How Do I?

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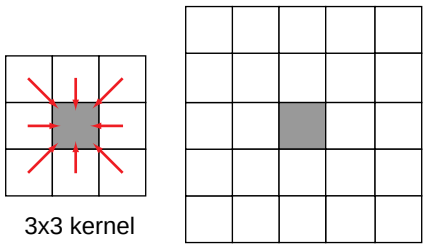
Create a Kernel for the Filter Operation

Operations Filter

Example The MFworks **Filter** operation allows you to use convolution kernels that you have created or supply. Kernels are also called roving windows. The values in a kernel are used as weighted multipliers that guide the **Filter** operation. The weighted multipliers indicate how the value in the centre of the window is calculated based on the values in the input map layer that fall within the window.

The **Filter** operation processes the data in the operand map layer by passing a roving window, called a kernel, over the data matrix. New values are assigned to the cell in the middle of the kernel based on the values of the cells that surround the centre cell. Kernels must have an odd number of rows and columns. The smallest kernel is a 3x3 matrix. Kernels can be 5x5, 7x7, 9x9, and so on. The larger the kernel, the more cells there will be to influence the value that is assigned to the central cell, and the longer it will take to process the data.



3x3 kernel

5x5 kernel

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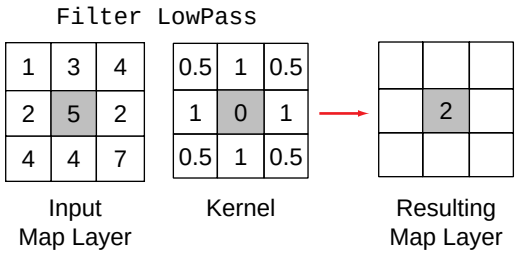
The cell values in a kernel, known as weights, specify how much influence that cell will have in determining the value of the centre cell. The larger the value, the greater the influence that cell will have.

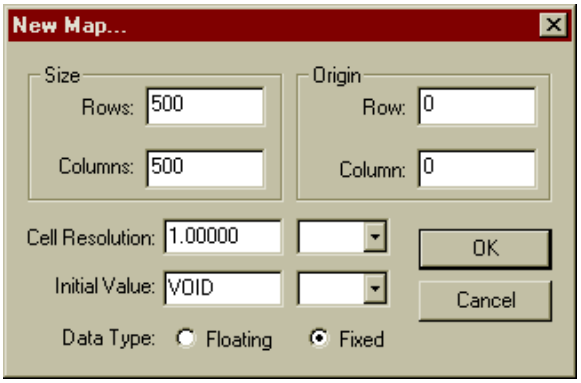
5	10	5
10		10
5	10	5

In the example above, the cells that are diagonal to the centre cell will only have half as much influence as the horizontally and vertically adjacent cells. The values in the cells of the kernel are used as multipliers in the different weighting formulae that the various filters use.

The **LowPass** filter averages the values in the window and assigns the central value accordingly. If an operand map layer has the following values and the value of the centre cell is the one to be determined, the **LowPass** filter using these kernel weights will yield the following results:



To make a kernel, select **New** from the **File** menu. This will open the New Map dialog box. In the **New Map** dialog box, specify the number of rows and columns and the data type, then click on **OK**. It is not necessary to set an initial value, origin, cell resolution, or data units:



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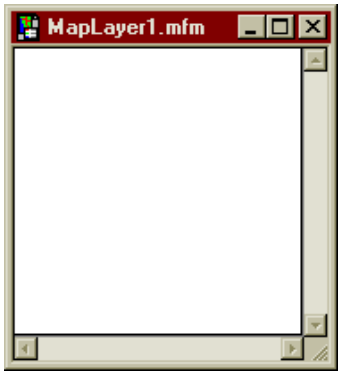
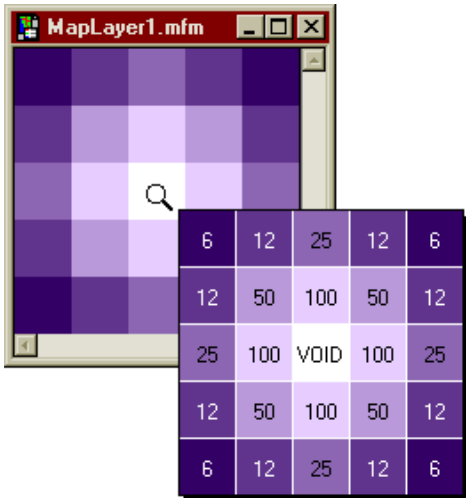
When the new Map window opens, increase the magnification to 1:16 to make editing easier:



Choose the pencil tool from the Map window tool box. Use the pencil tool to click on each cell and enter the values to represent the weights:



Once the weights have been entered, give the kernel an appropriate name and save it. The kernel can now be specified in the **Filter** operation in the same way any other map layer would be specified.

- Smooth Anomalous Values
- Create a Shaded Relief Map from a DEM

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