

3. List of Analysis Functions

Main Function		
Load data	Load image data	Support raw / gsd / tiff / bvx
	Possible to load/analyze multiple data	Display on tab pages
	Data information display	Display acquisition settings, comment, filter history etc.
Layer selection	Background layer	Can set gain/threshold/step/level/opacity/auto adjustment on each layer
	Reference layer	
	Image layer	
	Difference layer	
	Normalized difference layer	
	Analysis layer	
Image display	Point selection	Can specify any number of points. Can move with mouse drag easily
	Zoom in / Zoom out	Mouse wheel
	Change color map	New color map creation, import and export are also possible
	Use current image as reference/background image	Image display is changed
	XY coordinate display	Can be turned on/off
	Numerical value display	
	Time and frame number display	
	Scale bar display, Set scale	
	Color bar display	
Movie display	Play / stop movie	Can change movie speed
	Frame advance / frame reverse	Frame number can be specified
Waveform display	Click on image to instantly display waveform	When point is moved with mouse, image display is also changed.
	Simultaneous display of analog waveform such as ECG	Can be turned off
	Can specify coordinates of waveform display point manually	
	Move frame by dragging mouse on waveform	Image display is also changed
	Invert waveform polarity	Image polarity is not changed
	Select time range	Specify with mouse or enter manually
	Change size of waveform display point	1x1, 3x3, 5x5, 7x7, 9x9
	Change waveform calculation processing	F or F-F(0) or dV/dt
	Change waveform unit	% or Raw
	Waveform overlay display / stacked display	
Change gain for waveform display		

	Waveform value can be output to CSV file	*.csv
	Zoom in / Zoom out	Mouse wheel
Data Export	Image CSV	*.csv
	Movie	*.avi
	Image/Map data	*.png/ *.bmp / *.jpg
	Wave CSV	*.csv
	Wave map	*.png
App settings	Custom color map	Add/Delete/Edit/Import/Export color map info
	Use GPU	GPU is used for FIR filter and some data analysis
	Undo levels	Can specify how many times you can undo
Data Analysis		
Point analysis	Peak analysis	Show activation time/peak time/repolarization time/repolarization level
	Frequency analysis	Show frequency-magnitude or frequency-phase
	Phase analysis	Show phase info using Hilbert transform
	Time-frequency analysis	Show time-frequency map
Line analysis	Show line info	Show length, max, min, mean, std.dev, etc.
	Conduction velocity	Calculate conduction velocities of multiple peaks
	Spatiotemporal plot	Show time-distance map
Polyline analysis	Show line info	Show length, max, min, mean, std.dev, etc.
	Spatiotemporal plot	Show time-distance map
Rectangle (ROI) analysis	Show area info	Show histogram, max, min, mean, std.dev etc.
Polygon (ROI) analysis	Show area info	Show histogram, max, min, mean, std.dev etc.
Waveform analysis	Frequency analysis	Show frequency-magnitude or frequency-phase
	Phase analysis	Show phase info using Hilbert transform
	Time-frequency analysis	Show time-frequency map
	Automatic detection of APD and BPM	Automatic detection of Peak duration (APD) and BPM of displayed waveform
	Waveform info	Show max, min, average, std.dev of waveform
Image analysis	Masking	Specify area for data analysis
	Frequency analysis	Show dominant frequency map
	Single peak analysis	Analyze single AP and show single map
	- Activation time	Calculation of time from start of waveform display to rise of action potential and creation of activation map
	- Repolarization time	Calculation of time from start of waveform display to repolarization and creation of repolarization map
	- Duration (APD)	Calculation of action potential duration and creation of APD map
	- Activation to Peak time	Calculation of time from rise to peak of action potential and creation of map
- Peak to Repolarization time	Calculation of time from peak of action potential to	

		repolarization and creation of map
	- Peak time	Calculation of time from start of waveform display to peak of action potential and creation of map
	- Peak amplitude	Calculation of peak amplitude of action potential and creation of map
	- Decay tau	Calculation of time constant (tau) at the time of decay of action potential and creation of map
	All peak analysis	Analyze multiple AP in one waveform and show multiple maps
	- Activation time	Calculation of time from start of waveform display to rise of action potential and creation of activation map
	- Repolarization time	Calculation of time from start of waveform display to repolarization and creation of multiple repolarization map
	- Duration (APD)	Calculation of action potential duration and creation of APD map
	- Activation to Peak time	Calculation of time from rise to peak of action potential and creation of map
	- Peak to Repolarization time	Calculation of time from peak of action potential to repolarization and creation of map
	- Peak time	Calculation of time from start of waveform display to peak of action potential and creation of map
	- Peak amplitude	Calculation of peak amplitude of action potential and creation of map
	- Decay tau	Calculation of time constant (tau) at the time of decay of action potential and creation of map
	Phase analysis	Show phase map/export image, csv
	Conduction velocity analysis	Show conduction velocity map/export image, csv
	Average peaks	Average multiple APs
	Image SNR	Calculate image S/N ratio
	Leading region map	Show leading region map
Filters and other functions		
Filter (Spatial)	Undo filters	Undo the last filter
	Filter batch	Apply multiple filters at once
	Invert polarity	Reversal of image and waveform polarity
	Binning	Combine multiple pixels into one pixel (add or average multiple pixels)
	Brightness/Illumination correction	Brightness correction / illumination light unevenness correction
	Gaussian filter	Gaussian filter (noise removal)
	Mean Filter	Mean filter (noise removal)
	Median Filter	Median filter (noise removal)
Filter (Temporal)	Undo filters	Undo the last filter
	Filter batch	Apply multiple filters at once
	Deinterleave frames	Frames of data acquired by multi-wavelength excitation imaging such as fura-2 are extracted and divided into multiple data
	Drift removal	Correct drift of baseline

	Finite impulse response (FIR) filter	FIR temporal filter (noise removal)
	Dynamic range optimization	Brightness value of each pixel is optimized to use entire 16-bit gradation, and the dark image is corrected to be bright
	Normalize	Correct difference in amplitude of brightness value between each pixel and calculate so that brightness values of all pixels have the same amplitude (0 to 65,535)
Other functions	Image align	Enlarge/reduce, rotate, move, and overlay two images
	Crop	Crop image by specifying area
	Arithmetic operation (all frames)	Calculate using all frames of two data (Add, Subtract, Multiply, Divide, Average)
	Arithmetic operation (single frames)	Calculate using single frame of two data (Add, Subtract, Multiply, Divide, Average)
	Batch average	Average multiple trial data offline
	Create subset	Specify a frame range and cut out as separate data