

sample Free-Response Question 1 开放式问答题示例一

Here is a sample free-response question that uses recursion in a two-dimensional array. See if you can answer it before looking at the solution.

A *color grid* is defined as a two-dimensional array whose elements are character strings having values "b" (blue), "r" (red), "g" (green), or "y" (yellow). The elements are called *pixels* because they represent pixel locations on a computer screen. For example,

b b g r		y g r
g r g r	r r r r r	b y g
		g r b
		b b g

A *connected region* for any pixel is the set of all pixels of the same color that can be reached through a direct path along horizontal or vertical moves starting at that pixel. A connected region can consist of just a single pixel or the entire color grid. For example, if the two-dimensional array is called `pixels`, the connected region for `pixels[1][0]` is as shown here for three different arrays.

b b g r	y g r b	b b
g r g r	g g y g	b b
	b g r g	

The class `ColorGrid`, whose declaration is shown below, is used for storing, displaying, and changing the colors in a color grid.