



## How To

Expertise at Your Fingertips

[www.exsys.com](http://www.exsys.com)

# Returning a Continuous Numeric Value From an Image Map

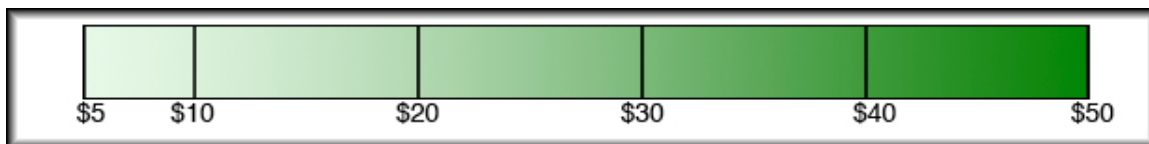
A system demonstrating this “How To” can be run from the “Returning a Continuous Numeric Value from an Image Map” section of:

<http://www.exsys.com/support/howto>

The code for the sample system can be downloaded from the same page.



An image map can have “hot spots” that return fixed values associated with the hot spot that was clicked on, but an image map can also return a Numeric value that is a **measure of where** the user clicked. For example, if the user clicks half way between \$10 and \$20, it returns 15.



This is sometimes loosely called a “slider bar”. The measure of location in the image can be horizontal or vertical. It can also be two-dimensional, where a single user click returns both an X and Y value.

- Open and run the demo
- Click on the price scale to select a price
- Click on the X/Y graph to select an X and Y value
- The RESULTS will show the selected values

### How it Works:

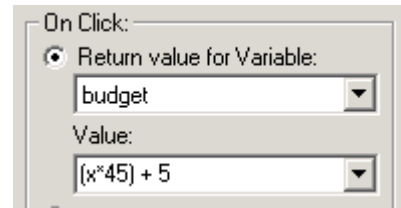
- Open the 'NumericFromImageDemo.CVD' file in Corvid editor.
- In the 'Variables' window, select [budget].
- Under the 'Ask With' tab, click on 'Edit Map' next to “Image Map”.

- Click on the '>' button to select the first (and only) hot spot. (Selecting the hot spot by clicking on the hot spot could accidentally drag it.)

The value assigned to [budget] is the formula:

$$(x*45) + 5$$

The formula has a parameter, "x", which will be automatically replaced by Corvid with the horizontal location where the user clicked.



Corvid determines the pixel location clicked relative to the left edge of the hot spot and uses that and the total width of the hot spot to compute the percentage between the left and right edges of the hot spot.

For example, if the user clicks exactly in the center of the hot spot, the value of "x" would be .50 (which is 50%). If the user clicks 10% of the distance from the left edge to the right edge, the value of 'x' would be .10 (which is 10%). But you don't want the percentage, you want the equivalent value as represented in the scale in your image, so you do a mathematical conversion. For images with a linear scale, the conversion formula is:

$$(x * (\text{right\_edge} - \text{left\_edge})) + \text{left\_edge}$$

where 'right\_edge' is the scale value at the right edge of the hot spot and 'left\_edge' is the scale value at the left edge of the hot spot.

The example scale has scale values at the edges of 5 and 50, so the conversion is:

$$(x * (50 - 5)) + 5$$

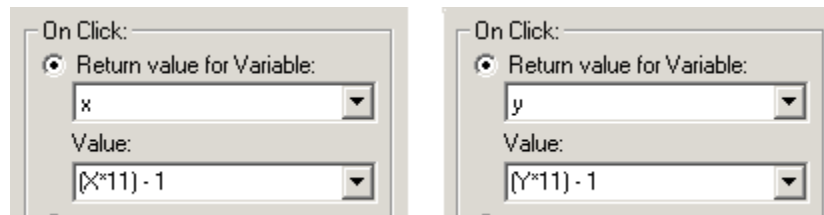
which simplifies to:

$$(x*45) + 5$$

The same conversion formula can be used if the scale decreases from left to right, instead of increasing.

## Retrieving X and Y with a Single Mouse Click

Edit the variable [x] and click on 'Edit Map'. This needs to return 2 values from a click. Returning two values requires two hot spots, though they can overlap. Click on the '>' button to select the first hot spot.



Notice the return value:

$$(X*11) - 1$$

will be assigned to [x]. You use the same conversion formula:

$$(X * (\text{right\_edge} - \text{left\_edge})) + \text{left\_edge}$$

since the graph ranges from -1 to 10, the formula is:

$$(X * (10 - (-1))) + (-1)$$

which simplifies to:

$$(X*11) - 1$$

**(Note:** The 'x' is not case sensitive.)

Click on the '>' button again to select the second hot spot. This time, [Y] is being assigned the value:

$$(Y*11) - 1$$

'Y' is similar to 'X' except it has the value of the percentage from the bottom of the hot spot to the top of the hot spot.

For a linear scale, the conversion formula is:

$$(Y * (top\_edge - bottom\_edge)) + bottom\_edge$$

Again, the edges are the hot spot edge values on the scale (not the pixels).

If the vertical scale increases going down (instead of up), use the same formula.

Building the two hot spots on top of each other requires a trick because when you attempt to drag out the second hot spot on top of the first hot spot, Corvid thinks you want to drag (move) the first hot spot. Drag out the first hot spot in its correct position and size and write down its 'Coordinates'.

Find a portion of the image that is not covered by the hot spot and drag out a new hot spot without being concerned about its size or location. If no portion of the image is free, drag the first hot spot out of the way so you have an area that is not covered. Now click on the '>' and '<' buttons to select each hot spot and type in the correct Coordinates. You should now have two hot spots that are the same size and location. Have each hot spot assign one of the two variables.

Sometimes circumstances require the hot spot to return a single value that is a combination of both the X and Y. To do so, the return formula can use both "X" and "Y" in it.

For example, suppose the graph has speed and fuel efficiency as the two axes. Suppose you want to return a measure that increases mostly with speed but also with fuel efficiency. This formula will do that:

$$400 * X + 200 * Y$$

where 400 and 200 are the weighting factors.

## Accuracy and Precision

The approach described above can be very accurate, but several factors can degrade accuracy.

1. The image may be distorted. Make sure that the space in each region of the image is correct and that the scale is in the correct place. The formulas used above are for linear scales. If the scale is non-linear the formulas will need to be modified accordingly.
2. The hot spot box is not placed accurately. If the hot spot is not aligned with the scale in the image, then the return values will not be accurate.
3. The user is not clicking precisely. The user may not know which spot in the mouser pointer is the spot that counts. Design the image so that it is easy tell what the scale markers represent. Also, it is very easy for the user to be off by a few pixels, so design the system the logic to take this into account.
4. Pixels have finite resolution. If the image is small, it will not have high resolution. A 20 pixel image can only return 20 possible values. To get higher precision, make the images/hot spots large. It is often a good idea to add a grid on the image to help the user to click a precise value.