

AuvizCV Datasheet

Middleware FPGA IP for Computer Vision



AuvizCV is OpenCV for Xilinx FPGAs. Available in different performance levels, our Middleware IP is scalable to fit your application. The APIs for AuvizCV functions are consistent with OpenCV to enable an easy fit into your use model. Moreover, the IP can be used on a wide range of Xilinx devices from Internet Of Things applications using Zynq to data center applications using Virtex-7 including Ultrascale and Ultrascale+ devices.

Target Markets & Applications

Auviz IP is suitable for a wide range of markets spanning the breadth of embedded applications as well as the data center. Our IP serves as key building blocks in a wide variety of systems.

Supported Architectures - Xilinx Series 7 FPGAs, Ultrascale and Ultrascale+.

Performance

AuvizCV functions are available at different performance levels to suit the application needs. The implementations supports 1-pixel parallel and 8-pixel parallel implementations at different clock speeds going all the way up to 300 MHz. AuvizCV functions can be used for various frame sizes up to 8K.

Tool Flow

The following tool flows are supported:

- Vivado HLS
- Xilinx SDSoC
- Xilinx SDAccel

Availability

AuvizCV is available now in three different categories, ranging in complexity from basic to advanced. AuvizCV is licensed in different configurations, for development & for deployment.

AuvizCV - category 1	
absdiff	Inverse
accumulate	multiply
accumulateSquared	sqrt
accumulateWeighted	merge
atan2	split
add	cvtColor
subtract	convertTo
bitwise_and	phase
bitwise_not	calcHist
bitwise_or	minMaxLoc
bitwise_xor	meanStdDev
magnitude	LookUpTable
integral	thresholding
AuvizCV - category 2	
boxFilter	canny
bilateralFilter	equalizeHist
dilate	FAST
erode	cornerHarris
gaussianBlur	buildPyramid
medianBlur	remap
scharr	resize
sobel	warpAffine
	warpPerspective
AuvizCV - category 3	
HOG	OpticalFlowLK
MST	SVM
ORB	OTSU

About us

Auviz Systems provides Middleware IP for the Data Center and Internet of Things. Auviz Systems empowers software and hardware developers through IP and custom services to integrate IP with customer designs. Auviz IP delivers higher performance, greater productivity with targeted performance optimizations.

AuvizCV, Category 1					
Function Type	OpenCV function	Equivalent AuvizCV function	Max F (Mhz)	Latency (ms), Full HD	
Computations	absdiff	auAbsDiff	300	0.87	
	accumulate	auAccumulateImage	300	1.73	
	accumulateSquared	auAccumulateSquared	300	1.73	
	accumulateWeighted	auAccumulateWeighted	300	1.73	
	Atan2	auAtan2LookupFP	200	29 CYCLES	
	add	auAdd	300	0.87	
	subtract	auSub	300	0.87	
	bitwise_and	auBitwiseAND	300	0.87	
	bitwise_not	auBitwiseNOT	200	1.3	
	bitwise_or	auBitwiseOR	300	0.87	
	bitwise_xor	auBitwiseXOR	300	0.87	
	magnitude	auMagnitude	300	1.73	
	integral	auIntegralImage	100	10.38	
	Inverse	auInverse	200	10 CYCLES	
	multiply	auMul	300	0.9	
	sqrt	auSqrt	200	20 CYCLES	
	Input Processing	merge	auChannelCombine	300	3.4
		split	auChannelExtract	300	3.4
		cvtColor	auRgba2Iyuv (RGBA to IYUV)	300	3.46
			auIyuv2Rgba(IYUV to RGBA)	300	3.46
convertTo		auConvertBitDepth (8U to 16U)	300	1.73	
		auConvertBitDepth (8U to 16S)	300	2.6	
		auConvertBitDepth (8U to 32S)	300	5.19	
		auConvertBitDepth (16U to 32S)	300	5.19	
		auConvertBitDepth (16S to 32S)	300	5.19	
		auConvertBitDepth (16U to 8U)	300	2.6	
		auConvertBitDepth (16S to 8U)	300	2.6	
		auConvertBitDepth (32S to 8U)	300	5.19	
		auConvertBitDepth (32S to 16U)	300	5.19	
		auConvertBitDepth (32S to 16S)	300	5.19	
phase		auPhase	300	1.73	
calcHist		auHistogram	200	1.32	
minMaxLoc		auMinMaxLoc	300	0.88	
meanStdDev		auMeanStddev	300	0.88	
LUT		auLUT	300	0.91	
thresholding		auThreshold	300	0.88	

Algorithms... Accelerated

Middleware FPGA IP for Image Processing & Computer Vision

AuvizCV, Category 2				
Function Type	OpenCV function	Equivalent AuvizCV function	Max F (Mhz)	Latency (ms), Full HD
Filter	boxFilter	auBoxFilter (3x3)(8 bit)	300	0.94
		auBoxFilter (5x5)(8 bit)	300	0.96
		auBoxFilter (7x7)(8 bit)	300	0.99
	bilateralFilter	auBilateralFilter (3x3)	250	1.18
		auBilateralFilter (5x5)	250	1.26
		auBilateralFilter (7x7)	250	1.29
	dilate	auDilate	300	0.97
	erode	auErode	300	0.97
	GaussianBlur	auGaussianFilter (3x3)	300	0.96
		auGaussianFilter (5x5)	300	0.97
		auGaussianFilter (7x7)	300	1
	medianBlur	auMedianBlur	300	1
	Scharr	auScharrFilter	300	1.73
	Sobel	auSobelFilter (3x3)	250	2.08
		auSobelFilter (5x5)	250	2.08
auSobelFilter (7x7)		250	4.15	
Edge, corner detectors, & other	Canny	auCanny(L1NORM_SD,3x3sobel)	168	1.49
		auCanny(L2NORM_SD,3x3sobel)	168	1.49
		auCanny(L1NORM_HD,3x3sobel)	100	7.03
		auCanny(L2NORM_HD,3x3sobel)	100	7.038
		equalizeHist	auHistEqualize	200
FAST	auFast(1024 corners)	200	1.3	
cornerHarris	auCornerHarris_3_3_1(1024 corners)	200	1.37	
	to			
buildPyramid	buildPyramid	auImagePyramid (Gaussian Half for 5 levels)	200	4.75
		auImagePyramid (Gaussian ORB for 5 levels)	200	8.54
		auImagePyramid (Gaussian DOUBLE for 3 levels)	200	83.6
		auImagePyramid (Laplacian Half for 5 levels)	200	3.36
		auImagePyramid (Laplacian ORB for 5 levels)	200	7.1
remap	auRemap	100	93.74	
resize	resize	auResize (Downscale NearestNeighbor)	100	4.6
		auResize (Upscale NearestNeighbor)	100	13.9
		auResize (Downscale BiLinear)	100	7
		auResize (Upscale BiLinear)	100	14
		auResize (Downscale Area)	100	20.8
		auResize (Upscale Area)	100	14
warpAffine	warpAffine	auWarpAffine (Nearest Neighbor)	250	4.8
		auWarpAffine (Bilinear Interpolation)	250	6.5
warpPerspective	warpPerspective	auWarpPerspective (Nearest Neighbour)	250	4.05
		auWarpPerspective (Bilinear Interpolation)	250	7.2

AuvizCV, Category 3				
Function Type	OpenCV function	Equivalent AuvizCV function	Max F (Mhz)	Latency (ms), Full HD
Other	Hog	auHOG(NRB-GRAY)	200	14.5
		auHOG(NRB-RGBA)	200	14.45
		auHOG(RB-GRAY)	200	266.5
		auHOG(RB-RGBA)	200	266.5
	MST	auTrackmulKernel (10 objects)	100	53.32
	ORB	ORB(500 keypoints)	250	2
	cvCalcOpticalFlowLK	auLKOpticalFlow(1000 corners)	200	117.85
	SVM	SVM(200 elements)	300	418 CYCLES
	OTSU	OTSU	200	10.38

Algorithms... Accelerated

Middleware FPGA IP for Image Processing & Computer Vision