LDC Debugging Guide

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Revision History

Revision	Date	Description
0.1	2021/07/14	Initial
0.1	2021/07/18	Chapter determination, adding table content
0.1	2021/07/20	Completion of the experimental diagram and content

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2 LDC Function and Specification Description

The Lens Distortion Correction (LDC) system corrects and expands a frame for Barrel Distortion and Pincushion Distortion, correcting the distorted images in both categories.

2.1 Algorithm Specification for Each Processor

If necessary, the reference data should be presented in a table when available.

3 LDC Debugging Guide

3.1 Basic Concept

3.1.1 Field of View

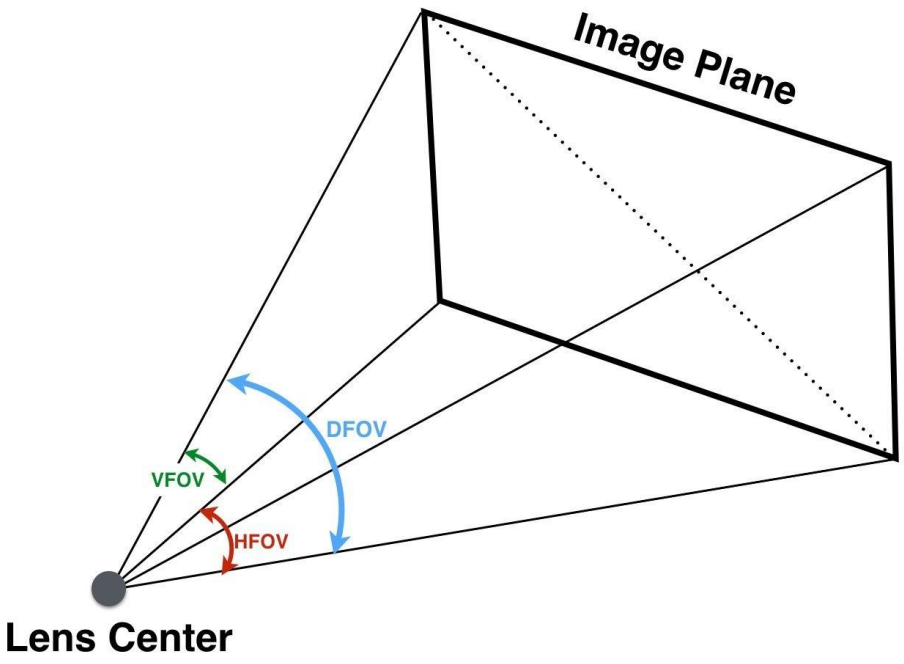


Fig. 3.1: horizontal field of view, vertical field of view, diagonal field of view

3.2 Debugging Guide for Each Application Scenario Parameter

3.2.1 LDC

Table 3.1: LDC Parameter Configuration Table

Configuration Parameter	Configuration Range	Parameter Meaning
CenterXOffset	-511~+511	Horizontal offset of the image center point from the physical center point
CenterYOffset	-511~+511	Vertical offset of the image center point from the physical center point
DistortionRatio	[-300,500]	Correction strength, negative numbers for pincushion type, positive numbers for barrel type
bAspect	bool	Whether the aspect ratio is maintained during the field of view adjustment
XYRatio	0~100	Parameter for field of view size, valid when bAspect=1
XRatio	0~100	X-directional field of view size parameter, valid when bAspect=0
YRatio	0~100	Y-directional field of view size parameter, valid when bAspect=0
stGridInfoAttr	/	GridInfo parameter

Table 3.2: GridInfoAttr' s configure parameters

Configure Parameters	Configuration Range	Parameter Significance
bEnable	bool	Whether to enable GridInfo.
gridFileName	/	GridInfo file name.
gridBindName	/	GridInfo binding name.
isBlending	bool	Not used at the moment.
bEISEnable	bool	Not used at the moment.
homoRgnNum	/	Not used at the moment.

3.2.2 LDC Correction Model

LDC supports two correction modes, barrel distortion and pincushion distortion, as shown in Fig. 3.2 and Fig. 3.4 .

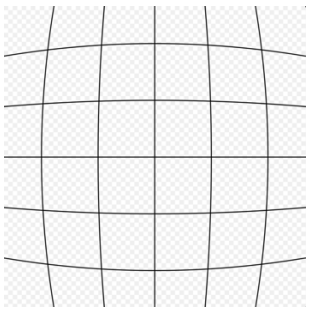


Fig. 3.2: Barrel Distortion

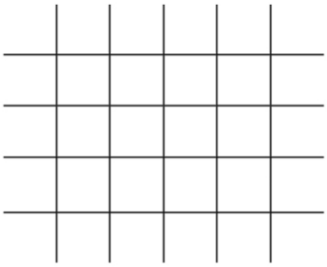


Fig. 3.3: Without Distortion

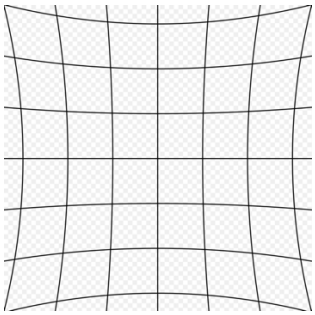
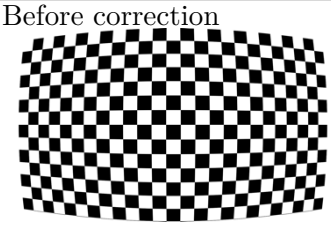
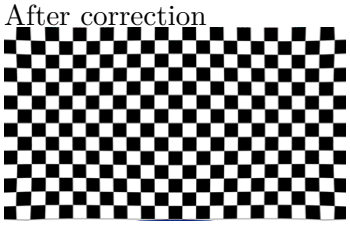
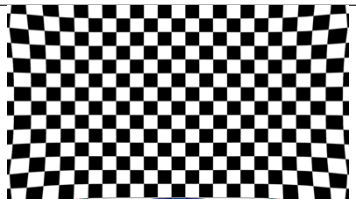
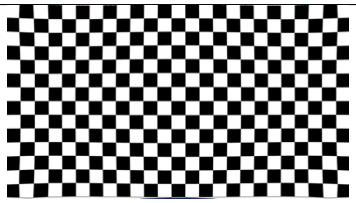
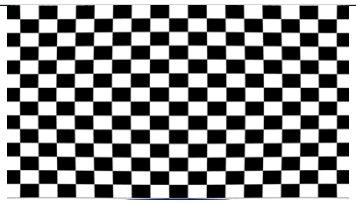
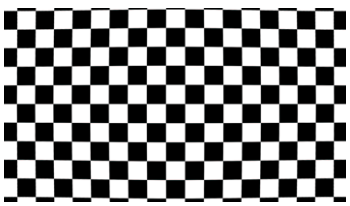


Fig. 3.4: Pincushion Distortion

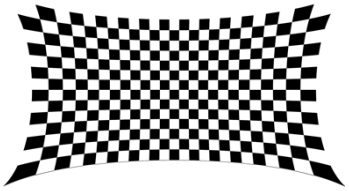
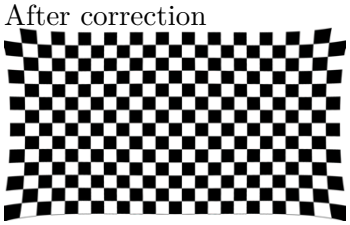
3.2.2.1 Example of Correction of Barrel Distortion

Table 3.3: Instructions for correction of barrel distortion

Parameter Description	Parameter Configuration	Image Examples
Typical Configuration Distortion center overlaps with image center Maintain the aspect ratio Maintain the maximum field of view	Width=1920 Height=1080 OutWidth=1920 OutHeight=1080 CenterXOffset/CenterYOffset=0 DistortionRatio=-165 bAspect=1 XYRatio=100 XRatio=100 YRatio=100	Before correction  After correction 
Ratio: Correction strength A higher value indicates a lower correction strength	DistortionRatio=-205	
bAspect: Whether to maintain the aspect ratio 1: Maintain the aspect ratio 0: Do not maintain the aspect ratio and retain the maximum field of view	bAspect=0 DistortionRatio=-165	
bAspect=0, XRatio, YRatio XRatio: Horizontal field of view reservation magnitude YRatio: Vertical field of view reservation magnitude bAspect=1: Enable XYRatio XYRatio: The field of view reservation magnitude in scene where the aspect ratio is maintained Note: 100 is the maximum field	bAspect=0, XRatio=20 bAspect=1, XRatio=20	 
of view retained, 0 is 2/3 of the maximum field of view retained		

3.2.2.2 Example of Correction of Pincushion Distortion

Table 3.4: Instructions for correction of pincushion distortion

Parameter Description	Parameter Configuration	Image Examples
Typical Configuration Distortion center overlaps with image center Maintain the aspect ratio Maintain the maximum field of view	Width=1920 Height=1080 OutWidth=1920 OutHeight=1080 CenterXOffset/CenterYOffset=0 DistortionRatio=500 bAspect=1 XYRatio=100 XRatio=100 YRatio=100	Before correction  After correction 

3.2.3 Free Angle Rotation

Table 3.5: Configuration of Free Angle Rotation

Configuration Parameter	Configuration Range	Parameter Meaning
CenterXOffset	-511~+511	Horizontal offset of the center of rotation from the center of the image
CenterYOffset	-511~+511	Vertical offset of the center of rotation from the center of the image
OutWidth	480~8192	Width of the output image
OutHeight	360~8192	Height of the output image

3.2.4 Data Flow Chart

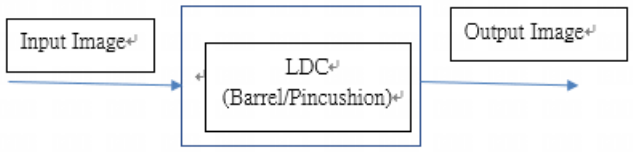


Fig. 3.5: LDC (Lens Distortion Correction flowchart)

4 Calibration Tool

4.1 Instruction

Please refer to the PQ tool to make online adjustments to obtain the best model parameters.