REDCV FUNCTIONS DOCUMENTATION

Most of functions are calling Red/System routines for faster image rendering. All redCV routines can be directly called from a red program (not for newbies). For a more convenient access, Red/System routines are "exported" to red functions. All red routines are prefixed with underscore (e.g. _rcvCopy). Only red functions are documented. Doc string summarizes the function and calling function from red code sample is in *italic.*

All includes to redCV libraries are declared in a single file (/libs/redcv.red).

```
[
#include %core/rcvCore.red              ; Basic image creating and processing functions
#include %highgui/rcvHighGui.red        ; Fast Highgui functions
#include %matrix/rcvMatrix.red          ; Matrices functions
#include %imgproc/rcvImgProc.red        ; Color space conversions Convolution and other
#include %math/rcvRandom.red            ; Random laws for generating random images
#include %math/rcvStats.red             ; Statistical functions for images
]
```

Just deactivate the #include if you don't need functions, but rcvCore is obligatory.

More documentation to come.

REDCV CORE FUNCTIONS

Library: redCV/libs/core/ rcvcore.red
Functions: 12

Function	Doc String
Basic Image I/O	
rcvCreateImage: function [size [pair!] return: [image!]] *img: rcvCreateImage 640x480*	Create empty (black) image
rcvReleaseImage: routine [src [image!]] *rcvRelease img*	Delete image from memory
rcvLoadImage: function [fileName [file!] return: [image!] /grayscale] *img: rcvLoadImage %test.jpg*	Load image from file /grayscale refinement loads a grayscale image
rcvLoadImageB: function [fileName [file!] return: [binary!] /alpha] *bin: rcvLoadImageB %test.png (bin=rgb)* *bin: rcvLoadImageB/apha %test.png (bin=argb)*	Load image from file and return image as binary
rcvSaveImage: function [src [image!] fileName [file!]] *rcvSaveImage img %test.jpg*	Save image to file
rcvCloneImage: function [src [image!] return: [image!]] *dst: rcvCloneImage src*	Return a copy of source image
rcvCopyImage : function [src [image!] dst [image!]] *rcvCopyImage src dst*	Copy source image to destination image
rcvRandomImage: function [size [pair!] value [tuple!] /uniform /alea return: [image!]] *dst: rcvRandomImage/uniform 640x480 red*	Create a random uniform or pixel random image
rcvZeroImage: function [src [image!]] *rcvZeroImage src*	All pixels to 0
rcvDecodeImage	TBD
rcvDecodeImageM	TBD
cvEncodeImage	TBD

Library: redCV/libs/core/rcvcore.red
Functions: 42

Function	Doc String
Image Conversion	
rcv2Gray: function [src [image!] dst [image!] /average /luminosity /lightness return: [image!]] *rcv2Gray/average src dst*	Convert RGB image to Grayscale according to refinement
rcv2BGRA: function [src [image!] dst [image!]] *rcv2BGRA src dst*	Convert RGBA => BGRA
rcv2RGBA: function [src [image!] dst [image!]] *rcv2RGBA src dst*	Convert BGRA => RGBA"
rcv2BW: function [src [image!] dst [image!]] *rcv2BW src dst*	Convert RGB image => Black and White
rcv2BWFilter: function [src [image!] dst [image!] thresh [integer!]] *rcv2BWFilter src dst 64*	Convert RGB image => Black and White according to threshold
rcvSplit: function [src [image!] dst [image!]/red /green /blue] *rcvSplit/blue src dst (->blue channel)*	Split source image in RGB separate channels
rcvInvert: function [source [image!] dst [image!]] *rcvInvert src dst*	Similar to NOT image
Math Operators on image	
rcvAdd: function [src1 [image!] src2 [image!] dst [image!]] *rcvAdd image1 image2 destImage*	dst: src1 + src2
rcvSub: function [src1 [image!] src2 [image!] dst [image!]] *rcvSub image1 image2 destImage*	dst: src1 - src2
rcvMul: function [src1 [image!] src2 [image!] dst [image!]] *rcvMul image1 image2 destImage*	dst: src1 * src2
rcvDiv: function [src1 [image!] src2 [image!] dst [image!]] *rcvDiv image1 image2 destImage*	dst: src1 / src2
rcvMod: function [src1 [image!] src2 [image!] dst [image!]] *rcvMod image1 image2 destImage*	dst: src1 // src2 (modulo)
rcvRem: function [src1 [image!] src2 [image!] dst [image!]] *rcvRem image1 image2 destImage*	dst: src1 % src2 (remainder)
rcvAbsDiff: function [src1 [image!] src2 [image!] dst [image!]] *rcvAbsDiff image1 image2 destImage*	dst: absolute difference src1 src2

Math operators with scalar (integer !)	
rcvAddS: function [src [image!] dst [image!] val [integer!]] *rcvAddS source destination 128*	dst: src + integer! value
rcvSubS: function [src [image!] dst [image!] val [integer!]] *rcvSubS source destination 128*	dst: src - integer! value
rcvMulS: function [src [image!] dst [image!] val [integer!]] *rcvMubS source destination 2*	dst: src * integer! value
rcvDivS: function [src [image!] dst [image!] val [integer!]] *rcvDivS source destination 2*	dst: src / integer! value
rcvModS: function [src [image!] dst [image!] val [integer!] *rcvModS source destination 4*	dst: src // integer! value (modulo)
rcvRemS: function [src [image!] dst [image!] val [integer!]] *rcvRemS source destination 2*	dst: src % integer! value (remainder)
rcvPow: function [src [image!] dst [image!] val [integer!]] *rcvPow source destination 2*	dst: src ^integer! value
rcvLSH: function [src [image!] dst [image!]val [integer!]] *rcvLSH source destination 2*	Left shift image by value
rcvRSH: function [src [image!] dst [image!] val [integer!]] *rcvRSH source destination 2*	Right Shift image by value
rcvSQR: function [src [image!] dst [image!] val [integer!]] *rcvSQR source destination 2*	Image square root
Math operators with scalar (tuple!)	
rcvAddT: function [src [image!] dst [image!] val [tuple!]] *rcvAddT source destination 128.128.128*	dst: src + tuple! value
rcvSubT: function [src [image!] dst [image!] val [tuple!]] *rcvSubT source destination 32.32.32*	dst: src - tuple! value
rcvMulT: function [src [image!] dst [image!] val [tuple!]] *rcvMulT source destination 2.2.2*	dst: src * tuple! value
rcvDivT: function [src [image!] dst [image!] val [tuple!]] *rcvDivT source destination 2.2.2*	dst: src / tuple! value
rcvModT: function [src [image!] dst [image!] val [tuple!]] *rcvModT source destination 2.2.2*	dst: src // tuple! value (modulo)
rcvRemT: function [src [image!] dst [image!] val [tuple!]] *rcvRemT source destination 2.2.2*	dst: src % tuple! value (remainder)

Logical operators on Image	
rcvAND: function [src1 [image!] src2 [image!] dst [image!]] *rcvAND source1 source2 destination*	dst: src1 AND src2
rcvOR: function [src1 [image!] src2 [image!] dst [image!]] *rcvOR source1 source2 destination*	dst: src1 OR src2
rcvXOR: function [src1 [image!] src2 [image!] dst [image!]] *rcvXOR source1 source2 destination*	dst: src1 XOR src2
rcvNAND: function [src1 [image!] src2 [image!] dst [image!]] *rcvNAND source1 source2 destination*	dst: src1 NAND src2
rcvNOR: function [src1 [image!] src2 [image!] dst [image!]] *rcvNOR source1 source2 destination*	dst: src1 NOR src2
rcvNXOR: function [src1 [image!] src2 [image!] dst [image!]] *rcvNXOR source1 source2 destination*	dst: src1 NXOR rc2
rcvMIN: function [src1 [image!] src2 [image!] dst [image!]] *rcvMIN source1 source2 destination*	dst: minimum src1 src2
rcvMAX: function [src1 [image!] src2 [image!] dst [image!]] *rcvMAX source1 source2 destination*	dst: maximum src1 src2
rcvNot: function [src [image!] dst [image!]] *rcvNOT source destination*	dst: NOT src
logical operators and scalar (tuple!) on image	
rcvANDS: function [src [image!] dst [image!] value [tuple!] return: [image!]] *rcvANDS source red*	dst: src AND tuple! as image
rcvORS: function [src [image!] dst [image!] value [tuple!] return: [image!]] *rcvANDS source green*	dst: src OR tuple! as image
rcvXORS: function [src [image!] dst [image!] value [tuple!] return: [image!]] *rcvANDS source blue*	dst: src XOR tuple! as image

REDCV MATRICES DOCUMENTATION

Library: redCV/libs/core/ rcvMatrix.red
Functions: 30
Attention: Matrices with the same type and the same size!

Function	Doc String
rcvCreateMat: function [type [word!] bitSize [integer!] mSize [pair!] return: [vector!]] *mat: rcvCreateMat 'integer! 8 512x512*	Create 2-D matrix
rcvReleaseMat: function [mat [vector!]] *rcvReleaseMat mat*	Releases Matrix
rcvCloneMat: function [src [vector!] return: [vector!]] *newmat: rcvCloneMat src*	Returns a copy of source matrix
rcvCopyMat: function [src [vector!] dst [vector!]] *rcvCopyMat src dst*	Copy source matrix to destination matrix
rcvRandomMat: function [mat [vector!] value [integer!]] *rcvRandomMat mat 255*	Randomizes matrix
rcvColorMat: function [mat [vector!] value [integer!]] *rcvColorMat mat 128*	Sets matrix color
rcvImage2Mat: function [src [image!] mat [vector!]] *rcvImage2Mat src mat*	Red Image to 2-D Matrix Converts Red Image to grayscale before matrix transformation Only 8-bit integer image
rcvMat82Image: function [mat [vector!] dst [image!]] *rcvMat82Image mat dst*	8-bit integer matrix to Red image
rcvMat16Image: function [mat [vector!] dst [image!]] *rcvMat162Image mat dst*	16-bit integer matrix to Red image
rcvMat322Image: function [mat [vector!] dst [image!]] *rcvMat322Image mat dst*	32-bit integer matrix to Red image
rcvSplit2Mat: function [src [image!] mat0 [vector!] mat1 [vector!] mat2 [vector!] mat3 [vector!]] *rcvSplit2Mat img1 mat0 mat1 mat2 mat3*	Split Red image to 4 8-bit matrices
rcvMerge2Image: function [mat0 [vector!] mat1 [vector!] mat2 [vector!] mat3 [vector!] dst [image!]] *rcvMerge2Image mat0 mat1 mat2 mat3 imgD*	Merge 4 8-bit matrices to Red image (argb)
rcvConvolveMat: function [src [vector!] dst [vector!] mSize[pair!] kernel [block!] factor [float!] delta [float!]] *rcvConvolveMat mat1 mat2 img1/size mask 1.0 0.0*	Fast 2-D matrix convolution For 8-bit integer matrix only
rcvConvertMatScale: function [src [vector!] dst [vector!] srcScale [number!] dstScale [number!] /fast /normal]	Converts Matrix Scale 8<->16<->bit conversions /fast for 8 to 32-bits

rcvConvertMatScale/fast mat1 mat2 255 32768	/normal for 8 to 16 or 32-bits
Math operator for matrix	
rcvAddMat: function [src1 [vector!] src2 [vector!] return: [vector!]] *m : rcvAddMat m1 m2*	Adds two matrices to a new matrice
rcvSubMat: function [src1 [vector!] src2 [vector!] return: [vector!]] *m : rcvSubMat m1 m2*	Subtracts two matrices to a new matrice
rcvMulMat: function [src1 [vector!] src2 [vector!] return: [vector!] *m : rcvMulMat m1 m2*	Multiplies two matrices to a new matrice
rcvDivMat: function [src1 [vector!] src2 [vector!] return: [vector!]] *m : rcvDivlMat m1 m2*	Divides two matrices and returns the result
rcvRemMat: function [src1 [vector!] src2 [vector!] return: [vector!]] *m : rcvRemlMat m1 m2*	Remainder src1 by src2
Scalar operations directly modify vector	
rcvAddSMat: function [src [vector!] value [integer!]] *rcvAddSMat m1 255*	Adds scalar
rcvSubSMat: function [src [vector!] value [integer!]] *rcvSubSMat m1 255*	Subtracts scalar
rcvMulSMat: function [src [vector!] value [integer!]] *rcvSMulSMat m1 255*	Multiplies matrix by scalar
rcvDivSMat: function [src [vector!] value [integer!]] *rcvSMulSMat m1 16*	Divides matrix by scalar
rcvRemSMat: function [src [vector!] value [integer!]] *rcvSRemMat m1 16*	Remainder
Logical operators	
rcvAndMat: function [src1 [vector!] src2 [vector!] return: [vector!]] *m: rcvAndMat m1 m2*	dst: src1 AND src2
rcvOrMat: function [src1 [vector!] src2 [vector!] return: [vector!] *m: rcvOrMat m1 m2*	dst: src1 OR src2
rcvXorMat: function [src1 [vector!] src2 [vector!] return: [vector!]] *m: rcvXorMat m1 m2*	dst: src1 XOR src2
Scalar operations directly modify vector	
rcvAndSMat: function [src [vector!] value [integer!] *rcvAndSMat src 127*	src AND value

rcvOrSMat: function [src [vector!] value [integer!] *rcvOrSMat src 127*	src OR value
rcvXorSMat: function [src [vector!] value [integer!]] *rcvXorSMat src 127*	src XOR value

REDCV IMAGE PROCESSING FUNCTIONS

Library: redCV/libs/imgproc/ rcvImgProc.red
Functions: 10

Function	Doc String
Space Color Conversion	
rcvRGB2XYZ: function [src [image!] dst [image!]] *rcvRGB2XYZ src dst*	BGR to CIE XYZ color conversion
rcvXYZ2RGB: function [src [image!] dst [image!]] *rcvXYZ2RGB src dst*	CIE XYZ to RBG color conversion
Image transformation	
rcvFlip: function [src [image!] dst [image!] /horizontal /vertical /both return: [image!]] *rcvFlip/horizontal src dst* *rcvFlip/vertical src dst* *rcvFlip/both src dst*	Left Right, Up down or both directions flip
Image Convolution	
rcvConvolve: function [src [image!] dst [image!] kernel [block!] factor [float!] delta [float!]] *rcvConvolve src dst noFilter 1.0 0.0*	Convolve an image with the kernel
rcvFastConvolve: function [src [image!] dst [image!] Channel [integer !] kernel [block!] factor [float!] delta [float!]] *rcvFastConvolve img1 img2 1 mask 1.0 0.0*	Convolves a 8-bit image with the kernel by channel *Convolves img1/channel 1*
rcvFilter2D: function [src [image!] dst [image!] kernel [block!] delta [integer!]] *rcvFilter2D src dst noFilter 0*	Basic convolution Filter
rcvFastFilter2D: function [src [image!] dst [image!] kernel [block!]] *rcvFastFilter2D src dst Filter*	Faster convolution Filter
Image Filters	
rcvMakeGaussian: function [kSize [pair!] return: [block!]] *knl: rcvMakeGaussian 3x3*	Create a Gaussian uneven kernel with the following equation $$G(x,y) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}}$$ Where, x is the distance along horizontal axis measured from the origin, y is the distance along vertical axis measured from the origin and σ is the standard deviation of the distribution.
rcvGaussianFilter: function [src [image!] dst [image!] kernel [block!] delta [integer!]]	Gaussian 2D Filter

rcvGaussianFilter src dst knl 0	
Gaussian Pyramid Decomposition	
rcvResizeImage: function [src [image!] canvas iSize [pair!]/gaussian return: [pair!]] *rcvResizeImage/gaussian src canvas iSize* *rcvResizeImage src canvas iSize*	Resizes image and applies filter for Gaussian pyramidal resizing if required. Only Gaussian 5x5 kernel is currently supported. Canvas is a base facet. If you don't call /Gaussian refinement image is just resized.

REDCV STATISTICAL FUNCTIONS

Library: redCV/libs/math/rcvStats.red
Functions: 12

Function	Doc String
rcvCountNonZero: function [arr [image! vector!] return: [integer!]] *n: rcvCountNonZero source*	Returns number of non zero values in image or matrix
rcvMean: function [arr [image! vector!] return: [tuple!] /argb] *mean: rcvMeanarr*	Returns mean value of array as a tuple rgb or argb
rcvSum: function [src [image! vector !] return: [block!] /argb] *sum : rcvSum source*	Returns sum value of image as a block rgb or argb
rcvSTD: function [src [image!] return: [tuple!] /argb] *std: rcvVarImage source*	returns standard deviation value of array as a tuple rgb or argb
rcvMedian: function [source [image! vector !] return: [tuple!]] *median : rcvMedianImage source*	Returns median value of array as tuple argb
rcvMinValue: function [source [image! vector !] return: [tuple!]] *mini : rcvMinImage source*	Minimal value in array as a tuple argb
rcvMaxValue: function [source [image! vector !] return: [tuple!]] *maxi : rcvMaxImage source*	Maximal value in array as a tuple arg
rcvMaxLoc: function [arr [image! vector!] arrSize [pair!]return: [pair!]] *rcvMaxLoc arr 512x512*	Finds global maximum location in array
rcvMinLoc: function [arr [image! vector!] arrSize [pair!]return: [pair!]] *rcvMinLoc arr 512x512*	Finds global minimum location in array
rcvHistogram: function [arr [image! vector!] return: [vector!] /red /green /blue /alpha]	Calculates array histogram for 1 channel matrix or for rgb channels in case of color image
rcvRangeImage: function [source [image!] return: [tuple!]] range: rcvRangeImage source	Range value in Image as a tuple argb
rcvSortImage: function [source [image!] dst [image!]] *rcvSortImage source destination*	Ascending image sorting

Library: redCV/libs/highgui/ rcvHighGui.red
Functions: 6

Function	Doc String
rcvNamedWindow: function [name [string!] return: [window!]] *s1: rcvNamedWindow "Source"*	Creates and shows a window
rcvDestroyWindow: function [window [face!]] *rcvDestroyWindow s1*	Destroys a window
rcvDestroyAllWindows: function [] *rcvDestroyAllWindows*	Destroys all windows
rcvResizeWindow: function [window [face!] wSize [pair!]] *rcvResizeWindow s1 512x512*	Sets window size
rcvMoveWindow: function [window [face!] position [pair!]] *rcvMoveWindow s1 10x10*	Sets window position
rcvShowImage: function [window [face!] image [image!]] *rcvShowImage s1 image*	Shows image in window