

How is 'Standard Area' used to determine a count?

Abstract

How Standard Area is used to determine a count.

Instructions

Question

How does "Standard Area" get the count from the object area. Is it a simple "integer" division, by the Area. Say ..

$$\text{Num} = (\text{Area} \setminus \text{StandardArea}) + 1$$

Or is it the actual "Mean Area" for an object. So that you might count objects when it reaches a certain percentage of the "Standard Area". Say ...

$$\text{Num} = (\text{Area} \setminus (\text{StandardArea} * 1.66)) + 1$$

Answer

Standard Area Count (SAC) in the Discovery-1 software is determined as follows. Standard Area is abbreviated as SA. The rule is that $\text{SAC} = (\text{Pixel Area} / \text{Standard Area})$, rounding upwards from 0.5 SA and downwards from 1.4999999 SA.

1. Single thresholded pixels (pixel area = 1) are ignored (because we assume they are noise in the image).
2. Let's assume that you've set Standard Area = 10000 pixels.
SAC = 1 for pixel areas of 2 to 14999.
SAC = 2 for pixel areas of 15000 to 24999.
SAC = 3 for pixel areas of 25000 to 34999.

Creating Test Images

The procedure for creating test images in the Discovery-1 software is:

1. File menu, select New, set the Gray value to 0.
2. Under the Measure menu, select Configure Object Standards, set Standard Area = 10000. Under the Measure menu, select Integrated Morphometry Analysis and check the Pixel Area, Standard Area Count, Length and Width parameters.
3. In the Window menu, select Toolbars, check Region Tools. In the Region Tools toolbar, click the Region Properties icon, set the Default region width to 99, and the Default region height to 149. Check the "Lock Region Size" box.
4. Using the Rectangular Region tool, create a region on the image (you will ultimately want several non-overlapping regions so leave room!).

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5. Under the Display menu, select Graphics, and Paint Region. Set the Gray Value to 255. Hit the Paint button. This makes a rectangle of 100x150 pixels.
6. Move (or create more) region(s) and paint those as well.
7. Click the Region Properties icon again and set the Default region width to 1 and the Default region height to 1. (Note: the Rectangle painted will be 2x2 pixels).
8. Under the Display menu, Graphics, Paint Region, set the gray value to 0. Position at a corner of a painted rectangle. Hit the Paint button. Since it is hard to tell if the region was completely over the rectangle (reducing the rectangle area by 4), or partly over a rectangle, I suggest you paint corners of several rectangles. Leave one white rectangle alone so its area will be 15000 pixels.
9. In the image window, click the Threshold icon and select "Threshold Image..." Set the Low to any value above 0, and High to 255.
10. In the Integrated Morphometry Analysis dialog box, click Measure.
11. In the Display drop-down, select Objects. Click in the middle of each rectangle. Note the Pixel Area and Standard Area Count.

Note: this function is very commonly used in journals, so check your journal for this function.