

Partial Volume Effect

Partial volume effects are present on any digital image; in 2D or in 3D. The effect is seen at pixels on the edges of an object as they include both object and background. The signal in these pixels is then the area weighted mean of object and the background. The larger the pixel and smaller the structures one wants to display on a digital image the more pronounced this effect will be. Below an example of this effect is shown.

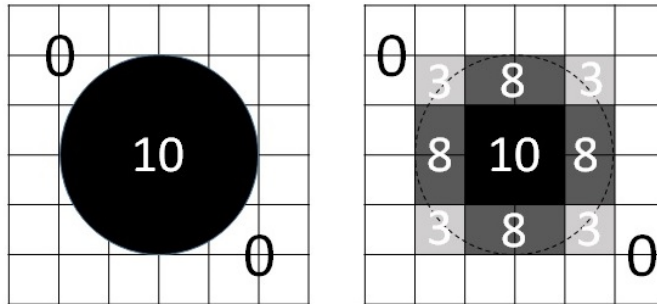


Figure 1 Partial Volume Effect

The partial volume effect makes it trickier to select the adequate threshold, especially on small or thin objects. The larger the object in relation to the resolution the less this effect will be pronounced. An example of this can be seen below.

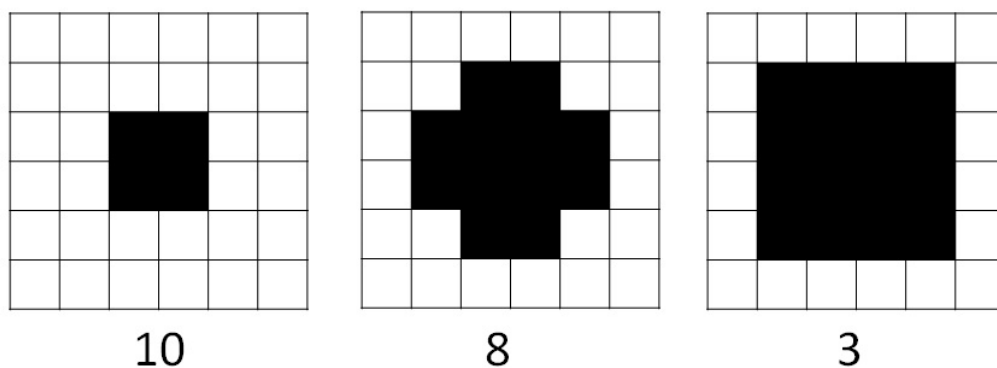


Figure 2 Effects of different segmentation thresholds

As a consequence of the selected threshold the average density of the object will change. This effect is shown in the bottom picture. To be on the safe side when computing mean density of trabecular bone, as standard the SCANCO Bone Morphometry script discards 2 surface voxels of every trabeculae. Hence, it is recommended that the scan resolution is high enough so that every trabeculae is at least 5 voxels large

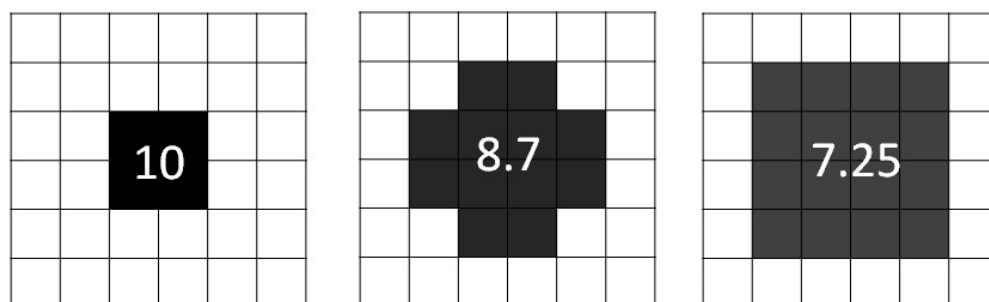


Figure 3 Average density of segmented object