

Important and Common Python Terms

Pixel/voxel

The smallest unit of a digital image, representing a single picture element, which in 2- and 3-dimensional images is called a pixel and voxel respectively, or just a value.

Resolution

For microscope images, it is often possible to attribute the size of a pixel or voxel in physical units, e.g., 1 micrometre per side of a pixel or voxel.

Binary/Grayscale/RGB Image

A grid of values typically that are either black or white (binary), a wider range of values from black to white (grayscale), or a tuple of three principal colour values (red, green, blue), where each in turn has a range of values. The image of, e.g., red values is called the red channel.

Histogram

A graphical representation showing the distribution of the intensity values of an image.

Signal/Noise

The wanted/unwanted contribution to image values. The noise is often stochastic.

Filtering/convolution/smoothing/denoising

Techniques used to enhance or suppress features in an image, such as blurring, sharpening, or edge detection. They involve a kernel, which is a small set of weights used in a weighted sum of neighbouring values in the input image to calculate values in the output image

Segmentation

The process of dividing an image into different regions, segments. Typically performed in a pixel-by-pixel manner, in which case, it is also known as pixel classification. The simplest pixel classification is called thresholding.

Morphological Operations (erosion, dilation, opening, closing)

Image processing operations that process images based on their shapes, commonly used on binary images for noise reduction on object boundaries, object separation, etc.

Registration

The process of aligning two related images by transforming the coordinates of one image to make it look like the second image. Commonly done for neighbouring images in a z-stack, in time, and across image modalities.