

CG Basics00 : Raster Bitmaps vs Vectors.

Raster vs Vector Graphics

Historically, two kinds of computer graphics technologies have evolved:

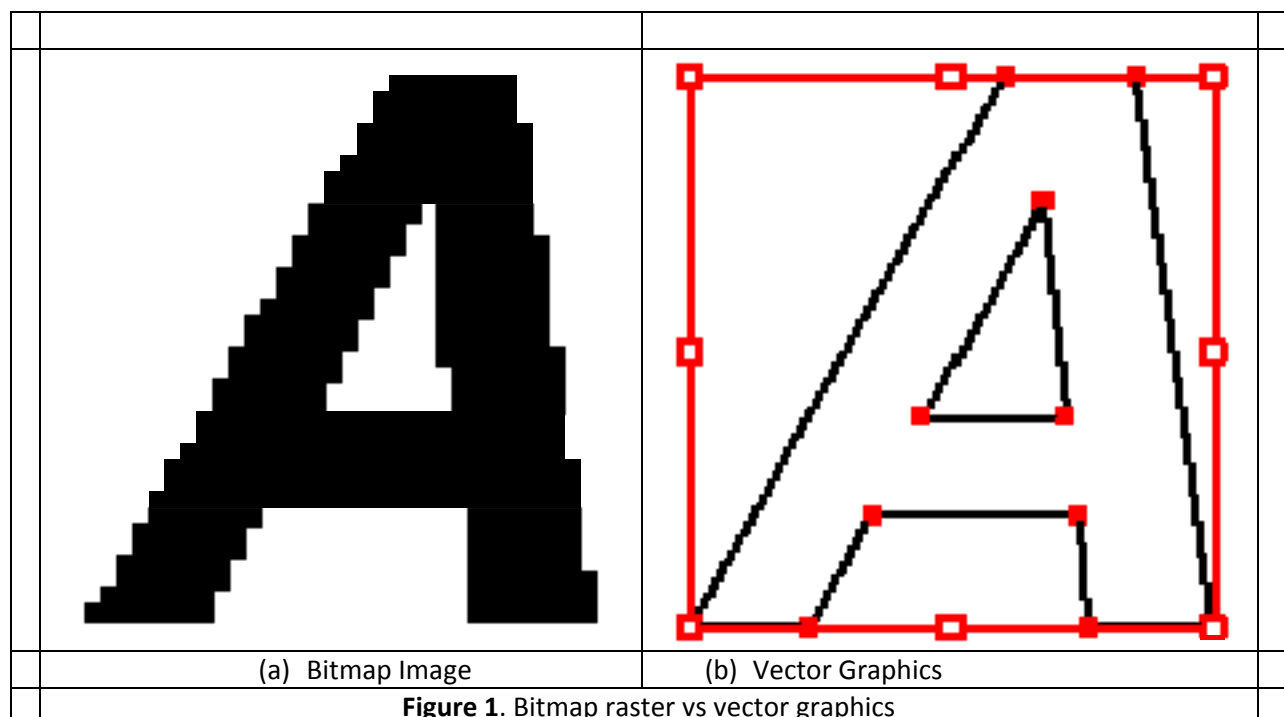
1. Raster Graphics – pixel-based
2. Vector Graphics – geometric paths in 2D

Raster (grid) displays support bitmap images using a grid or an array of individual pixels. Each pixel carries a unit of image information (gray level or color) that will occupy a finite area on the screen. Bitmaps are composed of pixels. The bitmaps are “written” only once on the raster grid.

Vector (path) displays trace the geometric information on the screen according to a traceable path. The paths are connected to form the final image. Vector graphics are composed of paths or traces and each object must be drawn independently from all the other objects.

The image in Figure 1a below represents the details of a raster bitmap composition of a bold letter **A**. Notice that the edges of the letter are built on regions of pixel bitmaps. This results in a blocky representation that becomes visible at subpixel levels.

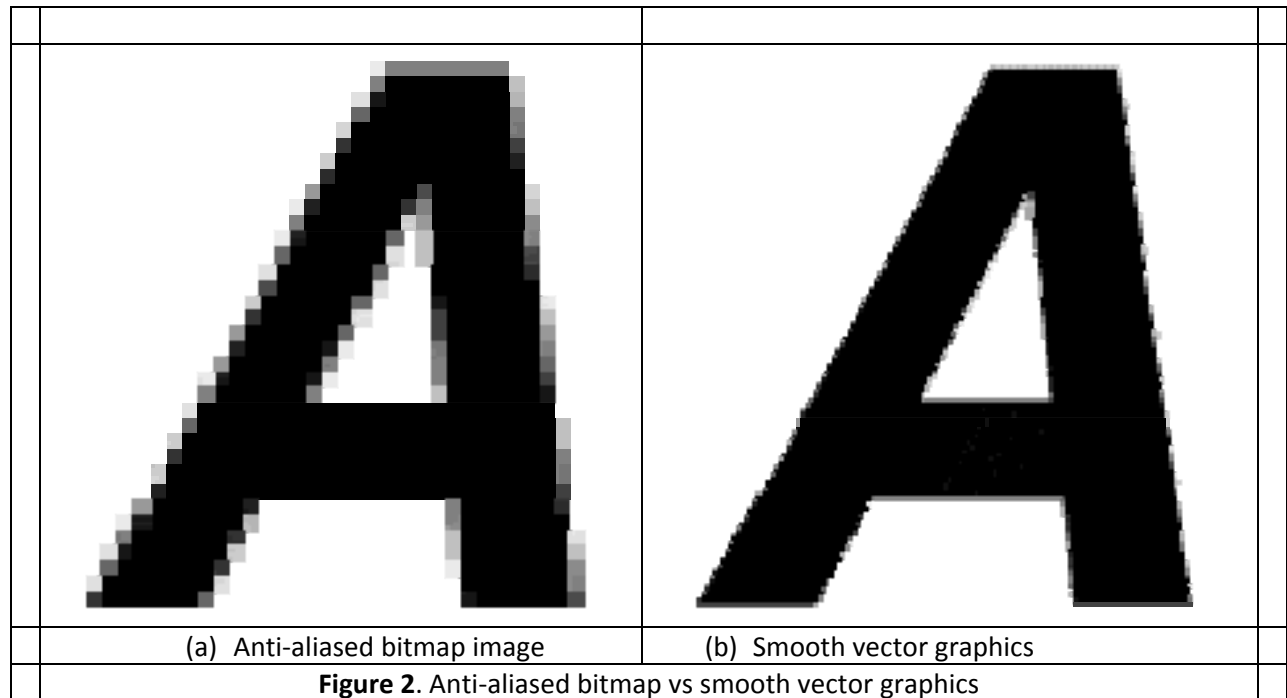
By comparison, the image in Figure 1b below is the representation of the same letter **A** drawn by tracing all the paths of the regions of the letter edges. This results in smoother edges, but comes at a cost.



Which is better (a) or (b)?

Aliasing and Anti-Aliasing

In order to compensate for the blockiness visible in Figure 1(a), *anti-aliasing* techniques are applied to smoothen out the edges. The jagged appearance in Figure 1(a) can be improved by partially filling pixels in the neighborhood of the blocky edges. The results are as in Figure 2(a).



Anti-aliasing is the category of rendering techniques that remove the high-frequencies in an image by applying smooth transitions between edges, lines and backgrounds.

Which is better (a) or (b)?

EOD.