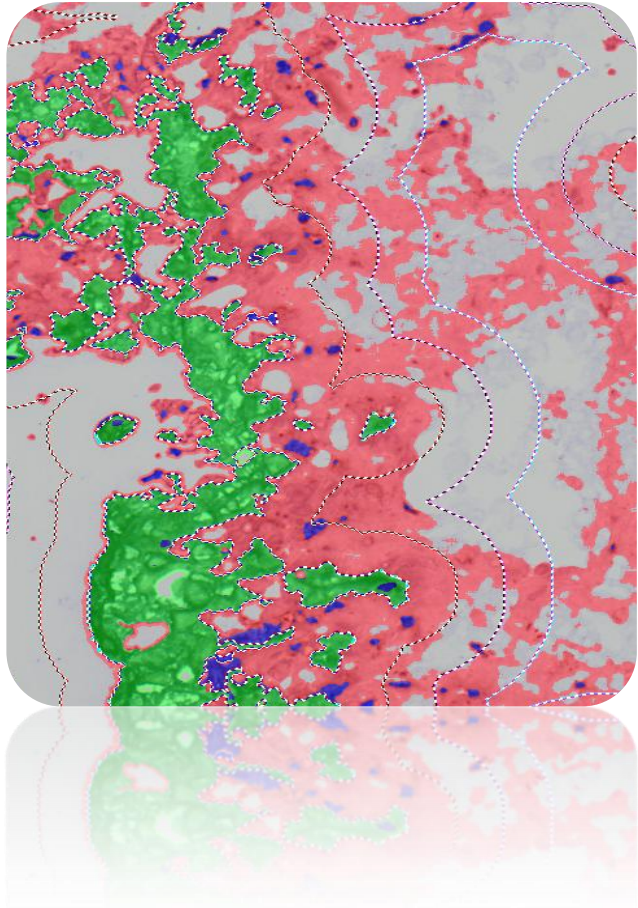


Visiomorph™ provides a set of highly specialized tools facilitating key aspects of working with quantitative image analysis, including imaging and data management.

The image analysis tools are optimized for the specific challenges in microscope images, and simplify the unambiguous expression of histological end-points in terms of spectral, spatial, morphological, and contextual image properties.

The knowledge and decisions made by expert users are easily stored electronically as user defined protocols. These electronic protocols can be loaded and executed by any authorized operator, either on individual images or entire batches of images, without necessarily knowing and understanding the technical and scientific content of the protocol. the technical and/or scientific content of the protocol.



## Technical overview

### Preprocessing steps

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#### Color transformations:

- RGB
- IHS
- Chromaticity, Contrast

#### Global operations and transformations:

- Abs, negate, not
- Add, subtract, multiply, divide (per pixel in two bands or with a constant number)
- Min, max (per pixel in two bands or compare to a constant number)
- Square, square root, ln, exp
- Scale [0;1]

#### Local (filter) operations

- Mean, median
- Standard deviation, modus
- Median unsharp, mean unsharp
- Normalize by median, normalize by mean

#### Polynomial filters (proprietary technology):

- Gradient
  - Orientation
  - Smoothing
  - Laplace
  - Linear structures
  - Blob structures
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## Classification design

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Classifier training by example:

- Freehand painting
- Region growing
- Extensive ROI and label tools

Basic classification tools:

- Thresholding
- Phase analysis

Advanced classification tools

- K-means clustering
  - Fuzzy K-means clustering
  - Linear Bayesian classification
  - Quadratic Bayesian classification
  - Automatic background detection
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## Post processing steps (refinement)

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Change object type based on:

- Unconditionally
- Area
- Circularity
- Context (neighboring objects)

Special operations:

- Enumerate objects
- Guidance step enabling manual interaction

Morphological operations:

- Fill holes
- Skeletonize
- Separate objects
- Conditional erode and dilate

ROI operations:

- Outline objects as ROI(s)
  - Create objects from ROI(s)
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## Quantitative measurement options (output)

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Output form

- Single values or histogram

Based on segmented image:

- Object area
- Object count
- Perimeter
- Interface length

Based on original image or feature image (for total image or specific objects):

- Min/Max intensity
  - Mean intensity
  - Standard deviation
  - Median
  - Modus
  - Entropy
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## Quick segmentation and quantification

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Define and use protocols

- Combine all above steps in a single protocol
- Apply protocol to a single image or batch process an entire study

Data collection:

- Output data and meta data are automatically stored in the integrated VIS database
  - Easy reviewing of output together with associated images and meta data
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