
Heatmap Examples

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This script demonstrates the capabilities of the *heatmap* visualization function.

Load Data for Visualization

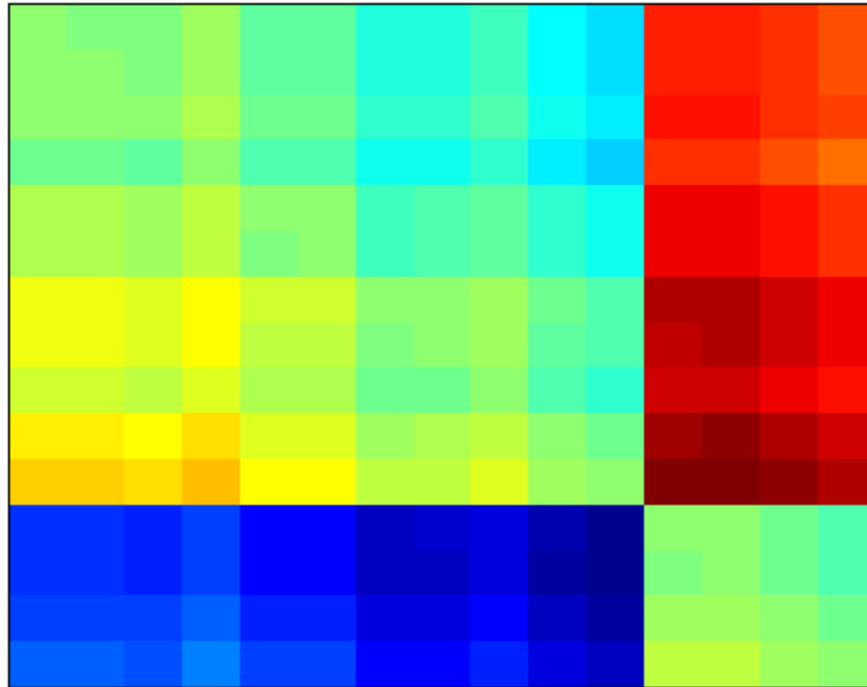
Import data set to visualize. The data set contains a matrix of electricity price differences between locations in New England.

```
load heatmapData
```

Simple Heatmap

Generate heatmap only with no labels

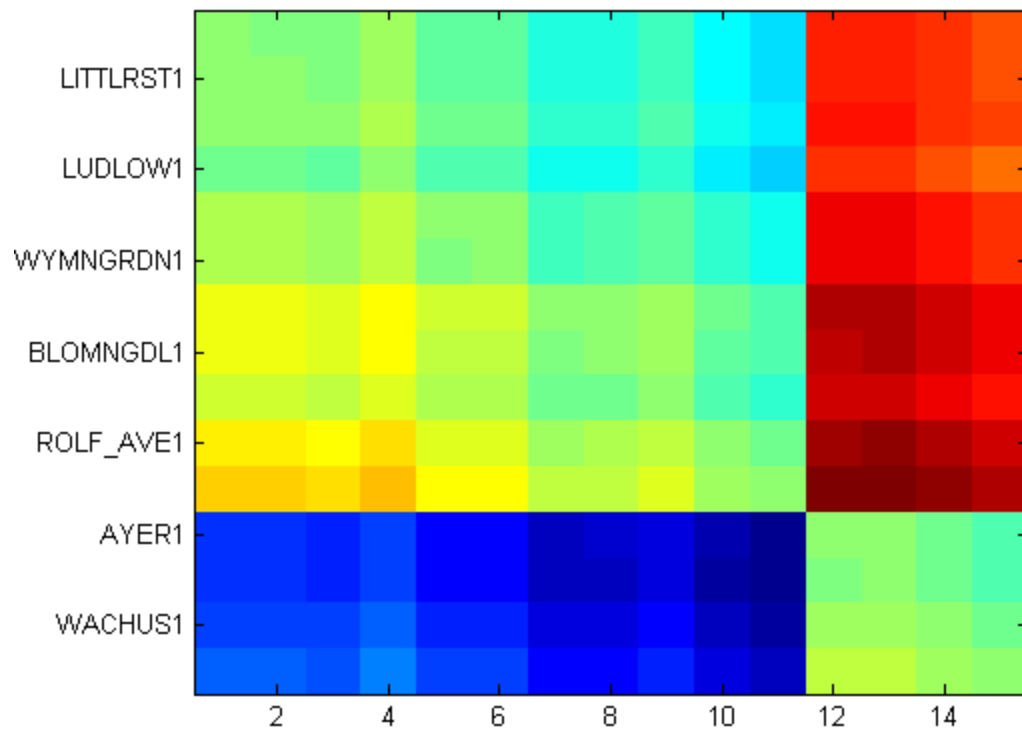
```
clf
heatmap(spreads_small);
```



Axes Ticks & Labels

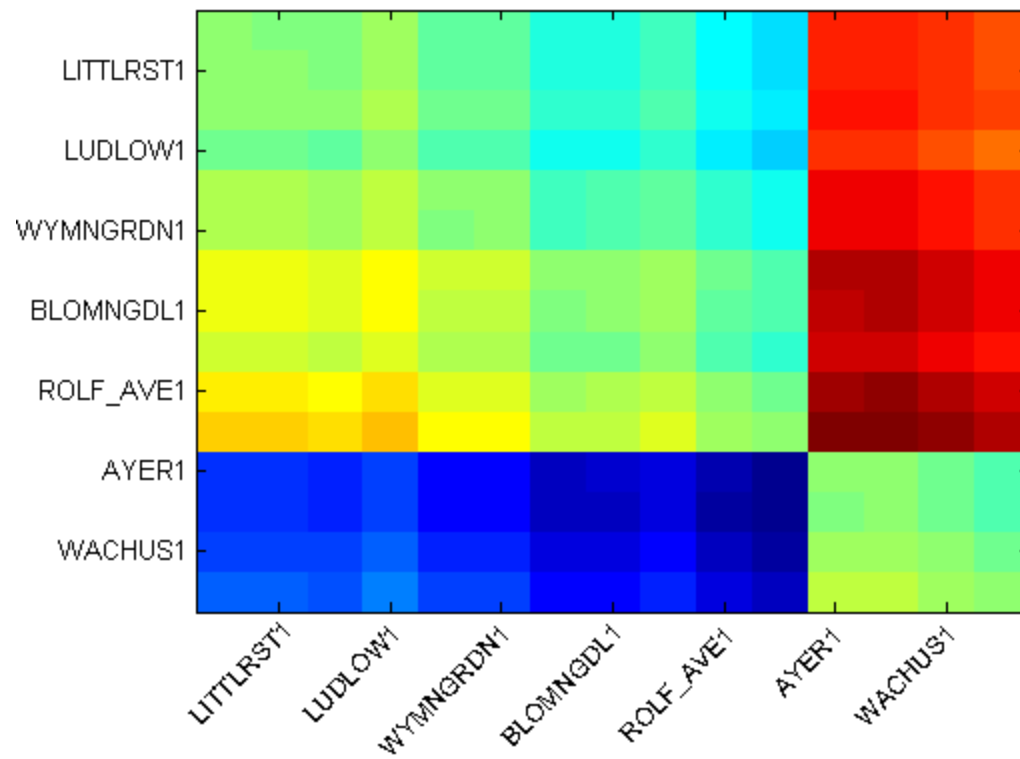
The heatmap above can be made a lot more useful with labels on the columns and rows. We can do this with two more inputs for x and y labels. The labels can be numeric or cell arrays of strings

```
clf
heatmap(spreads_small, 1:15, labels_small);
```



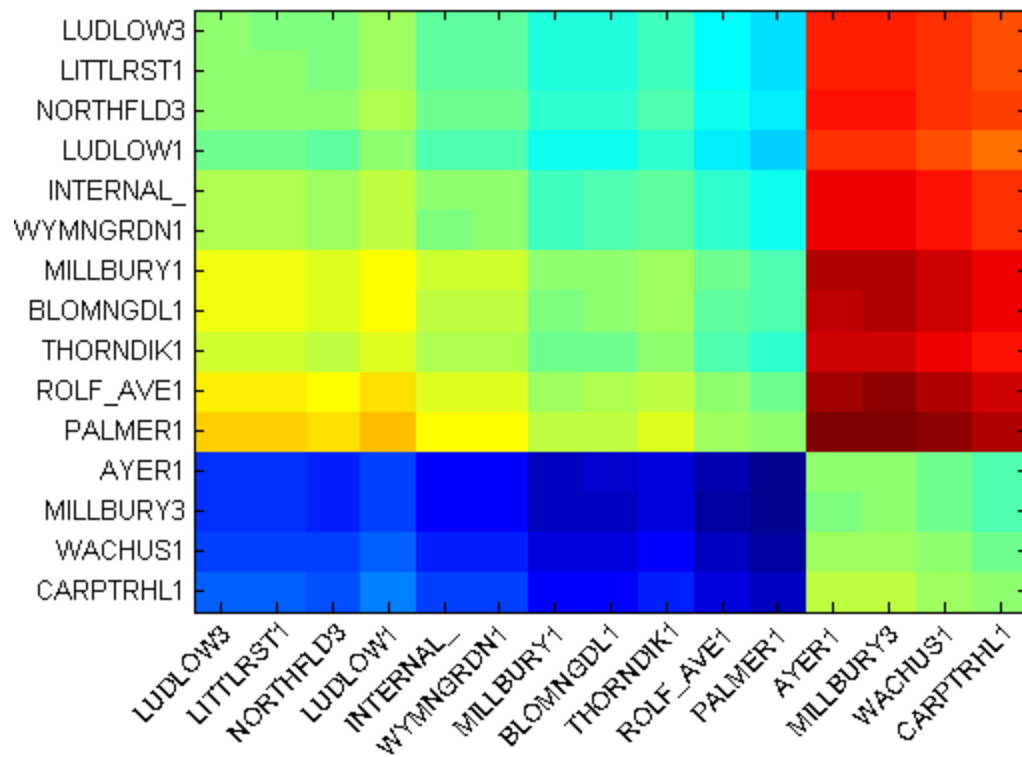
Labels on the x-axis can be rotated to prevent overlap

```
clf  
heatmap(spreads_small, labels_small, labels_small, [], 'TickAngle', 45);
```



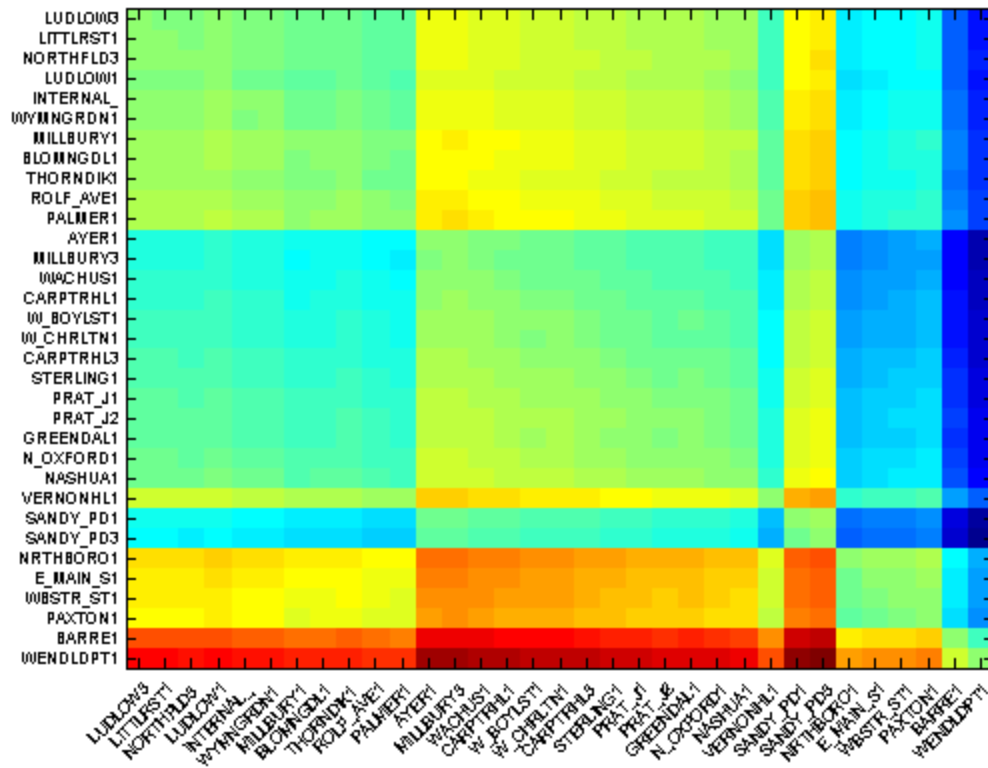
By default, for larger heatmaps, not all ticks are shown. This can be forced with the *ShowAllTicks* option.

```
clf
heatmap(spreads_small, labels_small, labels_small, [], 'TickAngle', 45,...
        'ShowAllTicks', true);
```



The font size of the ticks can also be controlled with the *TickFontSize* option. This can help when trying to fit many tick labels on a heatmap.

```
clf
heatmap(spreads, labels, labels, [], 'TickAngle', 45,...
        'ShowAllTicks', true, 'TickFontSize', 6);
```

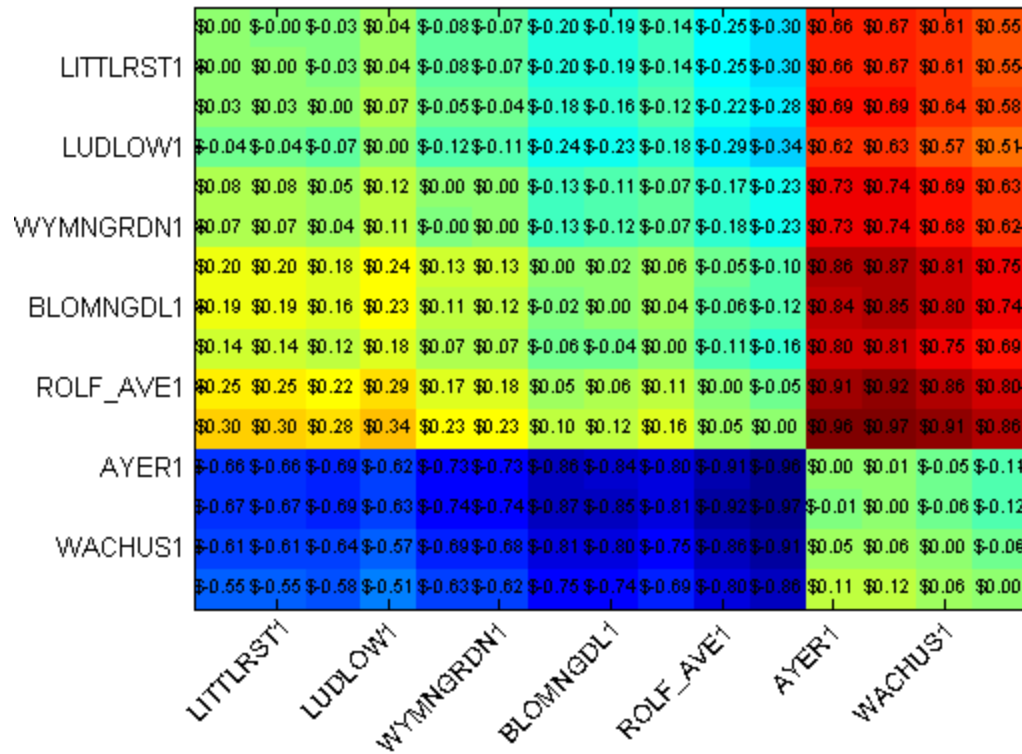


Heatmap Text Labels

The heatmap image can be overlaid with text strings to either make the heatmap more descriptive or overlay another data set. The text labels can either be just turned on, turned on with a specific format or specified as another numeric matrix or cell array of strings

Turn on text labels with a format `$xx.xx`. See the documentation of `sprintf` for more information on format strings

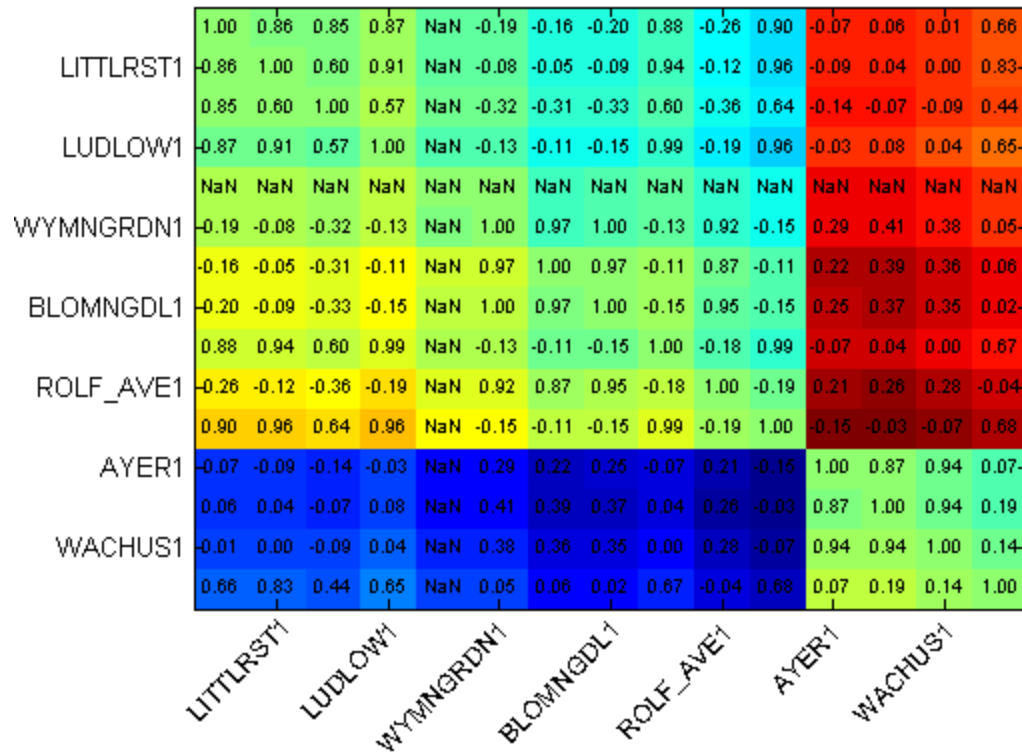
```
clf
heatmap(spreads_small, labels_small, labels_small, '$%0.2f', 'TickAngle', 45);
```



A completely different matrix of data can be shown as text labels on top of the original heatmap, enabling you to overlay another dataset

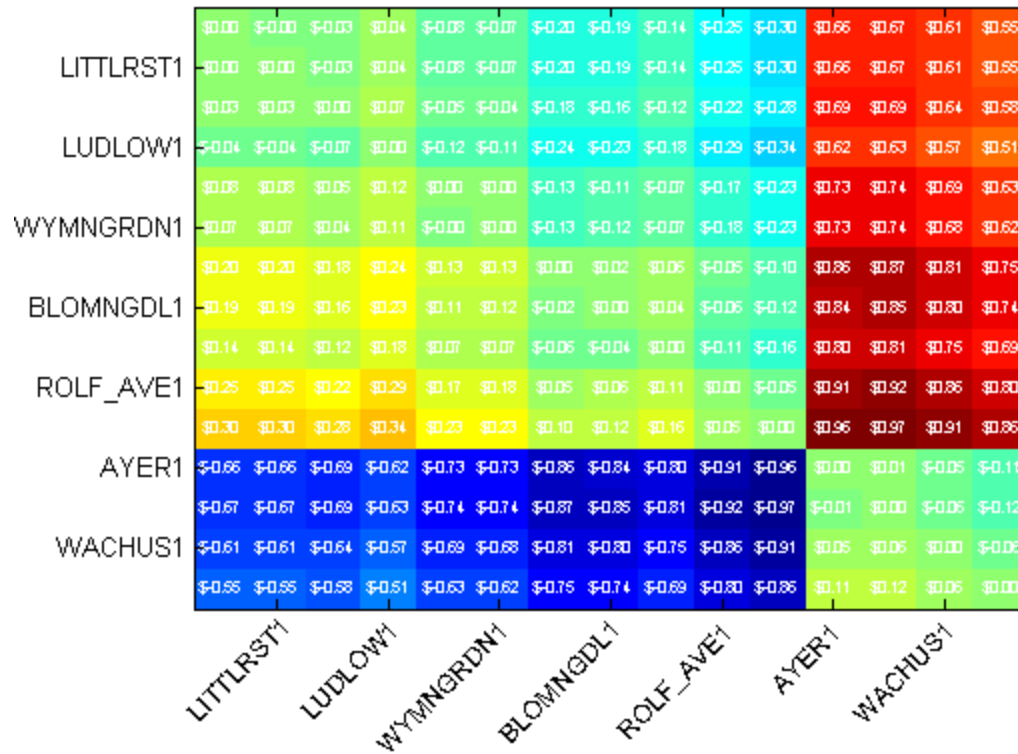
```
% Convert matrix c_small into a cell array of formatted strings
clabel = arrayfun(@(x){sprintf('%0.2f',x)}, c_small);

clf
heatmap(spreads_small, labels_small, labels_small, clabel, 'TickAngle', 45);
```



Properties of text labels include *FontSize* and *TextColor*. *TextColor* can also be specified as a string 'xor' in which case a color will automatically be chosen for each label to contrast with the color on the image.

```
clf
heatmap(spreads_small, labels_small, labels_small, '%0.2f', ...
        'TickAngle', 45, 'FontSize', 6, 'TextColor', 'w');
```

Zoom, Pan & Data Cursors

Heatmaps generated with *heatmap* are interactive, in that you can zoom and pan to explore the visualization. The tick labels will automatically update in response to zoom and pan events. Data cursors are also supported. The text shown in the data cursor is derived from the text labels used to display the data on the heatmap image.

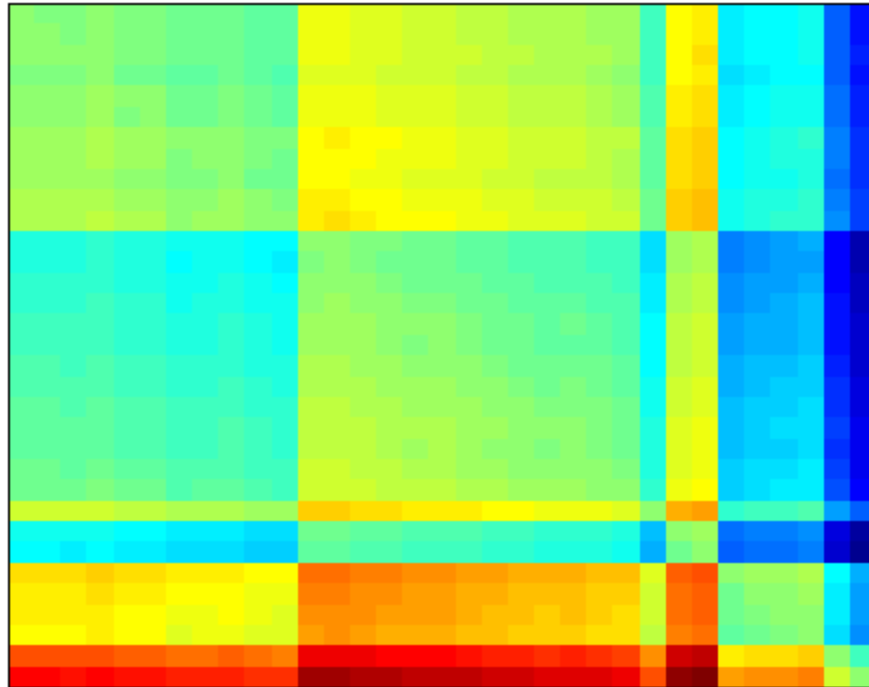
Changing the Colormap

Heatmaps, by default, use colormap of the figure in which they are created. So changing the figure colormap will change that of the heatmap

```
clf

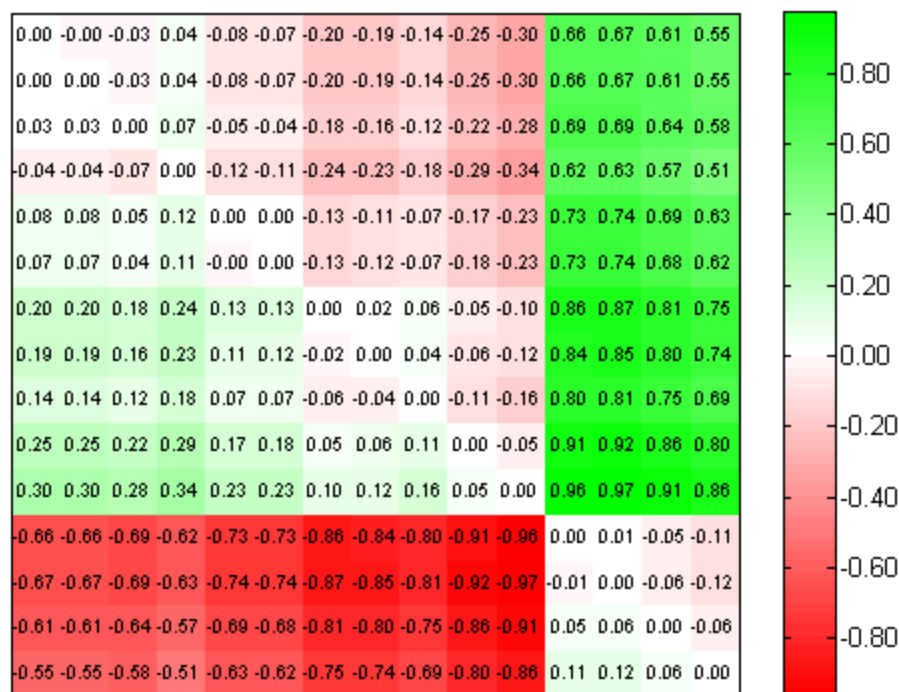
heatmap(spreads);
snapnow

colormap cool
snapnow
```



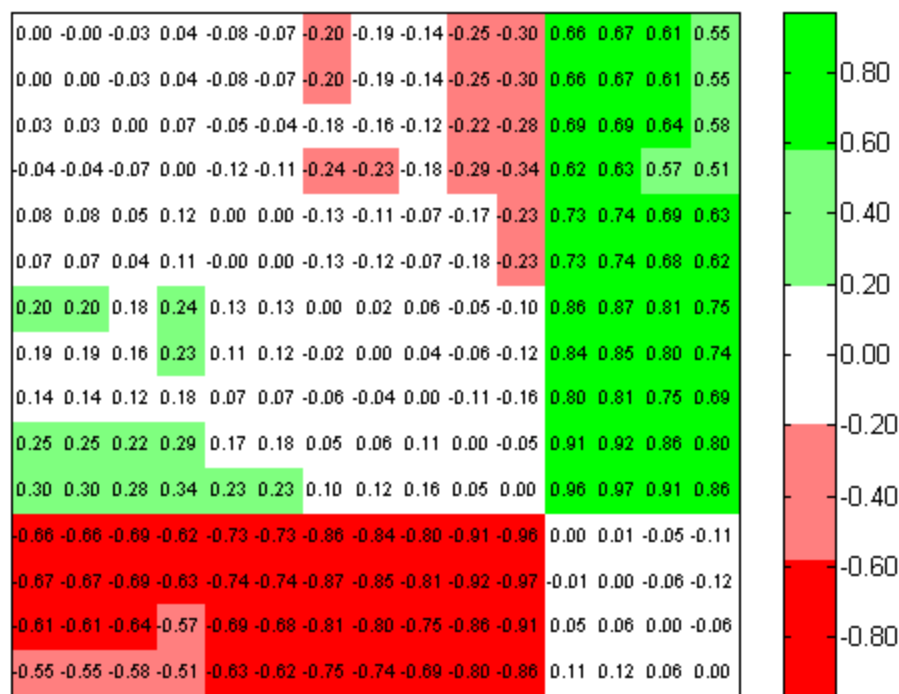
heatmap includes two custom colormaps. The colormap *money* displays values of 0 as white and positive and negative values as shades of green or red. The colormap *red* displays values of 0 as white and positive values as different shades of red. You can also use your own colormaps with the *Colormap* option

```
clf
heatmap(spreads_small, [], [], '%0.2f', 'Colormap', 'money', ...
        'Colorbar', true);
```



The option *ColorLevels* lets you increase or decrease the number of distinct colors in the colormap.

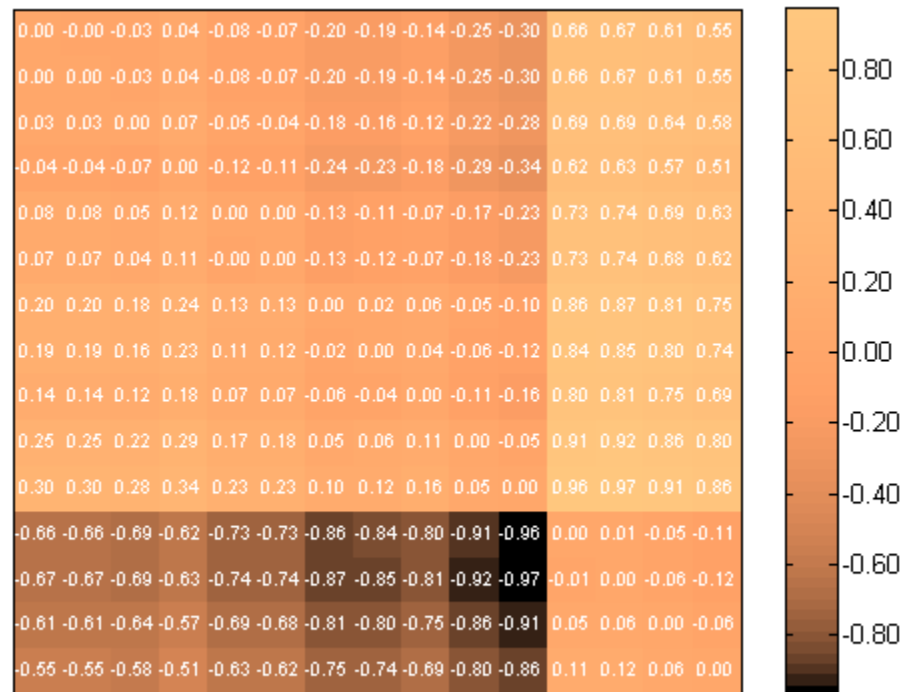
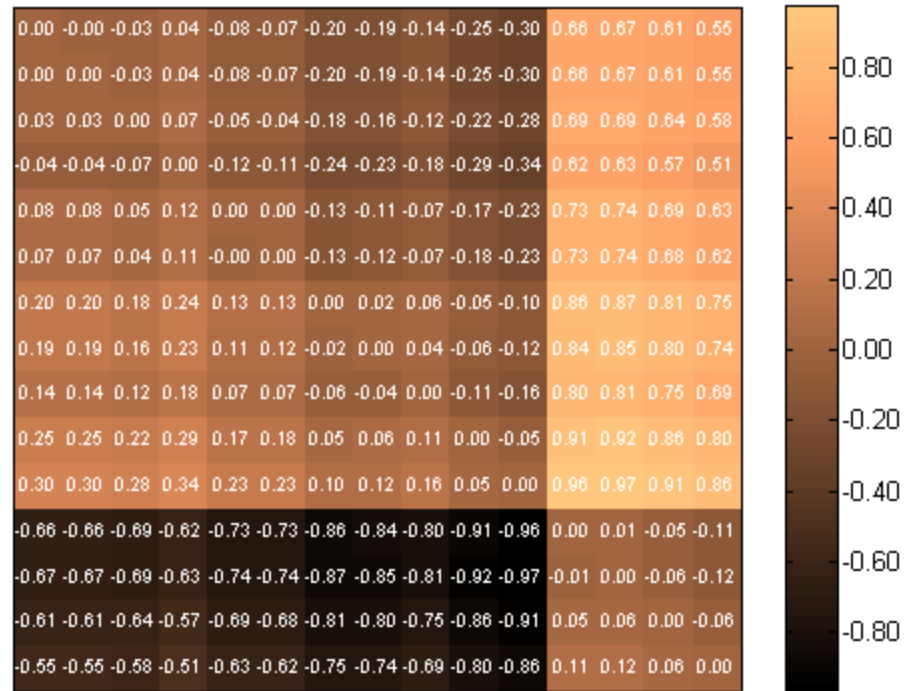
```
clf
heatmap(spreads_small, [], [], '%0.2f', 'Colormap', 'money', ...
        'Colorbar', true, 'ColorLevels', 5);
```



The colormap can also be constructed on a log-scale. This can be useful if your matrix values are not evenly distributed. Using a log-scale colormap will highlight the variation in the small values in your dataset.

```
clf
heatmap(spreads_small, [], [], '%0.2f', 'TextColor', 'w', ...
        'Colormap', 'copper', 'Colorbar', true);
snapnow

heatmap(spreads_small, [], [], '%0.2f', 'TextColor', 'w', ...
        'Colormap', 'copper', 'Colorbar', true, 'UseLogColormap', true);
```

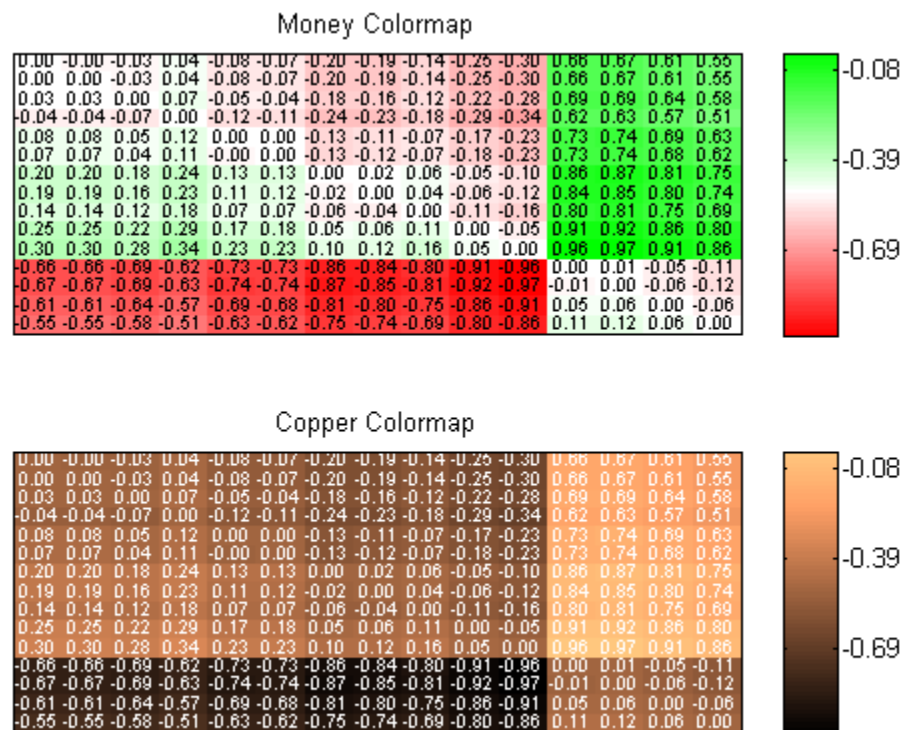


Multiple Heatmaps on a Figure

The `heatmap` function can be used with multiple axes in a figure, such as with the `subplot` command. By default they will share the colormap of the figure. The option `UseFigureColormap`, if set to 0 or false, will make each heatmap use a different colormap.

```
clf
subplot(2,1,1);
heatmap(spreads_small, [], [], '%0.2f', 'Colormap', 'money', ...
        'UseFigureColormap', false, 'Colorbar', true);
title('Money Colormap');

subplot(2,1,2);
heatmap(spreads_small, [], [], '%0.2f', 'Colormap', 'copper', ...
        'UseFigureColormap', false, 'Colorbar', true, 'TextColor', 'w');
title('Copper Colormap');
```

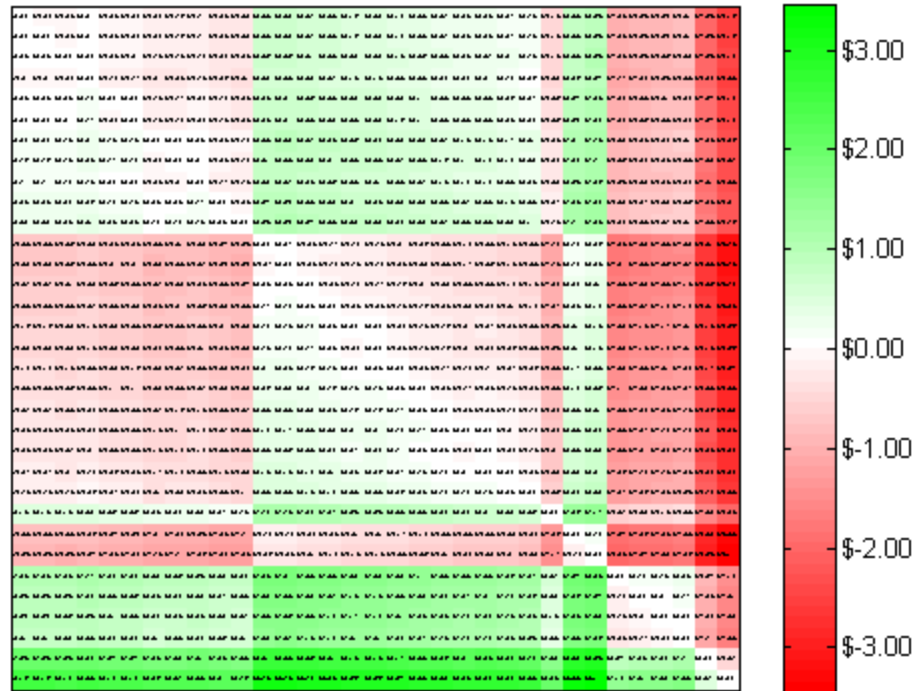


Colorbar

As seen above, a colorbar can be added to the figure using the `Colorbar` option. The labels for the colorbar will automatically be formatted using the formats for the text labels on the heatmap image. Notice the \$ signs on the colorbar in the image below.

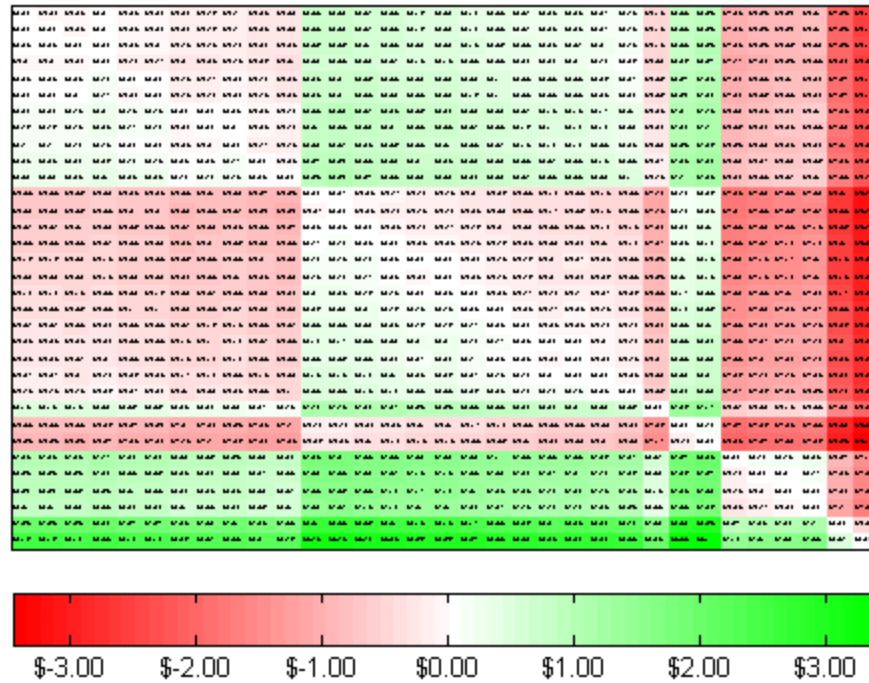
```
clf
heatmap(spreads, [], [], '$%0.2f', 'Colormap', 'money', ...
```

```
'FontSize', 2, 'Colorbar', true);
```



The value for the colorbar option can either be a simple true or false in which case the default colorbar will be drawn, or it can include a cell array of property-value pairs for the colorbar command.

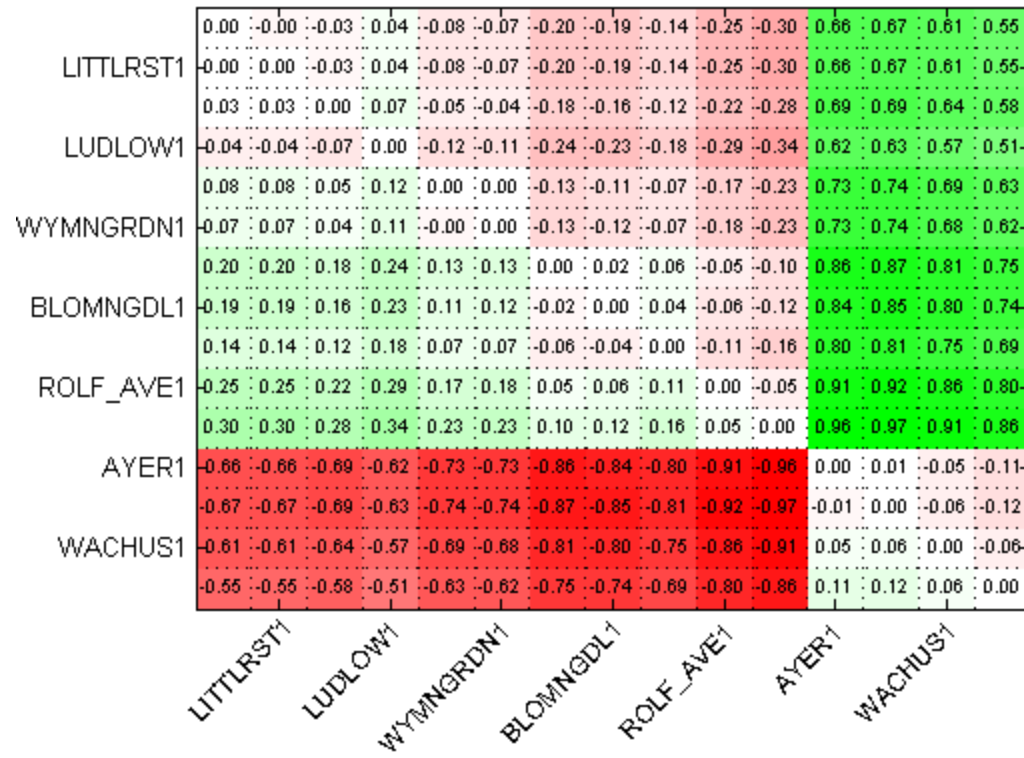
```
heatmap(spreads, [], [], '%0.2f', 'Colormap', 'money', ...
'FontSize', 2, 'Colorbar', {'SouthOutside'});
```



Grid Lines

Grid lines can be added with a *GridLines* option which is a line specification like ':' for a dotted line

```
clf
heatmap(spreads_small, labels_small, labels_small, '%0.2f', ...
        'TickAngle', 45, 'GridLines', ':');
```

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