



Main Visilog image processing and analysis features



Reminder :

The Visilog images are 5D images :

- **x, y and z** as space coordinates,
- **c** as the frequency coordinate. This means the colour (this dimension gets the value of 1 for a greylevel image, and 3 for a classic colour image),
- **t** is the temporal coordinate. If $t > 1$, then we speak about an image sequence or an image series.

Most of Visilog algorithms available manage these 5 Dimensions. But, the images (or sequences) with $z > 1$ will need to be used with the **3D Module**.

These algorithms usually work on all image types : 8, 16 or 32-bits and floating images.

Image Edition Algorithms

- Creation, conversion, cut, paste, pattern image or random image generation
- Colour display conversion, colour image separated in a sequence of plans, and also conversion from bayer to colour image
- Sequence concatenation, colour sequence conversion and also sequence projection (zstack)

Binarisation Algorithms

- Threshold, interactive threshold, hysteresis threshold, colour threshold, automatic threshold, labelling (labellisation).

Point Operation Algorithms

- Global or local histogram equalisation, normalisation, background correction, transformation.
- Arithmetic operation, linear combination, masks.
- Absolute value, minimum or maximum between two images
- Logical operations shifting, inversion

Morphology operation Algorithms

- Erosion, dilatation, opening, closing, thickening, thinning for several kernel types in binary, greylevel or colour.
 - Filtering top hat, hole fill, reconstruction, edge detection, ultimate erosion.
- Skeleton, centroid, pruning, triple points, terminal points, isolated points.
- Morphological filters.
- Watershed, distance function, Greylevel reconstruction, minimum and maximum, binary and Greylevel separation

Filtering Algorithms

- FIR, several predefined filters, possibility to edit your own filters, separable filters, recursive filters,
- Adaptative filters: Bilateral, Despeckel, Nagao, Nagmod, Sigma, SNN,
- Non linear filters : median, delineate, deblur.

Frequency Algorithms

- Fourier transformation (any image size), reference change (x,y) to (r, theta) and in the other side centring.

Differential Algorithms

- Morphological gradient, linear gradient, recursive gradient, transformation (x, y) to (module, phase).
- Linear Laplacian, recursive Laplacian , Laplacian passing by 0.

Polygonal Representation Algorithms

- Polygon of objects edges from Binary images, polygonal approximation, transformation of polygonal representation to graphical annotations.
- Interior length, convex envelopes, circle approximation, ellipse approximation.

Geometrical algorithms

- Resolution change, translation, rotation, symmetries
- Images connexion (warping), corner detection, images registration, sequence registration.

Correlation and Hough Algorithms

- Any type of correlation, maxima extraction correlation.
- Lines, Circles and any kind of shape Hough algorithms, maxima Hough extraction.

Segmentation algorithms

- 1st and 2d rank texture parameter calculation, Law and Gabor filter parameters.
- Karhunen Loeve algorithm, automatic classification, interactive classification, region growing.

Analysis algorithms

- Several global measurements: area perimeter, inertia parameters, intercepts, Euler number.
- Statistical analysis and histograms, classes histograms, image comparison.
- Individual analyse, individual analysis filters, sieve classification. Several individual measurements such as area, perimeter, gravity center, inertia moment, shape factors, Ferret diameters, diameter variations, length, width, eccentricity, orientation, difference from a circle, from an ellipse, Greylevel , maximum, minimum, variance.