

# Breeze - Specification sheet

## Supported image file formats

File format	Extensions
Breeze xml file	xml
ENVI Files	bil, bip, bsq, raw, img, bin, dat
Matlab files	mat
HDF files	h5, hdf
Image files	jpg,jpeg,wbmp,png,wbmp,bmp,pbm,pgm,ppm,pcx,tif,tiff,gif,bmp,jp2
SAC file	sac
HIPS File	hips

## Segmentations

Segmentation by	Description
model	Use Sample model to exclude background pixels that is outside models critical distance. Optional to specify minimum area and to remove number of border pixels.
model expression	Use quantification or classification model with expression to specify what classified pixels that should be sample.
intensity	Use spectral band intensities in logical expression and compare to other bands or/and by constant
grid and insets	Create a grid with specified rows and columns and use optional insets for top, left, bottom, right.
structure	Segmentation for finding object as structure changes on a surface, for example holes.
horizontal interval	Segment using one or several horizontal intervals
pixel coordinates	Specify pixel coordinates with x and y distance from origo.

## Modelling wizards

Model	Description
Sample	PCA model using Distance to model (dcrit) and Hotelling t2 to identify samples
Quantification	PLS quantification with Distance to model outlier detection and Y vs Ycalc plot for validation
Classification	PLS-DA classification with Distance to model outlier detection and Y vs Ycalc plot for validation
Classification (SIMCA)	SIMCA classification using Coomans plot to set critical distance for each model

## Pre-treatments

Pre-treatments	Description
Center	Center observations round origo
Uv-scale	Only applied for variables
SNV	Standard Normal Variate correction
Savitzky-Golay	Smoothing or 1st, 2nd or 3rd derivative
Derivate	Amplitude distance between consecutive variables

## Descriptors

Descriptors	Description
Quantification of properties	Use specified Quantification model (PLS) and property for prediction.
Classification of categories	Use specified Classification model (PLS-DA or SIMCA), category for prediction, and object or pixel classification
Classification of categories using expression	Use an expression of spatial parameters to assign a sample to a given class
Summary statistics of pixels (quantification of properties)	Calculate average, min, max or standard deviation over the sample surface using a given Quantification model and property.
Distribution statistics of pixels (quantification of properties)	Calculate distribution, balance or direction over a sample surface using a given Quantification model and property
Percent of sample by given class	Calculate percent of pixels of a given class over a sample surface using a given Classification model
Spatial values from sample	Calculate area, width, height, circumference, regularity, roundness, angle, d1, d2 and X location of samples
Distribution of subsamples	Calculate distribution, balance or direction of subsamples from a given segmentation
Number of subsamples by a given class	Count number of subsamples from a given segmentation of a given class.
Area of subsamples by a given class	Count area of pixels of a given class over a sample surface using a given Classification model.
Number of subsamples	Count number of sub-samples
Summary of subsamples	Calculate max, min, sum or average from sub-segmentation descriptor

## Export

Export	Description
CSV	Export table data and average spectrum to comma separated file
Html report	Export table data with thumbnails to html report
Model parameters	Export model parameters (transformations and pls-weights)
Spectral pixel data	Export spectral pixel data (hypercube) from selected sample segmentation in raw or mat format
Predicted pixel data	Export predicted pixel data (properties and categories) from selected sample segmentation in raw or mat format

## Supported Cameras and Sample Movers

Manufacturer	Camera	Sample mover
Specim	LUMO SDK – Swir, FX-10, FX-17	SisuChema Lab-scanner
inno-spec	RedEye	Stepper table
HySpex	SDK	Stage
Middleton Spectral Vision		ViaSpec II
Generic	USB webcam	
Prediktera	File reader simulator camera	UmBio Inspector

## Real-time performance

Frame size / Method	320p x 256w	640p x 224w	1024p x 448w	1024p x 10w
Background (PCA) + Quantification (PLS)	1500 fps	780 fps	180 fps	6100 fps
Object identification	5050 fps	2200 fps	1100 fps	2350 fps
Both	1150 fps	580 fps	160 fps	1700 fps

*Tested on Intel Core i7-4770K CPU 3.50 GHz. Breeze plotting visualisation was turned off*