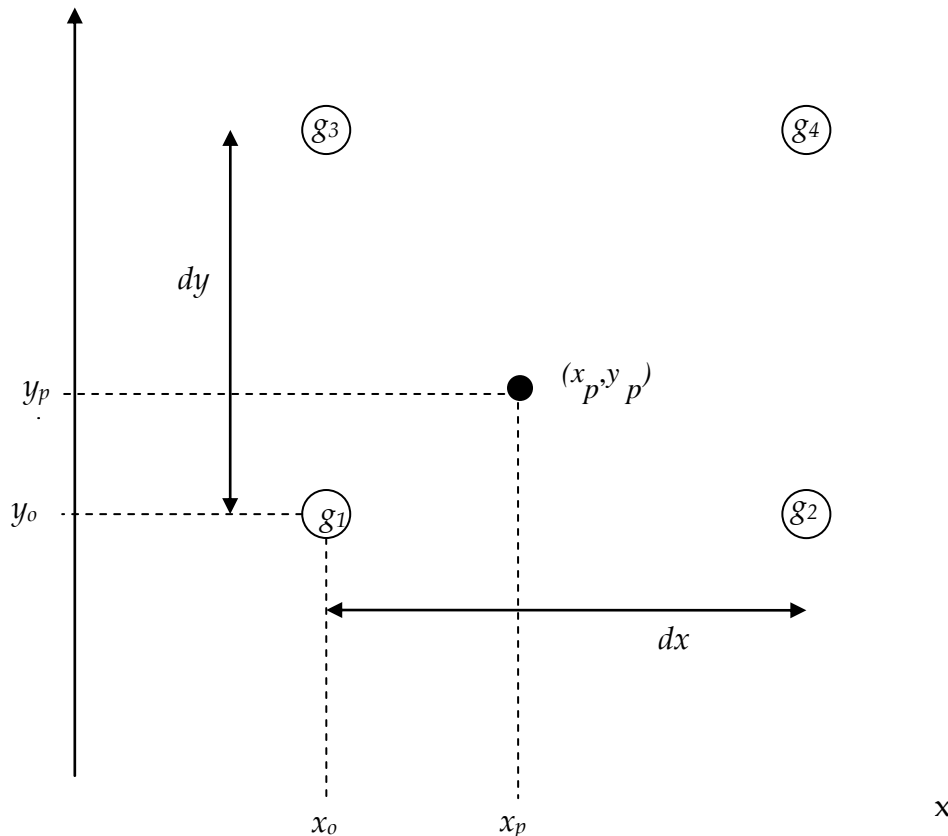


Bilinear interpolation

Bilinear interpolation requires that the measuring points are stored in a regular grid. In this case, a grid in x and y with the divisions dx and dy is used. Each measuring point i has the value g_i (here: values from the original satellite image). For an arbitrary point (x_p, y_p) , the value $g(x_p, y_p)$ can be interpolated by applying the following calculation procedure:

1) Determine in which square the point (x_p, y_p) is located. Find the 4 measuring points which form corner points in this square (these points are called g_1, g_2, g_3 and g_4 in the figure below). These points are, of course, the four nearest points to the point (x_p, y_p) .



2) Determine where the point (x_p, y_p) is in this square, *i.e.* determine u and w according to the equations (names as shown in the figure above):

$$u = (y_p - y_0)/dy$$

$$w = (x_p - x_0)/dx$$

3) Interpolate the value $g(x_p, y_p)$ according to the following equation:

$$g(x_p, y_p) = \begin{bmatrix} u & 1-u \end{bmatrix} \begin{bmatrix} g_3 & g_4 \\ g_1 & g_2 \end{bmatrix} \begin{bmatrix} 1-w \\ w \end{bmatrix} = (1-u)(1-w) g_1 + (1-u)w g_2 + u(1-w) g_3 + uw g_4 =$$

$$= g_1 + (g_3 - g_1)u + (g_2 - g_1)w + (g_1 - g_2 - g_3 + g_4)uw$$