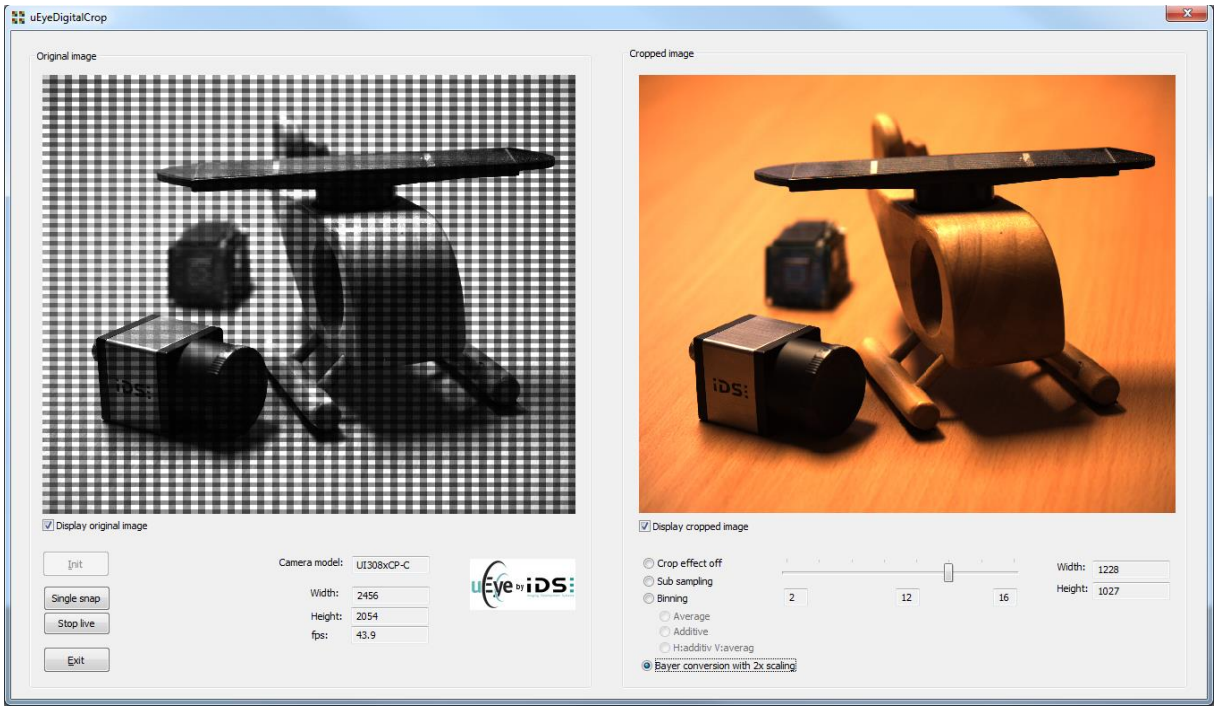
Name

uEyeDigitalCrop



Programming language and interface

uEye Software Version:	V4.90.3	
uEye SDK	☒ Core SDK (C/C++)	☐ .NET SDK (C#)
Platform of exe file:	☐ 32bit	☒ 64bit
Development platform:	Visual Studio 2015	
Operating System	☒ Windows	☐ Linux

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Description

This sample is based on the uEyeImageQueue demo. In the processing part of the image queue thread, you can run different types of crop operations. All these operations are executed digitally based on the images received in the host. The crop operations are not performed in the camera sensor. In contrast to hardware crop functions on the sensor, the software solution also allows odd scaling factors.

The demo shows you how to access and process the image data using C/C++ pointer operations.

The different results for crop operations can be visualized and compared easily.

Digital subsampling

For subsampling (pixel skip) only a subset of the original image data is required. When using a factor of 2 every second pixel gets dropped. Some image content gets lost. Subsampling works pretty fast with only some data copy operations required.

That can be useful for embedded systems when a camera sensor cannot provide subsampling and for CPU processing power limitations small images are required

Digital binning

Binning is merging neighbor pixels. Image data does not get totally lost as it is when using subsubsampling. However, some image content gets lost when a cluster of pixel is merged in a single pixel.

Some applications require large pixel sizes. The trend of having smaller pixel design in sensors continues. By merging the pixel in software you can enlarge the pixel size in software.

Binning operation require more CPU load compared to subsubsampling.

- **Average**: Build the mean value of a cluster. That helps reducing noise. The brightness stays the same.
- **Additive**: The values of the pixels are added. Therefor the brightness is increased.
- **H:additive V:average:** Combing the binning method that way is common on sensor hardware. It is nice mix between reducing noise and gaining brightness.

Bayer conversion with 2x scaling

Based on raw Bayer data from a color camera scaling down the image and color conversion can be done in a single step. The quality of doing a Bayer conversion to a color image might not result in high end in color images. But it is quick and efficient way to get a color image at an embedded system without wasting too much CPU power for the Bayer color conversion.

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The source code of the many crop functions is spilt for monochrome and color cameras and the different crop effects. The source code snippets required for a customized can cut and paste easily.

	Mono	Color
Subsampling	`DoSubSamplingMono`	`DoSubSamplingColor`

Binning	`DoBinningMonoAverage`
	`DoBinningMonoAdditive`
	`DoBinningMonoAdditiveAverage`
		`DoBinningColorAverage`
		`DoBinningColorAdditive`
		`DoBinningColorAdditiveAverage`

Bayer conversion + scaling		`CropDoBayerScaling`

Among others, uEye API functions/methods used

```
is_InitCamera
is_ExitCamera

is_GetSensorInfo
is_GetCameraInfo
is_GetDuration
is_SetErrorReport
is_GetFrameTimeRange
is_SetExternalTrigger

is_AllocImageMem
is_FreeImageMem
is_AddToSequence
is_ClearSequence
is_GetImageMemPitch
is_UnlockSeqBuf

is_InitImageQueue
is_ExitImageQueue
is_WaitForNextImage

is_FreezeVideo
is_CaptureVideo
is_StopLiveVideo

is_SetDisplayMode
is_SetColorMode
is_RenderBitmap
```

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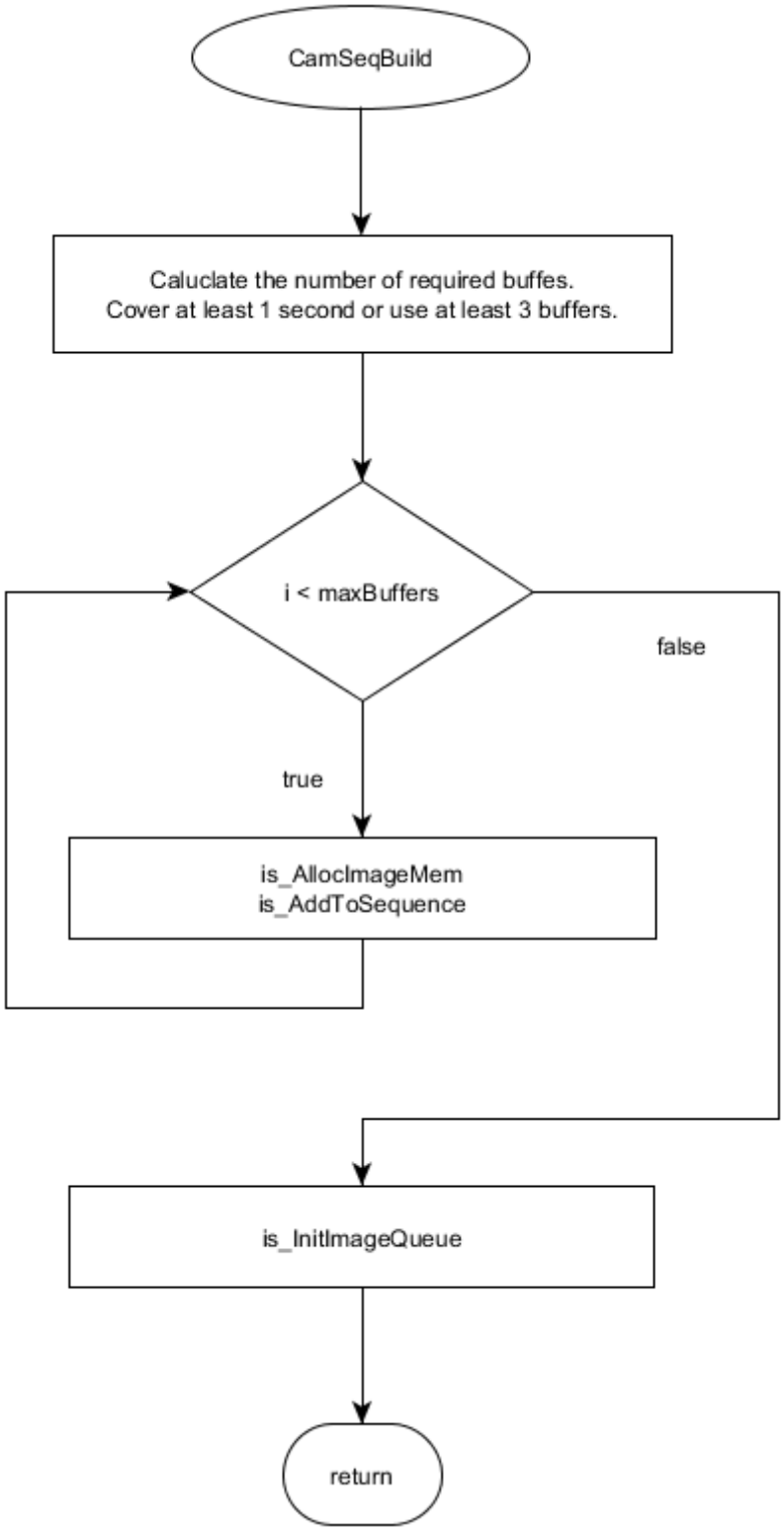
Flowcharts

The flowcharts below show how the most interesting and major parts of the sample software work. The flowcharts do not cover the whole application and all details.



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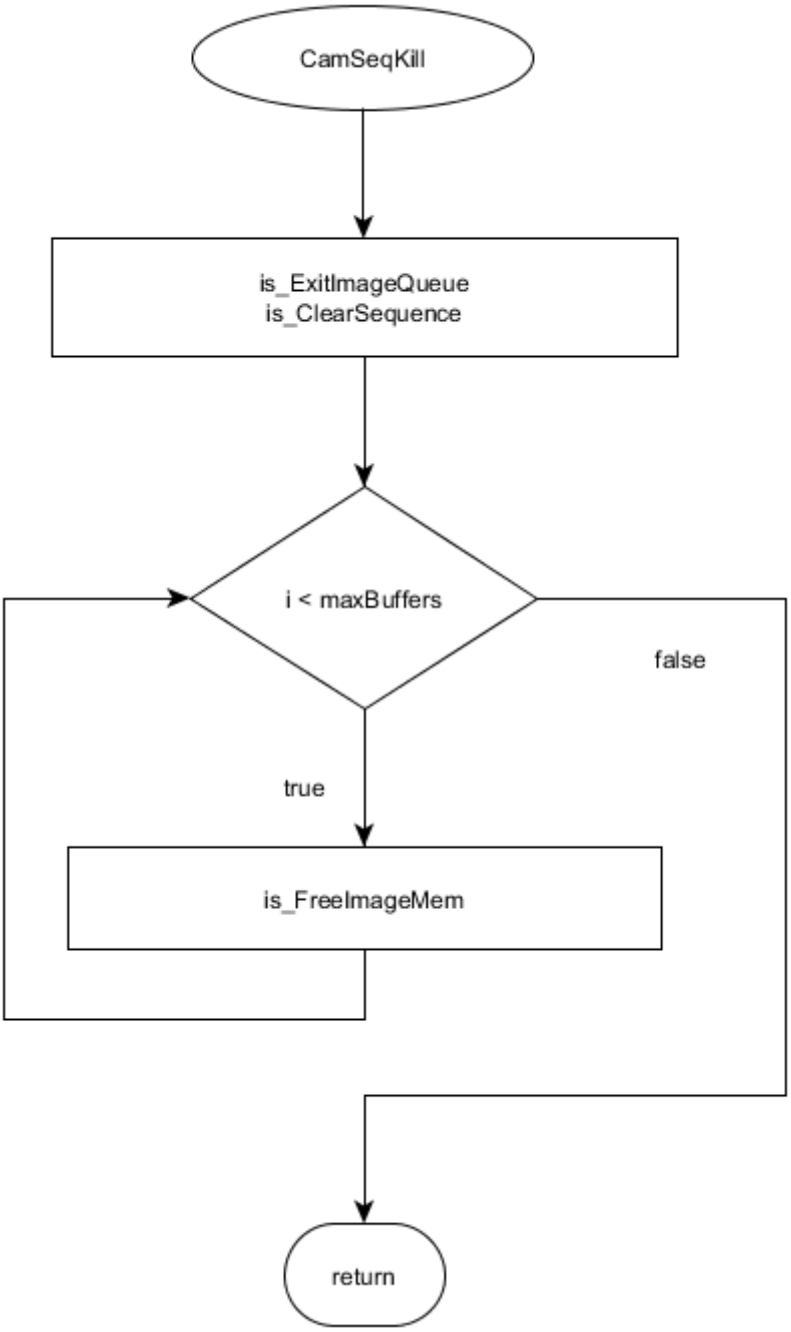

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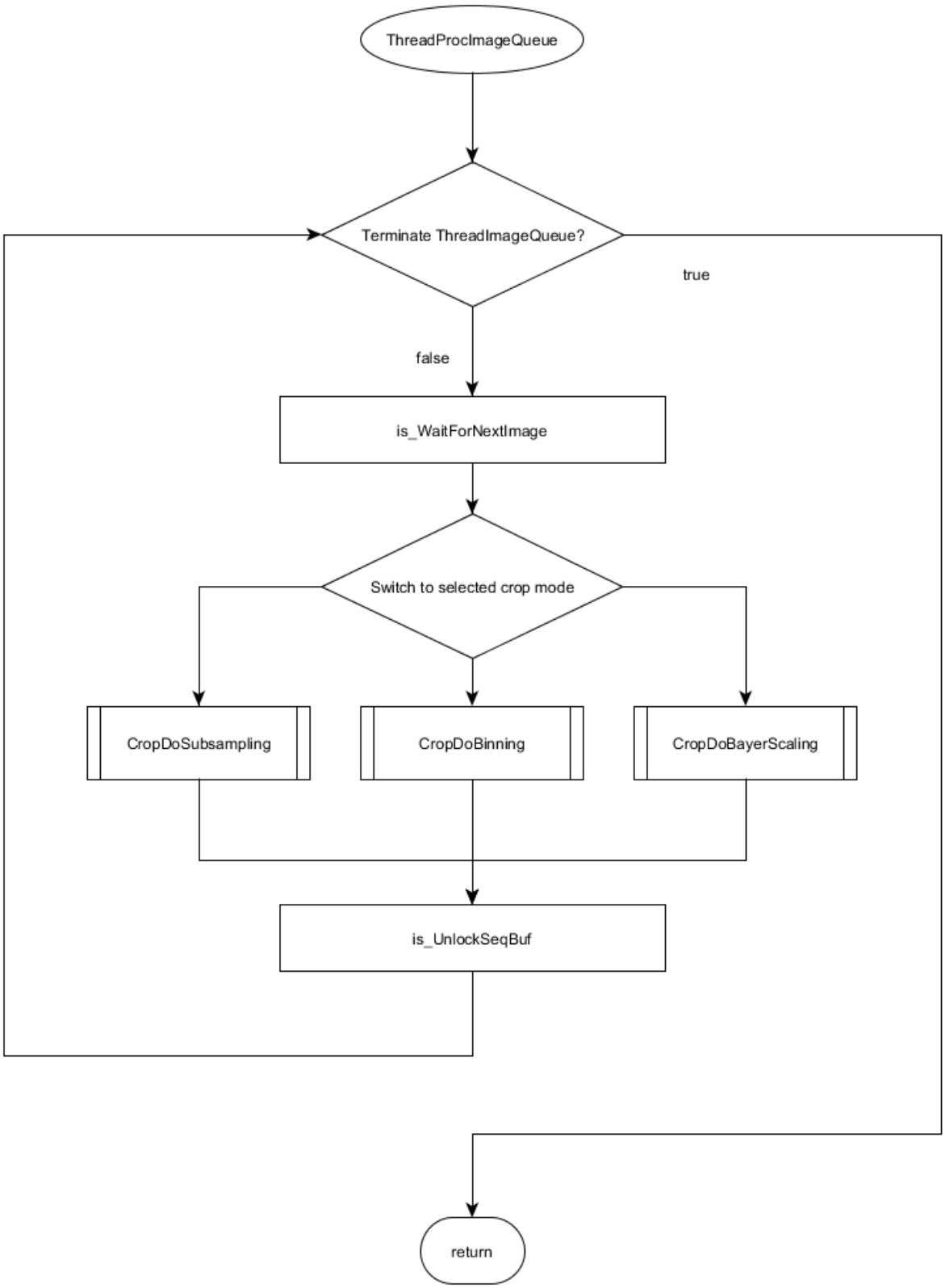

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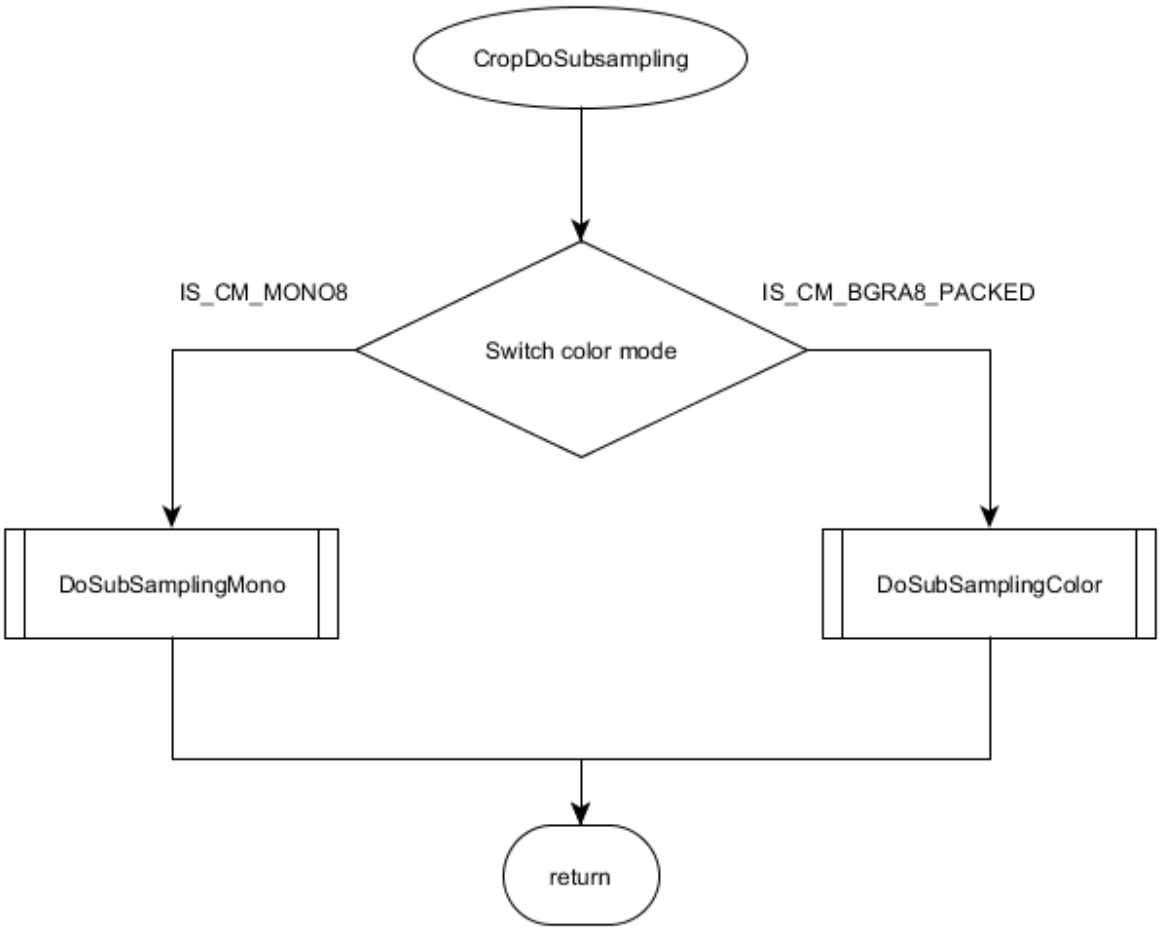

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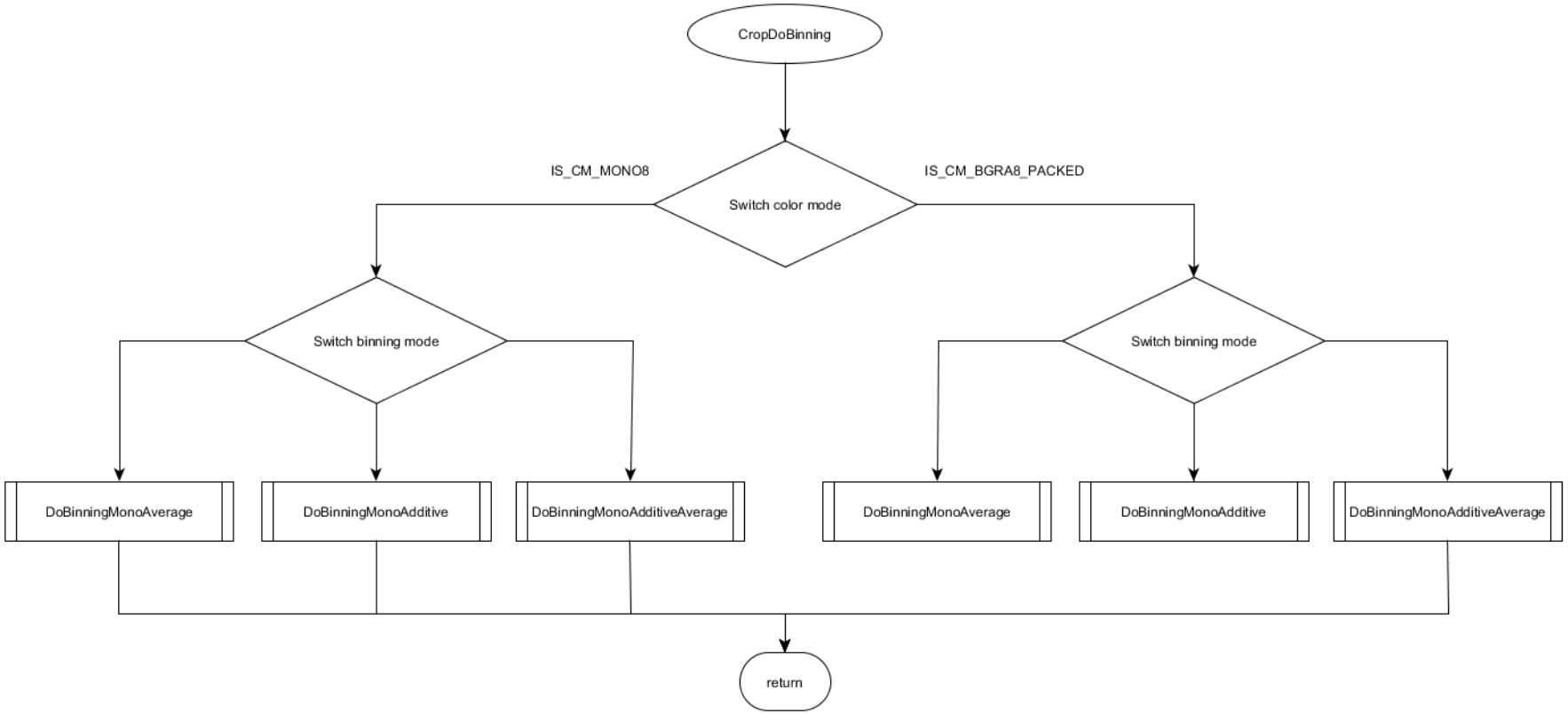

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Cameras

All uEye camera models. Note that XS and UI-3013XC camera might require an extra handling.

Contact

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