▸ Morpheus

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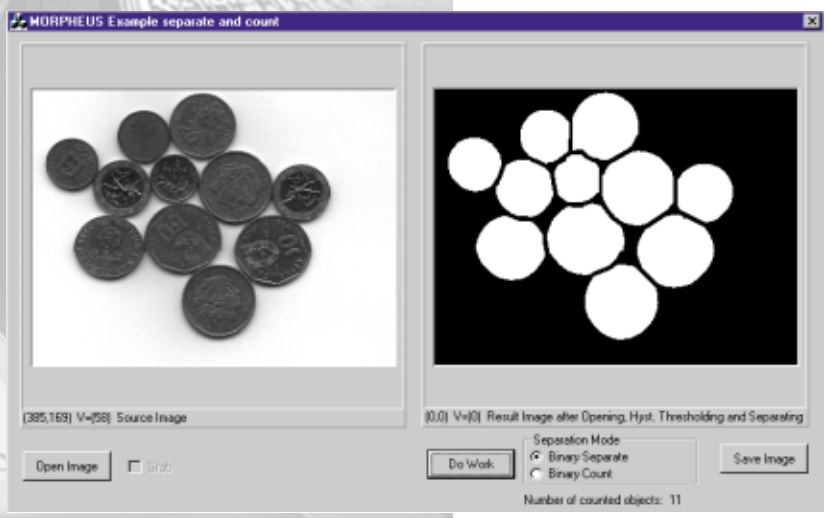

Software tool for morphological image analysis

STEMMER® IMAGING

▸ Morpheus

Morpheus is a software tool that facilitates the processing and analysis of grayscale and binary images using modern methods of mathematical morphology. The applications of morphological image processing range from visual inspection and quality control to scientific image analysis.

▸ How does Morpheus work?

Morphological image operators are ideal for suppressing or highlighting binary image objects or image structures. In addition to these basic morphological transformations, Morpheus also provides modern morphological, geodesic transformations based on the concept of mathematical restoration. Using these operators it is possible to define what are known as algebraic filters that are able to adapt to image structures. It is possible, for example, to eliminate all structures below a particular size, in grayscale images as well, without changing other parts of the image.

Most image analysis problems are very complex and can only be solved by combining a number of basic transformations. It is therefore possible in Morpheus to execute an unlimited number of consecutive transformations; the output image of one operation becomes the input image of the next one. In this way, it is possible to program very powerful image analysis procedures specifically for a particular problem within a very short space of time.

The segmentation of the image into different regions plays a key role in the quantitative analysis of the image data. Morpheus makes morphological segmentation available in the form of watershed transformation. Since successful segmentation is dependent on the relevant image extrema first being extracted and marked, all the operators required for extrema analysis and filtering are available. This means that complete segmentation sequences can be programmed to separate overlapping grayscale objects. Ready-made methods are available so that the separation of binary objects can be rapidly implemented. These methods provide an image of the separated or labeled objects.

Functions in Morpheus

Basic transformations
- Erosion and Dilation using a rectangular structuring element
- Extraction of morphological gradients
- Morphological opening and closing
- Top-hat transformations (white, black, selfdual)
- Contrast enhancement

Operators based on morphological restoration
- Hysteresis binarization
- Filtering of regional and extended extrema
- Algebraic opening and closing
- Connected opening and closing
- Labeling and particle analysis, clean-up of image edges
- Filling of holes

Segmentation functions
- Distance functions with different standards (Euclidean, 4- or 8-neighborhood)
- Watershed transformation (marker-controlled)
- Separation and counting of overlapping objects

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