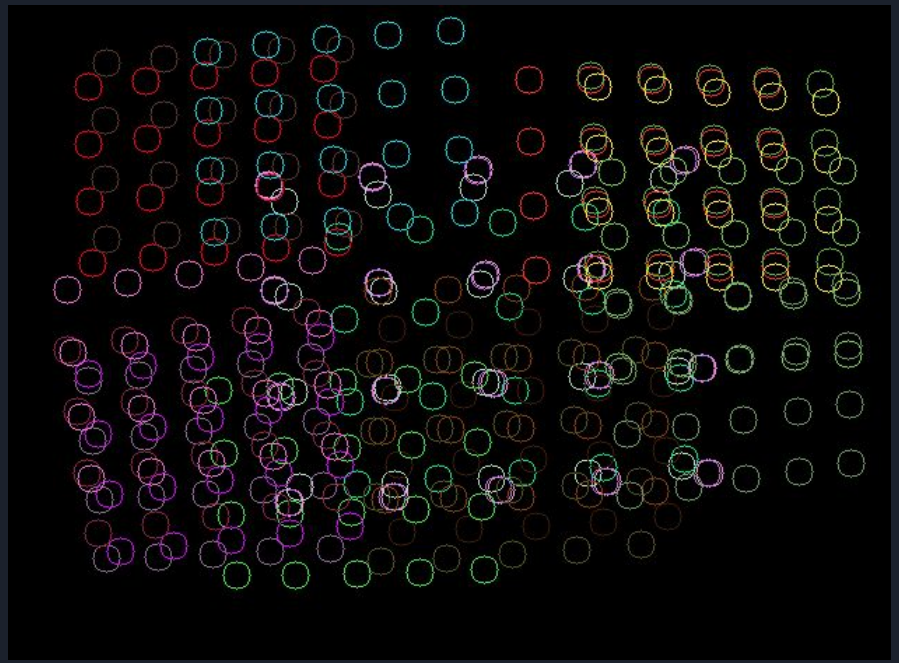


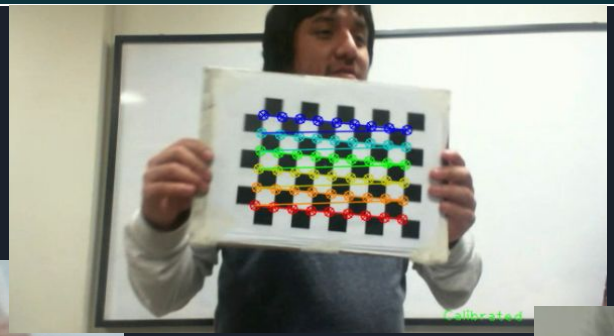
Image
Detect Ellipses
Select frames
Calibrate camera
Undistort image
Result

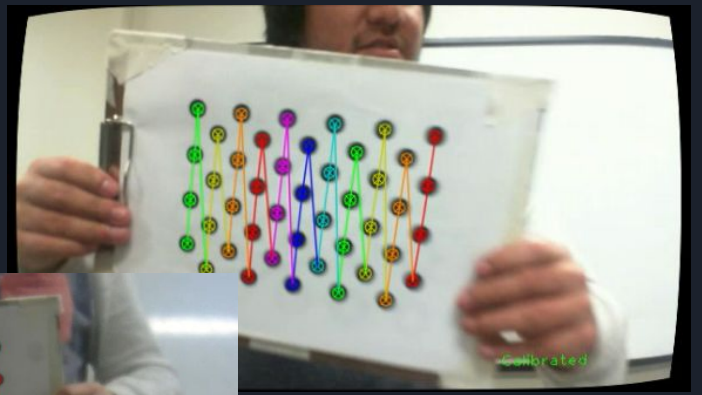


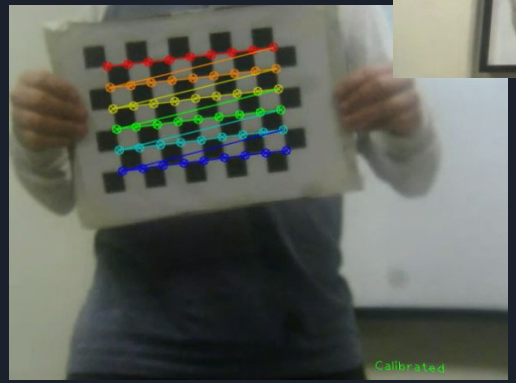


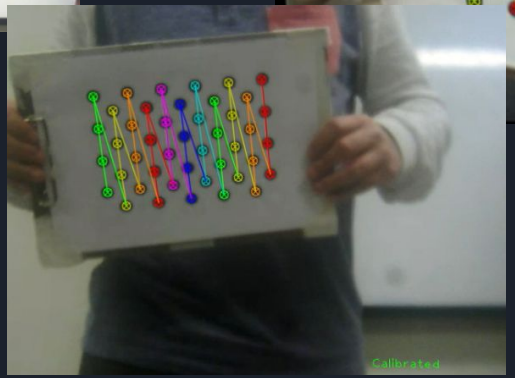
Process

Image → Detect Ellipses → Select frames → **Calibrate camera** → Undistort image → Result



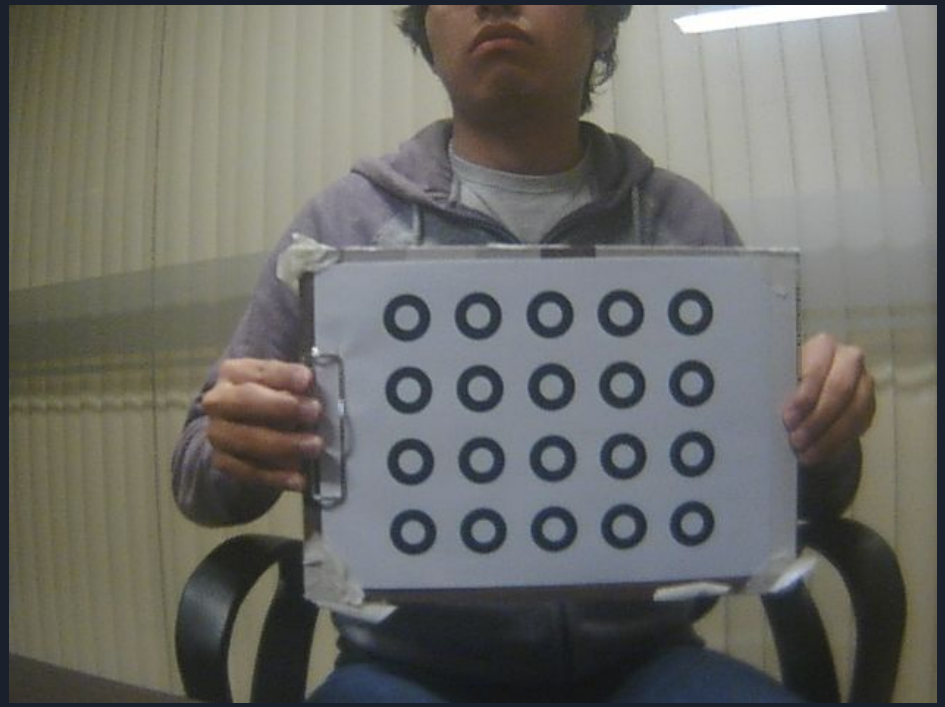




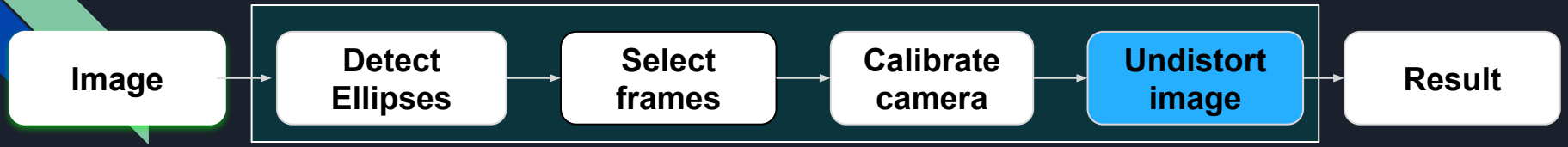


Process

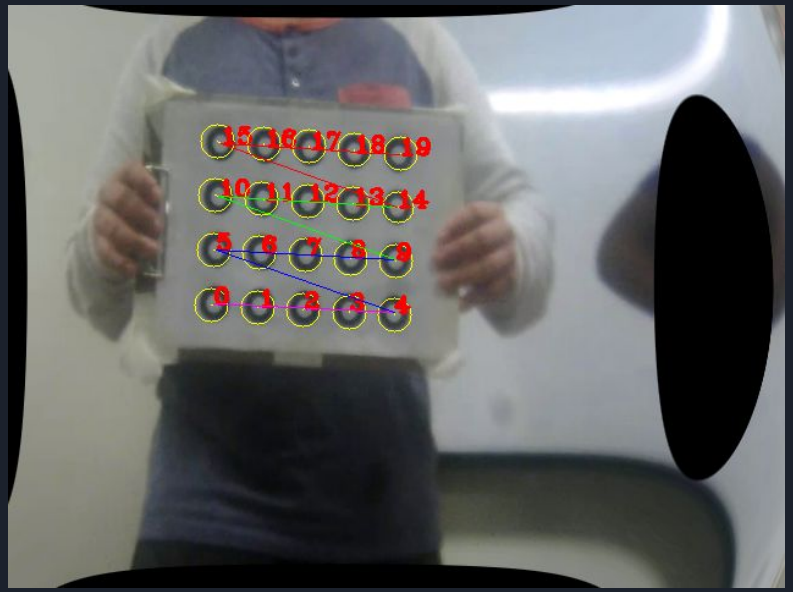
Image → Detect Ellipses → Select frames → Calibrate camera → Undistort image → Result



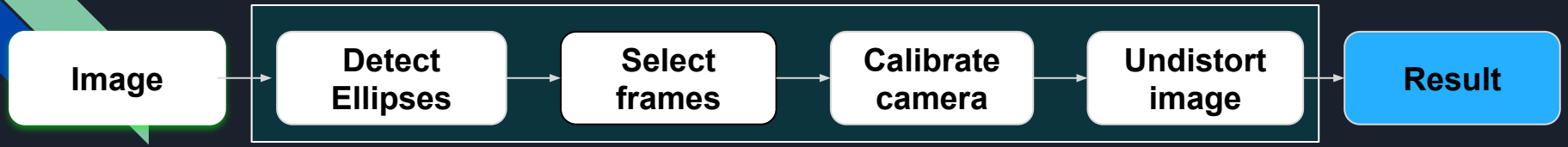
Process



error = 0.364856

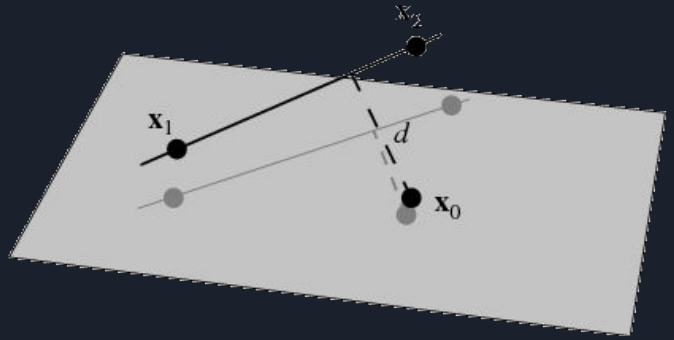


Experiments

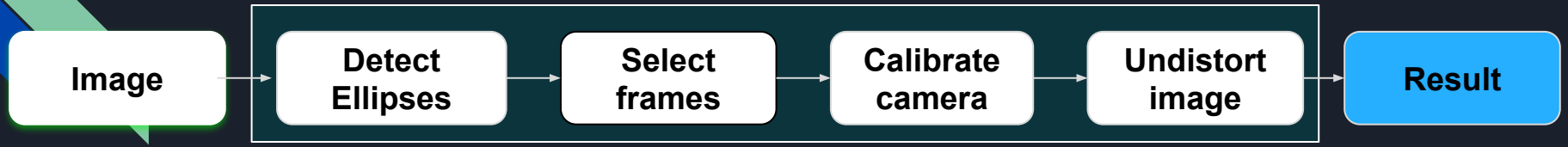


	Average of collinearity	
Center point	Original video	Undistorted video
PS3	0.2946	0.09
LifeCam	0.1193	0.1063

Table 1. Average of collinearity



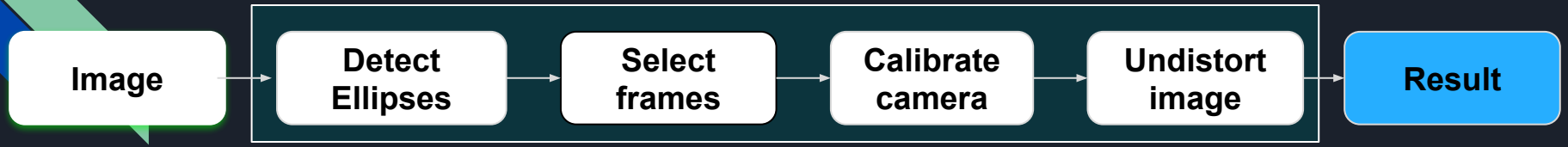
Experiments



Parameter	Chessboard	Circles	Rings
Reprojection e	0.23547	0.1250	0.1346
Focal length x	847.5653	914.8484	842.2776
Focal length y	848.2543	918.5734	845.9872
Optical center x	332.6489	325.1919	306.8028
Optical center y	249.0016	233.0003	258.6146

Table 3. Comparisons of results obtained with chessboard, circles and rings pattern, on the PS3 camera.

Experiments



Parameter	Chessboard	Circles	Rings
Reprojection e	0.8346	0.1707	0.1362
Focal length x	611.1363	637.0749	618.3848
Focal length y	612.7416	640.6737	621.9344
Optical center x	318.4211	351.7642	341.9354
Optical center y	225.0789	229.1633	231.4488

Table 2. Comparisons of results obtained with chessboard, circles and rings pattern, on the LifeCam camera.

Input Videos

1. Circles lifecam : https://drive.google.com/open?id=17EQUnf-3Di3J-PxnmMP-KIY8aNb5STqA
2. Circles ps3 : https://drive.google.com/open?id=1pP0ll2FbwNeLDBwdDu8e28oSHiTtcBVb
3. Chessboard ps3 : https://drive.google.com/open?id=1G2sysbylG299x7crZLz4tAH0YVYV-htp
4. Chessboard lifecam: https://drive.google.com/open?id=1zB15OFQVL_8y5x93QFQ66yk6Hj--ZEnV

Thanks