About Objects

After selecting your data source and data items, add one or more objects to display the results. SAS Visual Analytics provides objects for all of your reports. (You can also select data after you add objects to the canvas.) Objects are grouped into types in the Objects pane: Tables, Graphs, Controls, Analytics, Containers, and Content (which includes data-driven content, images, text, and web content).

For a definition and picture of each object, see “Gallery of Objects” in SAS Visual Analytics: Reference.


You can import custom graphs that you have created in the SAS Graph Builder (the graph builder). For more information, see “Import Custom Graph Objects” on page 7.

Basic Object Tasks

Insert an Object into a Report

To insert an object into a report, choose one of the following methods:

- Drag the object from the Objects pane, and drop it onto the canvas. For more information, see “About the Canvas” in SAS Visual Analytics: Designing Reports.

- Double-click the object in the Objects pane. The object is automatically placed on the canvas. If you want the object to appear in a different location, then drag and drop it in a new location.

  **TIP** Use the Show or Hide Objects window to specify which report objects are displayed in the Objects pane. For more information, see “Show or Hide Objects in the Objects Pane” on page 5.

- Right-click the object in the Objects pane, and select Add to current page or Add to new page.
Drag any data item from the Data pane, and drop it onto the canvas. Depending on the type of data item or data items that you select, SAS Visual Analytics can display different types of charts:

### Table 1  Automatic Chart Types

<table>
<thead>
<tr>
<th>Data Items</th>
<th>Chart Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>One measure</td>
<td>Histogram</td>
</tr>
<tr>
<td>One category and any number of measures</td>
<td>Bar chart</td>
</tr>
<tr>
<td>One datetime category and any number of measures</td>
<td>Time series plot</td>
</tr>
<tr>
<td>One date or datetime category and one or more categories</td>
<td>List table</td>
</tr>
<tr>
<td>One geography and up to two measures</td>
<td>Geo map</td>
</tr>
<tr>
<td>One geography and three or more measures</td>
<td>Bar chart</td>
</tr>
<tr>
<td>One hierarchy and any number of measures</td>
<td>Bar chart</td>
</tr>
<tr>
<td>One hierarchy, one or more categories, and any number of other data items</td>
<td>Crosstab</td>
</tr>
<tr>
<td>Two or more hierarchies and any number of other data items</td>
<td>Crosstab</td>
</tr>
<tr>
<td>Two or more categories and any number of measures</td>
<td>List table</td>
</tr>
<tr>
<td>Two or three measures</td>
<td>Scatter plot or Heat map</td>
</tr>
<tr>
<td>Four or more measures</td>
<td>Scatter plot or Correlation matrix</td>
</tr>
</tbody>
</table>

You can change this object if you want a different type. For more information, see “Change an Object’s Type” on page 4.

Additional steps are required for some objects.

- If you insert a container, then you can drag and drop other objects onto the container.
- Inserting images requires additional steps. For more information, see “Insert an Image into a Report” on page 32.

### Use an Object’s Toolbar

Each object in SAS Visual Analytics has a toolbar in the upper right. This toolbar enables you to do many tasks, such as change an object’s type, save an image, and export data. You can also maximize an object. For more information, see “Maximizing Objects” on page 19.

When an object is selected on the canvas, the toolbar is displayed by default. You can hover to display the toolbar for an object that is not selected on the canvas. Click 🖼️ to display the menu items.

Here is an example of the options available for a bar chart:
Note: If the object toolbar is not visible, select **Enable object overlays** from the main menu.

**Duplicate an Object**

Duplicating an object in SAS Visual Analytics enables you to use a copy of the object on the same page or on another page of your report. Or, you can select a different object type for the object that you are duplicating. For example, you might want to duplicate a pie chart as a bar chart.

**Note:** If you duplicate a control with a parameter, the parameter is not copied from the original control because the parameter gets its value from only one control.

To duplicate an object:

1. On the canvas, click ☰ on the object's toolbar, and then select **Duplicate**.

   **TIP** Press the Alt key to modify the menu selections, and then select **Duplicate on new page** to place the object on a new page.

   The duplicated object is placed on the canvas with a name based on the original name. For example, if the original object name is **List Table 1**, then the duplicate object is displayed as **List Table 1 (1)**. If you choose to duplicate the same object again, then it is displayed as **List Table 1 (2)**.

2. (Optional) Move the duplicate object to another page. Using the **Outline** pane, click and drag the ⦁ indicator to move the duplicate object. Alternatively, you can click ☰ on the object’s toolbar, select **Move to**, and then select an existing page or **New page**.

3. (Optional) If you want the object to appear in a different location on the page, then drag and drop it in a new location.

   If you move an object to a page with precision layout, then you must manually move the object to its proper location. All objects are put in the top left corner by default.

To duplicate an object and change its type at the same time:
1. On the canvas, click $\mathbf{\downarrow}$ on the object’s toolbar, select **Duplicate as**, and then select the new object type.

   **TIP** Press the Alt key to modify the menu selections, and then select **Duplicate on new page as** to place the object on a new page.

2. (Optional) Update the options for the new object.

**Change an Object’s Type**

You can change an object’s type after you have placed the object on the canvas. For example, you might want to change a pie chart to a bar chart once you see how it looks in your report.

On the canvas, click $\mathbf{\downarrow}$ on the object’s toolbar, click **Change <objectName> to**, and then select a new object type.

SAS Visual Analytics attempts to keep the original object’s display rules, filters, and ranks. It also attempts to assign data roles appropriately for the new object type. However, if it cannot keep the original object’s display rules, filters, or ranks, a message is displayed. SAS Visual Analytics does not attempt to keep any options, and it does not display a message when options are discarded.

   **TIP** Click $\mathbf{\hat{H}}$ to restore the original object and all of its settings, including the options and other items that were discarded.

**Work with an Object’s Name**

SAS Visual Analytics adds object names automatically. The automatic name is a combination of a shortened form of the object name (for example, **Bar** instead of **Bar Chart**) and the name of the first data item that is assigned. For example, suppose that you add a new bar chart object and assign **Country** as a category data role. The automatic name is **Bar — Country 1**. If an object already exists with the same name, then a unique name is generated. Using the previous example, if the automatic name already exists, the unique name **Bar — Country 2** is generated.

The automatic object name changes if you change the object type. For example, if you have a bar chart and the generated name is **Bar — Country 1**, and you then change the bar chart to a line chart, the generated name is changed to **Line — Country 1**. An object name does not change if you specified a custom object name.

You can use the **Options** pane to specify a custom object name.

**Note:** The name of a sensitive data item should not be part of an automatic object name or a custom object name. Instead, you can specify a custom object name that does not include the sensitive data item name or you can rename the sensitive data item in the **Data** pane.

To specify a custom object name:

1. Select the object on the canvas that you want to have a custom name.

2. If the **Options** pane is not already displayed, click $\mathbf{\hat{H}}$.

3. Expand the **Object** heading, and then enter a name in the **Name** field.

   **Note:** If you remove the custom object name, then SAS Visual Analytics automatically adds a new object name.
Work with an Object’s Title

SAS Visual Analytics adds object titles automatically. The object title changes as you add data items to an object or remove them, unless you customize the title. You can use the Options pane to specify that you want a custom title or no title for an object.

Here are some key points about object titles:

- The name of a sensitive data item should not be part of an automatic object title or a custom object title. Instead, you can specify a custom object title that does not include the sensitive data item name or you can use the No title option.
- There is a setting available for object titles if you want to use the same type of title across SAS Visual Analytics sessions. For more information, see “Modify SAS Visual Analytics Settings” in SAS Visual Analytics: Designing Reports.
- Automatic titles are not available for list tables or crosstabs. These objects have no titles by default, but you can add custom titles.
- You must use the Custom title option for object templates that you want to save to the Objects pane.

TIP To quickly format an object’s title, double-click the text of the title on the canvas. Use the toolbar that is displayed to change the style, font, size, color, and more.

To specify a custom title for an object:

1. Select the object on the canvas that you want to have a custom title.
2. If the Options pane is not already displayed, click OPTIONS.
3. Expand the Object heading, and then from the Title drop-down list, select Custom title.
4. Enter the custom title.
   
   Note: SAS Visual Analytics does not change a custom title when you change the object’s type.
5. (Optional) Change the style options for the custom title by double-clicking the title of the object on the canvas.

If you do not want an object to have a title, select No title in the Title drop-down list. Alternatively, you can click REMOVE TITLE in the object, and select Remove title.

Show or Hide Objects in the Objects Pane

You can customize which objects you want to see in the Objects pane. Once you hide an object, it remains hidden until you choose to show it again.

TIP To quickly hide an object on the Objects tab, right-click the object, and select Hide.

To show or hide objects:

1. In the Objects pane, click SHOW OR HIDE, and then select Show or hide objects. The Show or Hide Objects window is displayed.
2 Do one of the following:

- Select the object or objects that you want to hide in the **Displayed items** list. Then, click \( \rightarrow \) to move them to the **Hidden items** list.

- Select the object or objects that you want to show in the **Hidden items** list. Then, click \( \leftarrow \) to move them to the **Displayed items** list.

**TIP** Use the Ctrl key to select multiple objects.

3 Click **OK**. The list of objects in the **Objects** pane is updated.

### Select Data Values in a Graph Object

Many graph objects enable you to select data values from the graph. Data selections enable you to perform linked selection (data brushing) actions and to create inclusion or exclusion filters.

To select data values, you can either click the values in the object or click and drag to create a rectangular selection of values.

**Note:** Some object types enable selection only if a grouping role is assigned or if the data roles include discrete data.
Multi-cell graphs have a type of data selection called selection mirroring. Selection mirroring occurs when you select data values in one plot of a multi-cell graph, and then your selection is automatically mirrored across all the plots within that multi-cell graph. For example, suppose that you select multiple data points in a scatter plot that is within a scatter plot matrix. This causes the data points that share information to also be selected in all of the other scatter plots in the multi-cell graph.

Here are some examples of selection mirroring:

- Graphs that have Separate Axes selected for the Measure layout option and have two or more data items assigned to the Measure data role (for example, a bar chart).
- Graphs that create a matrix of plots when three or more data items are assigned to the Measure data role (for example, a scatter plot matrix).
- Graphs that have a single Category data role with separate plots for each Measure data role (for example, a butterfly chart).
- Custom graphs with a lattice layout where all plots share all non-measure roles.

You can also create a linked selection across different graphs. For more information, see “Working with Report Actions and Links” in SAS Visual Analytics: Working with Report Data.

### Hide Object Overlays

To hide all object overlays (for example, toolbars, information icons, and search boxes), click ‡ in the application bar, and then select Disable object overlays. This option is not saved when you close the report and it does not affect the appearance of the report in the viewers.

### Import Custom Graph Objects

The SAS Graph Builder (the graph builder) enables you to create custom graph objects. For more information about creating custom graphs, see SAS Graph Builder: User’s Guide.

To import custom graphs:

1. In the Objects pane, click ‡, and then select Import custom graph. The Choose an Item window is displayed.
2. Select the custom graph, and click OK. The list of objects in the Objects pane is updated.
3. Insert the custom graph into a report, and then add data to it.

### Using the Options Pane

The Options pane lists the options for the currently selected report, page, or object. This pane enables you to specify the data styling, frame styling, text styling, and data colors for a selected object. SAS Visual Analytics retains the state of each expanded or collapsed heading in the Options pane between sessions. For example, suppose the Style heading is expanded when you exit SAS Visual Analytics. The Style heading is expanded when you start another session.

### Specify Options for a Report

1. If the Options pane is not already displayed, click ‡.
Select the report name in the drop-down list at the top of the Options pane.

If you want the report to refresh automatically, expand the General heading, and then select Automatically refresh report.

Note: Selecting the Automatically refresh report option might affect the report’s performance.

Specify Style options for the report. All objects in the report inherit these styles. However, report styles can be overridden by object-specific styles for Padding, Fill, Line/Marker, Gradient, and Missing.

Report theme applies a consistent look and feel to SAS reports. SAS Visual Analytics provides the following report themes: Marine, Aqua, and High Contrast. Marine is the default report theme for all new reports.

Your site might have custom report themes. Custom report themes are automatically created when a custom application theme is created in SAS Theme Designer. For more information, see SAS Theme Designer: User’s Guide.

Report background enables you to specify and customize a background for the report.

Font specifies the font that is used for all of the text in the report.

Padding specifies the amount of empty space to display around the sides of the report.

Fill specifies the colors for any color fills in the report.

Line/Marker specifies the colors for markers and lines in the report.

Gradient specifies the colors that make up the color gradients in the report.

Missing specifies the color that represents a missing value.

Other specifies the color that represents “other” values.

Data element style rotation improves the accessibility of your objects for users who have impaired vision or impaired color perception. You can select Rotate all colors first or Rotate all attributes. This option overrides the style specified by the report theme, and is applied to all graphs in the report.

Note: This option does not affect graphs that use color fills (for example, bar charts and pie charts).

If you want to specify a fixed size for the report, expand the Layout heading, and then select the Set fixed report size check box. Specify a number for Report width (pixels) and a number for Report height (pixels).

Specify Options for a Page

If the Options pane is not already displayed, click 粉色.

Select the page in the drop-down list at the top of the Options pane.

Expand the General heading. You can specify the following options: Name, Hide and link to page as pop-up window, and Automatically refresh page.

Note: Selecting the Automatically refresh page option might affect the report’s performance.
If you want the page to have a specific amount of padding, specify the **Padding** option under the **Style** heading.

Expand the **Layout** heading to specify the **Direction** of the page. If you want the page to have scroll bars, clear the **Avoid scrollbars** check box.

**Specify Options for an Object**

1. Select the object on the canvas that you want to update.
2. If the **Options** pane is not already displayed, click ![Options](1).
3. Specify the specific options for the object type. In general, the options that are specific to the current object type are expanded by default.
4. Specify the general options for the object. Depending on the object type, some of the following options are available:
Table 2  General Options for Objects

<table>
<thead>
<tr>
<th>Grouping</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>Automatically refresh object</td>
<td>specifies that you want the object to refresh automatically in the report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>viewer or mobile app.</td>
</tr>
<tr>
<td></td>
<td>Note:</td>
<td>Selecting the <strong>Automatically refresh object</strong> option might affect the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>report's performance.</td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td>specifies a description for the object.</td>
</tr>
<tr>
<td></td>
<td>Tip:</td>
<td>The <strong>Description</strong> is displayed in the report viewer or mobile app when</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the user selects 🖼.</td>
</tr>
<tr>
<td>Enable selection in the viewers</td>
<td></td>
<td>controls the availability of the selection outline and the object toolbar in the report viewer or mobile app.</td>
</tr>
<tr>
<td>Name</td>
<td></td>
<td>specifies the name of the object. The name is used to identify the object in the Outline pane and in the Actions pane. The name must be unique within the report.</td>
</tr>
<tr>
<td></td>
<td>Tip:</td>
<td>The <strong>Name</strong> is displayed in the report viewer or mobile app when the user selects 🖼.</td>
</tr>
<tr>
<td>Override system data limit</td>
<td></td>
<td>enables users to specify a different system data limit.</td>
</tr>
<tr>
<td></td>
<td>For more information about the data limits for each object, see “High-Cardinality Thresholds for Objects” in SAS Visual Analytics: Reference.</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td></td>
<td>specifies a title that is displayed at the top of the object. If you double-click the title in the object, then you can edit the title and change style options.</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics adds object titles automatically. You can specify a <strong>Custom title</strong> or <strong>No title</strong>. For more information, see “Work with an Object’s Title” on page 5.</td>
<td></td>
</tr>
<tr>
<td>Grouping</td>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Style</td>
<td>Background</td>
<td>displays a background for the object and enables you to specify the color and transparency of the background.</td>
</tr>
</tbody>
</table>
|          | Border       | displays a border around the object and enables you to specify the thickness and transparency of the border.  
<p>|          |              | <strong>Note:</strong> A border is always displayed for an object that is currently selected. |
|          | Data skin    | specifies the visual style of the data elements in the object (for example, the style of the bars in a bar chart). |
|          | Fill         | specifies the colors for any color fills (for example, the bars in a bar chart). |
|          | Font         | specifies the font that is used for all of the text in the object. |
|          | Gradient     | specifies the colors that make up the color gradients. |
|          | Line/Marker  | specifies the colors for markers and lines. |
|          | Missing      | specifies the color that represents a missing value. |
|          | Padding      | specifies the amount of empty space to display around the sides of the object. |</p>
<table>
<thead>
<tr>
<th>Grouping</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graph Frame</td>
<td>Data tip background</td>
<td>specifies the color of the background for data tips.</td>
</tr>
<tr>
<td></td>
<td>Data tip style</td>
<td>specifies the font size and color of the data tip text.</td>
</tr>
<tr>
<td></td>
<td>Grid lines</td>
<td>displays grid lines for each tick on the axes and enables you to set the thickness and color of the lines.</td>
</tr>
<tr>
<td></td>
<td>Header background</td>
<td>specifies the background color for lattice headings.</td>
</tr>
<tr>
<td></td>
<td>Header value</td>
<td>specifies the text color for the lattice heading text.</td>
</tr>
<tr>
<td></td>
<td>Lattice heading background</td>
<td>specifies the color and transparency of the background for lattice headings.</td>
</tr>
<tr>
<td></td>
<td>Wall background</td>
<td>specifies the color and transparency of the background for the graph wall.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The wall is the area that is bounded by the graph axes.</td>
</tr>
<tr>
<td>Axis Options</td>
<td>Axis label</td>
<td>displays the axis label and enables you to set the text style for the label.</td>
</tr>
<tr>
<td></td>
<td>Axis line</td>
<td>displays the axis line and enables you to set the width and color of the line.</td>
</tr>
<tr>
<td></td>
<td>Fixed maximum</td>
<td>specifies a fixed maximum value for the axis.</td>
</tr>
<tr>
<td></td>
<td>Fixed minimum</td>
<td>specifies a fixed minimum value for the axis.</td>
</tr>
<tr>
<td></td>
<td>Overview axis</td>
<td>specifies whether the overview is displayed. The overview axis is a scrolling axis that enables you to specify how much of the axis is displayed and which segment of the axis is displayed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: This option has no effect if the object displays a lattice.</td>
</tr>
<tr>
<td></td>
<td>Rotate value label</td>
<td>displays the category tick values at an angle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: The Rotate value label option has no effect if your object displays a lattice.</td>
</tr>
<tr>
<td></td>
<td>Tick values</td>
<td>displays the tick values along the axis and enables you to set the text style for the tick values.</td>
</tr>
<tr>
<td>Grouping</td>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Legend</td>
<td>Background style</td>
<td>specifies the color and transparency of the background for the legend.</td>
</tr>
<tr>
<td></td>
<td>Border line style</td>
<td>specifies the thickness and color of the border around the legend.</td>
</tr>
<tr>
<td></td>
<td>Placement</td>
<td>specifies the position of the legend.</td>
</tr>
<tr>
<td></td>
<td>Visibility</td>
<td>specifies whether the legend is displayed (On) or hidden (Off).</td>
</tr>
<tr>
<td>Data Options</td>
<td>Combine excluded into “All Other”</td>
<td>See “Use the Combine Excluded into “All Other” Option” on page 16.</td>
</tr>
<tr>
<td>Grouping</td>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Layout</td>
<td>Extend height if available</td>
<td>extends the height of the object if space is available.</td>
</tr>
<tr>
<td></td>
<td>Extend width if available</td>
<td>extends the width of the object if space is available.</td>
</tr>
<tr>
<td></td>
<td>Shrink height if necessary</td>
<td>shrinks the height of the object if there is insufficient space.</td>
</tr>
<tr>
<td></td>
<td>Shrink width if necessary</td>
<td>shrinks the width of the object if there is insufficient space.</td>
</tr>
<tr>
<td></td>
<td>Specify height</td>
<td>if enabled, specifies the height of the object as a percentage of the space on the canvas or as a percentage of the space in a container if the object is inside a container. By default, SAS Visual Analytics automatically computes the height of any control or text object when the report is rendered. (This makes reports or text objects more portable across various screen sizes.) Use the <strong>Specify height</strong> option only if you want a control or text object to always be a fixed percentage of the report's height on any screen.</td>
</tr>
<tr>
<td></td>
<td>Specify width</td>
<td>if enabled, specifies the width of the object as a percentage of the space on the canvas or as a percentage of the space in a container if the object is inside a container. By default, SAS Visual Analytics automatically computes the width of any control or text object when the report is rendered. (This makes reports or text objects more portable across various screen sizes.) Use the <strong>Specify width</strong> option only if you want a control or text object to always be a fixed percentage of the report's width on any screen. <strong>Note:</strong> Some controls (for example, a text control) do not have an automatically computed width on the canvas. However, these controls do have a width in prompt containers.</td>
</tr>
<tr>
<td>Grouping</td>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Reference Lines</td>
<td>Reference Lines</td>
<td>enables you to manage the reference lines for the selected object. Click <strong>New reference line</strong> to add a reference line. You can set the value for the reference line by entering it in the <strong>Value</strong> field or by dragging the reference line in the object. <strong>Note:</strong> For needle plots and step plots, if you change the X axis to a category with discrete data, then any reference lines on the X axis are removed. <strong>Note:</strong> Heat maps with three or more data items do not support reference lines. If you add additional data items to a heat map with two data items, then any reference lines are removed.</td>
</tr>
</tbody>
</table>

**Using the Style Options to Change Graph Colors**

To modify the colors that are used in a graph, use the styles that are available under **Style**. Here is an example of the style options for a bar chart:
Note: If a graph has two or more distinct values for the data item in the **Group** data role, the first **Fill** color (teal in the example above) is applied to the first value, the second color (orange in the example above) is applied to the second value, and so on. If there is no data item in the **Group** data role, then only the first color is applied to the graph.

To change a color, click its tile to open the color palette. Using the palette, select a new color. The new color is automatically applied to the graph, and the tile changes to the new color.

**Use the Combine Excluded into “All Other” Option**

The **Options** pane provides a data option for list tables and some graphs that you can use to combine content across categories (for example, the content that is formed by combining the object’s visible categories). These options are frequently used with filters and ranks.

You can use the **Combine excluded rows into “All Other”** option for list tables or the **Combine excluded into “All Other”** option for some graphs.

The effect of these options can be influenced by certain types of actions. For example, if you have a list table with a Sales measure data item, the list table might have the **Combine excluded rows into “All Other”** option selected and be targeted by a slider showing a range of Sales figures. The category combinations that are dropped based on the range selected in the slider control are grouped into a category named “All Other.”

Here are some key points about the **Combine excluded rows into “All Other”** and the **Combine excluded into “All Other”** options:
The Combine excluded rows into “All Other” option is not available for crosstabs.

The Combine excluded into “All Other” option is not available for time series plots, bubble plots, scatter plots, step plots, needle plots, geo maps, or word clouds.

There is a similar, but distinct per-category “All Other” option that is provided for ranking in SAS Visual Analytics. For more information about the All Other concept for ranking, see “Ranking Values in Reports” in SAS Visual Analytics: Working with Report Data.

Here are some key points about the Combine excluded rows into “All Other” option and the Combine excluded into “All Other” option:

- The option cannot be set when the object is displaying detail data.
- The option cannot be set when the object includes a rank with the per-category All Other option selected.
- The option cannot be set for pie charts when the Create “Other” slice for minimal values option is selected.
- The option cannot be set when a hierarchy is assigned to the object.

Using Object Templates

About Object Templates

You can add an object template to the Objects pane in SAS Visual Analytics. You can use an object template to create other tables, graphs, or controls that you want to have a similar appearance in multiple reports. For example, you might have a bar chart that you want to use in your company’s monthly reports and annual reports. You can use an object template to ensure that the same visual customizations to the bar chart are used each time the bar chart is created.

No data is saved with an object template. Any data that was assigned to the original object before you created the object template is removed. Data-related features, such as rules, filters, ranks, and sorting are also removed.

An application administrator can share an object template with multiple users, which can help multiple report designers create reports using objects that have the same customizations.

Here are some key points about object templates:

- Once an object template is on the canvas, it behaves like any other object.
- An object template maintains all of the visual customizations that you have made to the original object.
- The undo and redo features are not available for managing object templates.
- The content of an object template cannot be edited. Instead, you can modify the original object, and then create a new object template from it. Remember to delete the object template that you do not want.
- You can change the name of an object template that you create, whether it is shared or not. If you are an application administrator, you can change the name of a shared object template that any user has created. You cannot change the name of a shared object template if you are not an application administrator.
- An object template is visible only to the user who created it. However, an application administrator can make an object template available to multiple users by changing its properties in the Objects pane. For more information, see “Share an Object Template” on page 18.
- You can delete only an object template that you created, unless you are an application administrator. An application administrator can delete a shared object template.
- An analytics object cannot be the source of an object template. This includes all objects that are listed under the Analytics, SAS Visual Statistics, and SAS Visual Data Mining and Machine Learning headings in the Objects pane.
Create an Object Template

Note: If your object has a formatted title, make sure that the Custom title option is specified in the Options pane before you create the object template.

1  On the canvas, do one of the following:
   - Right-click an object, and then select Save to Objects pane.
   - Click \( \square \) on an object's toolbar, and then select Save to Objects pane.

The object template is displayed in the Objects pane. The name of the object template is the name of the source object with a number appended to it. For example, if the original object’s name is Bar Chart, then the object template’s name is Bar Chart (1).

Here is an example of a bar chart object template in the Objects pane:

2  (Optional) Change the name of the object template. Select the object template, and then click \( \checkmark \). Change the object template name in the Name field. Remember that the Objects pane sorts alphabetically.

Note: When you change the name of an object template, the new name is not displayed in any of the presentation-related tasks that are initiated from the right pane. For example, suppose that you want to change Bar Chart (1) to My Bar Template, and then use the new object template. In the Objects pane, My Bar Template is displayed. However, the Options pane displays Bar 1.

TIP To create an object template for a container, you must use the Outline pane. In the Outline pane, right-click the container name, and then select Save to Objects pane. (This option is not available if the container contains an analytics object.) When you save a container as an object template, any objects in the container are also saved as part of the object template.

Share an Object Template

If you are an application administrator, you can share an object template with other users.

1  Select the object template in the Objects pane, and then click \( \checkmark \).

2  Use the Shared control. This control indicates that the object template is shared: \( \square \). This control indicates that the object template is not shared: \( \square \).

Here is an example of a shared bar chart object template in the Objects pane:
An application administrator can change the name of a shared object template.

**Hide an Object Template**
You can hide an object template that you have created or an object template that an application administrator has shared with you.

1. In the **Objects** pane, select the object template that you want to hide.
2. Right-click the object template, and select **Hide**.

**TIP** Use the Show or Hide Objects window to show an object template that you have hidden. For more information, see “Show or Hide Objects in the Objects Pane” on page 5.

**Delete an Object Template**
You can delete only an object template that you have created. Only application administrators can delete a shared object template.

1. In the **Objects** pane, select the object template that you want to delete.
2. Right-click the object template, and select **Delete**.

**Note:** Deleting an object template from the **Objects** pane does not delete any reports that have used the object template.

---

**Maximizing Objects**

**About Maximized Objects**
Maximizing an object expands it to the full size of the canvas. It displays the details table for the object.

While an object is maximized, you cannot make changes to the layout of the report, add objects, or modify data items in the **Data** pane. You can make changes to a maximized object using the right pane (for example, options, roles, and actions).

**Note:** If you try to undo or redo changes while an object is maximized, then maximize mode automatically exits. Maximize mode automatically exits after you save changes and close a report.
Enter Maximize Mode
To maximize an object, select ☐ from the object toolbar. You can also use the shortcut Alt+F11 to maximize the selected object, or select Maximize view from the object’s pop-up menu.

Exit Maximize Mode
To exit maximize mode, select ☐ from the object toolbar. You can also use the shortcut Alt+F11 to exit maximize mode, or select Restore view from the object’s pop-up menu.

Viewing Objects with SAS Graphics Accelerator

What Is SAS Graphics Accelerator?
You can view some types of graph objects with SAS Graphics Accelerator.
SAS Graphics Accelerator is a Google Chrome extension that enables users with visual impairments or blindness to explore data visualizations. It supports alternative presentations of data visualizations that include enhanced visual rendering, text descriptions, tabular data, and interactive sonification. Sonification uses non-speech audio to convey important information about the graph.

Installation

Supported Object Types
The following object types support SAS Graphics Accelerator:
- bar chart
- bubble plot
- line chart
- time series plot
- pie chart
- scatter plot

View an Object with SAS Graphics Accelerator
To view an object with SAS Graphics Accelerator, select ☐ for the object, and then select View with SAS Graphics Accelerator.
SAS Graphics Accelerator displays the object in a new Google Chrome tab.
Working with Automated Analysis

About Automated Analysis

The automated analysis object determines the most important underlying factors for a specific response variable. After you specify a response variable, most of the remaining data items are added as underlying factors. Variables that are identical to the response variable, variables that have excessive missing values, or variables that have high cardinality are not added as underlying factors. For category responses, you can select the event level (category value) that you are interested in.

After SAS Visual Analytics adds the underlying factors, it creates a relative importance score for each underlying factor. The most important underlying factor is assigned a score of 1, and all other scores are proportional to that value. For measure responses, the results display the four groups that result in the greatest values of the response. The results also display the two groups that result in the smallest values of the response. For category responses, the results display the four groups that contain the greatest percentages of the response. The results also display the two groups that contain the least percentages of the response.

An explanatory plot is included for each underlying factor. The contents of this plot depend on the variable type of both the response variable and the underlying factor. The following table presents the plot used for each combination of response variable and underlying factor.

<table>
<thead>
<tr>
<th>Response Variable Type</th>
<th>Measure Underlying Factor</th>
<th>Category Underlying Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Response</td>
<td>A scatter plot or heat map of the response variable and the underlying factor.</td>
<td>A bar chart of the response variable and the underlying factor.</td>
</tr>
<tr>
<td>Category Response</td>
<td>A histogram of the response variable and the underlying factor that is grouped by the event level of interest and all other event levels.</td>
<td>A stacked bar chart of the response variable and the underlying factor that is grouped by the event level of interest and all other event levels.</td>
</tr>
</tbody>
</table>

Data Roles for an Automated Analysis

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for an automated analysis are a response variable and underlying factors. The response variable can be any category data item or measure data item.

Options for an Automated Analysis

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Include missing

Specifies whether to include observations with missing values in the analysis. For both measure and category underlying factors, missing values are considered a distinct level.
Show all subgroups
Specifications whether all response groups are reported in the results. By default, only the top four groups and bottom two variables groups are reported.

---

Working with Bar Charts

About Bar Charts

A bar chart displays data by using bars. The height of each bar represents the value.

By default, a bar chart is sorted in descending order by the value of the first measure. If a bar chart is sorted by a measure data item and has a category data item assigned to the group role, then each category data item’s sort value is determined by summing the measure values of the bars for the category (even when the bars themselves represent something other than a sum). For example, suppose that you are evaluating test scores. There is a TestScores measure that has been assigned an aggregation of Max. You have created a bar chart that shows regional TestScores grouped by Gender. Each bar represents the high test score of a particular Gender within a particular Region. However, the TestScores value that is used to sort each Region is determined by summing the male high test score in that Region with the female high test score in that Region.

Data Roles for a Bar Chart

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a bar chart are a category and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign many measures, and the measure values are plotted on the response axis. If a bar chart contains no measures, then the frequency of the category values is plotted on the response axis.

In addition to the basic data roles, you can assign these roles:

Group

groups the data based on the values of the category data item that you assign. Depending on the value that you selected for the Grouping style property, the group values are shown as either individual bars or as segments of each bar.

Note: Grouping is not available if you assign multiple measures to the bar chart.

Lattice columns
creates a lattice of charts with a column for each value of the category data item that you assign.

Lattice rows
creates a lattice of charts with a row for each value of the category data item that you assign.

Data tip values

specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Animation

specifies a datetime data item that is used to animate the chart.

If you assign the Animation data role, then the ▶ icon appears at the bottom left corner of the object. Click ▶ to start the animation.
Note: A graph with the Animation data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Bar Chart
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Direction
specifies whether the bars are vertical or horizontal.

Fixed baseline
specifies the baseline value for the bar chart.

Spacing
specifies the percentage of space between the bars. The default is 15%. For example, suppose that you specify a value of 80% for the Spacing option. This increases the space between the bars, and the bars become skinnier.

If a Group data role is assigned, then the Spacing option’s default is 0%.

Transparency
specifies the amount of transparency for the bars.

Combine excluded into “All Other”
summarizes all excluded rows. This option is available when you use summarized data. It applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

Grouping style
specifies how grouped data is displayed. If you select , then each value of the grouping variable is displayed as a separate bar. If you select , then the values of the grouping variable are displayed as segments of each bar.

Group scale
specifies how the data values for a grouped chart are displayed. By default, the chart displays the actual measure values (Display actual values). If you select Normalize groups to 100%, then the values for each grouped bar are displayed as percentages of the total.

- The Group scale option is not available for the dual axis bar chart or the dual axis bar-line chart.
- The Normalize groups to 100% selection requires that either the Group role is assigned or that multiple measures are assigned.
- If you select Normalize groups to 100% for a bar chart, then the Fixed baseline option is not available.
- Negative values are ignored in the 100% stacked bar chart.

Measure layout
specifies whether the measures share a single response axis (Shared Axis) or have separate response axes for each measure (Separate Axes). If you specify Automatic, then separate axes are automatically assigned if the measure values are dissimilar in format or magnitude.

Note: When Separate Axes is specified, options are applied to all individual bar charts.
**Data labels**
shows the data values as text beside or above the bar, depending on the direction of the bar. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.

**Note:** You can always view a data value as a data tip when you position the cursor over a data value.

**Segment labels**
shows the data values of segments inside the bars. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.

---

**Working with Box Plots**

**About Box Plots**

A box plot displays the distribution of data values by using a rectangular box and lines called “whiskers.”

*Figure 1  Parts of a Box Plot*

![Diagram of a Box Plot](image)

*Figure 1 on page 24* shows a diagram of a box plot. The bottom and top edges of the box indicate the interquartile range (IQR). That is, the range of values that are between the first and third quartiles (the 25th and 75th percentiles). The marker inside the box indicates the mean value. The line inside the box indicates the median value.

You can enable outliers, which are data points whose distances from the interquartile range are greater than 1.5 times the size of the interquartile range. Outliers can be located at the upper extreme and the lower extreme of the data range.

The whiskers (lines protruding from the box) indicate the range of values that are outside of the interquartile range. If you do not enable outliers, then the whiskers extend to the maximum and minimum values in the plot. If you enable outliers, then the whiskers indicate the range of values that are outside of the interquartile range, but are close enough not to be considered outliers.

If there are many outliers, then the range of outlier values is represented by one or more bars. The data tip for each bar displays additional information about the outliers.

**Data Roles for a Box Plot**

For information about setting data roles, see “Working with Data Role Assignments” in *SAS Visual Analytics: Working with Report Data.*
The basic data roles for a box plot are categories and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign many measures, and the measure values are plotted on the response axis. At least one measure is required.

Note: Frequency cannot be assigned to a measure data role for a box plot.

In addition to the basic data roles, you can assign these roles:

**Lattice columns**
- creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
- creates a lattice of charts with a row for each value of the category data item that you assign.

---

**Options for a Box Plot**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:

**Box direction**
- specifies whether the boxes are vertical (\(\uparrow\)) or horizontal (\(\rightarrow\)).

**Measure layout**
- specifies whether the measures share a single response axis (**Shared Axis**) or have separate response axes for each measure (**Separate Axes**).

**Outliers**
- specifies how outliers are displayed. An outlier is a data point whose distance from the interquartile range is greater than 1.5 times the size of the interquartile range.
  - **Ignore Outliers**
    - excludes outliers from the plot. If you select this option, then outlier values are not represented in the plot.
  - **Hide Outliers**
    - includes the outliers within the whiskers. If you select this option, then outlier values are not represented differently from the other values in the plot.
  - **Show Outliers**
    - displays outliers separately from the whiskers. If there are a small number of outliers, then each outlier is displayed as a point. If there are a large number of outliers, then the range of outlier values is displayed as one or more bars. If there are multiple bars, then each bar represents a specific range of outlier values.

**Outlier bin outlines**
- draws an outline around each outlier bar to provide visual separation.

**Averages**
- displays the mean value as a marker inside the box.

---

**Working with Bubble Plots**

**About Bubble Plots**

A bubble plot displays the values of at least three measures by using differently sized plot markers (bubbles) in a scatter plot. The values of two measures are represented by the position on the plot axes, and the value of the third measure is represented by the marker size.
You can create animated bubble plots to display changing data over time.

**Data Roles for a Bubble Plot**

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a bubble plot are:

**X axis**
specifies the measure that is assigned to the X axis.

**Y axis**
specifies the measure that is assigned to the Y axis.

**Size**
specifies the measure that determines the marker size.

In addition to the basic data roles, you can assign these roles:

**Group**
groups the data based on the values of the category data item that you assign. A separate set of points is created for each value.

*Note:* You cannot assign both the **Group** role and the **Color** role at the same time.

**Color**
specifies a data item that determines the color of the bubbles. If you specify a category, then each value of the category is represented by a different bubble color. If you specify a measure, then the measure value is represented by the bubble color.

*Note:* You cannot assign both the **Group** role and the **Color** role at the same time.

**Lattice columns**
creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
creates a lattice of charts with a row for each value of the category data item that you assign.

**Data tip values**
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Animation**
specifies a datetime data item that is used to animate the chart.

If you assign the **Animation** data role, then the ▶ icon appears at the bottom left corner of the object. Click ▶ to start the animation.

*Note:* A graph with the **Animation** data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

**Hidden**
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

**Options for a Bubble Plot**

For information about general options, see “Using the Options Pane” on page 7.
In addition to the general options, you can specify the following object-specific option in the **Options** pane:

**Transparency**
- specifies the amount of transparency for the bubbles.

---

**Working with Bubble Change Plots**

**About Bubble Change Plots**

A bubble change plot displays the difference between two sets of measures by using bubbles that are connected by lines. The values of two measures are represented by the position on the plot axes and by the sizes of the bubbles.

**Data Roles for a Bubble Change Plot**

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: *Working with Report Data*.

The basic data roles for a bubble change plot are:

- **X start, X end**
  - specify the measures for the starting and ending values on the X axis.

- **Y start, Y end**
  - specify the measures for the starting and ending values on the Y axis.

- **Size start, Size end**
  - specify the measures for the starting and ending values that determine the bubble size.

In addition to the basic data roles, you can assign the following role:

- **Group**
  - groups the data based on the values of the category data item that you assign. A separate set of points is created for each value.

**Options for a Bubble Change Plot**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific option in the **Options** pane:

- **Transparency**
  - specifies the amount of transparency for the bubbles.

- **Arrowheads**
  - displays an arrow pointing to the end bubble.

- **Line thickness**
  - specifies the thickness of each line.
Working with Butterfly Charts

About Butterfly Charts
A butterfly chart displays two bar charts with a shared category axis. The baselines of the two bar charts are located in the center of the chart.

Data Roles for a Butterfly Chart
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a butterfly chart are categories and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign one measure for each side of the butterfly chart, and the measure values are plotted on the response axis.

In addition to the basic data roles, you can assign these roles:

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure's aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Butterfly Chart
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Fixed baseline
specifies the baseline value for the bars on each side of the chart.

Transparency
specifies the amount of transparency for the bars.

Combine excluded into “All Other”
summarizes all excluded rows. This option is available when you use summarized data, and it applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

Data labels
shows the data values as text at the end of each bar.

Note: You can always view a data value as a data tip when you position the cursor over a data value.

Segment labels
shows the data values as text in each bar.

Note: You can always view a data value as a data tip when you position the cursor over a data value.
Working with Comparative Time Series Plots

About Comparative Time Series Plots
A comparative time series plot displays two time series in parallel with a shared time axis and separate Y axes.

Data Roles for a Comparative Time Series Plot
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a comparative time series plot are the time axis and measures. You can assign only one datetime data item to the time axis. You can assign one measure for each of the lines in the plot.

In addition to the basic data roles, you can assign these roles:

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Comparative Time Series Plot
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Binning interval
specifies the interval between datetime values in the plot. Select one of the following values:

Automatic
automatically determines the best interval for the plot.

Fixed count
plots a specific number of equally spaced values. Specify the number of values in the Fixed bin count option.

Use format
plots all of the datetime values as rendered by the data format.

Fixed bin count
specifies the number of datetime values to plot.

Note: This option is available only if Binning interval is set to Fixed count.

Transparency
specifies the amount of transparency for the plot.

Line thickness
specifies the thickness of the line.
Markers
shows markers for the data points in the plot.

Marker size
specifies the size of each marker in pixels.

Use filled markers
specifies whether the markers are filled or hollow.

Data labels
shows the data values as text in the plot.

Note: You can always view a data value as a data tip when you position the cursor over a data value.

Fill
creates a color fill for the areas below the line.

---

**Working with Containers**

**About Container Objects**

You can use containers to group other objects or prompts. Each container type is available from the Objects pane. The scrolling container and standard container are new.

The following types of containers are available:

**Precision Container**
enables you to place, align, and size the objects within the container. The precision type allows objects to overlap.

By default, a layout guide appears when you are moving or resizing content in a precision container. If you press and hold the Ctrl key, the layout guide uses a more precise grid to guide the alignment of your content. To disable the layout guide, select Disable layout guides from the main menu.

With the precision type, you can manipulate the depths of the objects within the container. Click on the toolbar for the object that you want to manipulate, and then select Send to front or Send to back.

**Prompt Container**
groups prompt controls. Only objects that are controls can be placed inside a prompt container. Objects inside prompt containers are filtered by the same rules as other objects.

Prompt containers can be added to the report prompt area and page prompt area on the canvas. They can also be added to the content area of the canvas.

**Scrolling Container**
displays content in a scrolling layout, where each object fills the entire container area and you scroll to see other objects. You can select either a vertical layout or a horizontal layout.

**Stacking Container**
displays the objects as if they are in a slide deck. Only one object is displayed at a time. A stacking container has a control bar that lets you move between objects.

**Standard Container**
lays out the content horizontally or vertically. Where it is possible, the content is resized so that multiple objects can be displayed together without scrolling.

---

TIP When you specify the size and position of objects using layout options, you can enter a specific percentage value instead of selecting a value from the drop-down list.
Specify Container Options

1. If it is not already selected, select the container that you want to update from the Outline pane.

2. If the Options pane is not already displayed, click 🕵️.

3. Update the general options for the container, such as the Name and Title.

4. Update the object-specific options for the container. Here are some details about the options for containers:
   - By default, the Enable selection in the viewers option is deselected for containers. Select this option to enable users who use the report viewer or a mobile device to select the container, and click 🐙 to see the container name and any incoming filter information.
   - If the container type is Standard or Scrolling, then the Direction option specifies whether the container contents are laid out horizontally or vertically. The Avoid scrollbars option specifies whether to resize the contents (Resize content to fit container) or to resize the container (Resize container to fit content) to reduce the need for scrolling.
     - Note: If you enable Avoid scrollbars for a scrolling container, then the container type changes to Standard. If you disable Avoid scrollbars for a standard container, then the container type changes to Scrolling.
   - If the container type is Stacking, then the Button type option changes the appearance of the control bar and the Placement option changes the location of the control bar.
   - For prompt containers, you can specify the Button text for the drop-down list in the prompt container. The Automatically apply values option is selected by default. If you clear the Automatically apply values check box, then you cannot work with any actions to or from the prompt container until you apply or cancel changes.

Working with Content

Working with Data-Driven Content

About Data-Driven Content

The data-driven content object enables you to display your data in a custom third-party visualization within your SAS Visual Analytics report. The third-party visualization can be authored in any JavaScript charting framework, such as D3.js, Google Charts, or CanvasJS. The visualization in a data-driven content object receives its data from SAS Visual Analytics and interacts with filters, ranks, and actions in the same way as other objects in your report.

In addition to third-party visualizations, you can display any web content that is capable of being displayed in an IFrame.

For information about creating third-party visualizations for data-driven content, see “Programming Considerations for Data-Driven Visualizations” in SAS Visual Analytics: Reference.

To find and share samples of third-party visualizations, see the SAS Software GitHub repository: https://github.com/sassoftware/sas-visualanalytics-thirdpartyvisualizations.
Data Roles for Data-Driven Content

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data role for data-driven content is Variables. The type and number of data items that you assign depend on the visualization that is displayed in the data-driven content object.

Note: Depending on the implementation of the third-party visualization, the order of your data items might be important.

Note: Numeric data is exchanged with the third-party visualization as unformatted data. Any formatting of numeric variables is controlled by the third-party visualization.

Options for Data-Driven Content

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the URL option. The URL option specifies the location of the third-party visualization that is displayed in the data-driven content object.

You can either enter a URL in the text field or select a URL that has been defined by an administrator. See “Defining URL Mappings for Data-Driven Content” in SAS Visual Analytics: Designing Reports.

Use an Image

About Images

You can use images to include your corporate logo or other graphics in your reports. You can insert images from your local machine, from shared SAS Drive content, or from the web. You can also add tooltip text to an image.

Insert an Image into a Report

1 Drag image from the Objects pane, and drop it onto the canvas.

2 Select the image by using one of the following methods:
   - drag a local image file onto the image object in the report.
   - click Upload a Local Image to select a local image file.
   - click Choose from SAS Content to select a shared image from SAS Drive.
   - in the Enter a URL field, enter the URL of an image on the web.

   Note: If your image URL requires authentication, then it might not be printed and might not be displayed in the report viewer. Instead, you should upload the image.

3 (Optional) Specify the Scale type.

4 (Optional) Specify the Tooltip text.

Specify Image Options

1 If it is not already selected, select the image on the canvas that you want to update.

2 If the Options pane is not already displayed, click 📋.

3 Update the general options for the image, such as the Name and Title.
4 Specify the options that are specific to images:

**Tooltip text**
specifies text that is displayed when you move the cursor over the image.

**Scale type**
displays how the source image is scaled to the size of the object. Select one of the following:

- **None**
The actual size of the image is maintained. The image might not fill the entire area of the image's object. If the image is larger than the object, then scroll bars are displayed.

- **Fit width**
The width of the image is set to the width of the image's object. The height maintains the image's original aspect ratio. Scroll bars are displayed if the set height of the image is greater than the height of the object.

- **Fit height**
The height of the image is set to the height of the image's object. The width maintains the image's original aspect ratio. Scroll bars are displayed if the set width of the image is greater than the width of the object.

- **Fit all**
The image is modified to fit best into the image's object. The image's original aspect ratio is maintained.

- **Stretch**
The height and width of image are set to the height and width of the image’s object. The image's original aspect ratio is not maintained.

- **Tile**
The image is tiled in the object. The image's original size is maintained. There are no scroll bars.

By default, the **Enable selection in the viewers** option is not selected for images. This means that users who use the report viewer or a mobile device cannot select the image.

### Use a Text Object

#### About Text Objects

Text objects can display both static and dynamic text. You can use text to convey messages (such as confidentiality statements), to annotate other objects, and to display key values. You can have hyperlinks in text. For more information about hyperlinks, see “Create a Link from a Text Object” in SAS Visual Analytics: Working with Report Data.

Dynamic text supports display rules. The displayed values are affected by actions, filters, and ranks. For more information, see “Display Dynamic Text in a Text Object” on page 34.

**Note:** You cannot paste dynamic text into a text object.

SAS Visual Analytics automatically computes the height and width of any text object when the report is rendered. This makes reports more portable across various screen sizes. For example, the height of a text object might be 10% of your report height on one screen, and 5% of your report height on another screen. If you want a text object to always be a fixed percentage of the report's height and width on any screen, you can use the **Specify width** and **Specify height** options in the **Options** pane.

#### Specify Text Object Options

1 If it is not already selected, select the text object on the canvas that you want to update.

2 If the **Options** pane is not already displayed, click 📽.

3 Update the general options for the text object, such as **Name** and **Title**.
By default, the **Enable selection in the viewers** option is not selected for text objects. This means that users who view the report in the report viewer or a mobile device cannot select the text in a report.

**Specify Text Object Styles**

When you edit the text for a text object, a floating toolbar appears. You can use the floating toolbar to change style options such as the font and the paragraph alignment. You can also use the floating toolbar to create a link from a text object. For more information, see “Create a Link from a Text Object” in *SAS Visual Analytics: Working with Report Data*. It is recommended that you create a link before you style the text in a text object.

**TIP** You can use the pop-up menu to cut, copy, paste, and delete text.

**Display Dynamic Text in a Text Object**

Text objects support several types of dynamic text:

- Measure values
- Parameter values
- A timestamp for the most recent update of the current data source
- A description of the current interactive filters (from prompts and from actions with other objects)

To add a measure or a parameter to the text object, either use the **Roles** pane or drag the data item from the **Data** pane and drop it onto the text object.

To add the timestamp for the most recent update of the current data source, click on the floating toolbar.

To add a description of the current interactive filters, click in the floating toolbar.

Here are some additional considerations for using dynamic text:

- You cannot copy and paste (or cut and paste) text that contains dynamic text. To edit dynamic text, click **Source** in the floating toolbar to edit the source HTML for the text.
- If you replace or remove the data source that is associated with the text object, then all dynamic text is removed.
- If no items are assigned to the **Measures** role, then Frequency is automatically assigned when you add a timestamp or a filter description. The Frequency value is hidden if Frequency is assigned automatically. To display the Frequency value, you must assign it manually.
- If you change the order of data items in the **Roles** pane, then all dynamic text that is based on measure values or parameter values is moved to the bottom of the text object.

**Use Web Content**

A web content object displays a web page or embedded video content in an inline frame (iframe).

**Note:** Some web content is configured so that it cannot be displayed in an inline frame. This content cannot be displayed in a web content object.

To insert a web content object into a report:

1. Drag **Web Content** from the **Objects** pane, and drop it onto the canvas.
2. In the **Options** pane, specify the **URL** that you want to display.
Working with Controls

About Controls

A control is an object that filters or narrows the scope of the data that you are currently viewing. A control enables you to group your data by a selected category, and then select which group you want to view. A control based on a measure enables you to select a range of data. For example, you might have a data item called Units Sold for all the items your company sells. You can use a slider control to let users select a range of the units that have been sold.

When you drag and drop a data item onto a control, the control creates a group based on that data item. For example, you might have a data item called Cars that contains all of the models that a manufacturer produces. When you drag and drop the Cars data item onto a drop-down list, the control groups the car models, and then you can select a car model to use as a filter. Controls can be used in a report with actions.

For a definition and a picture of each control type, see “Gallery of Objects” in SAS Visual Analytics: Reference.

SAS Visual Analytics automatically computes the height and width of any control when the report is rendered. This makes reports more portable across various screen sizes. For example, the height of a list control might be 10% of your report height on one screen, and 5% of your report height on another screen. If you want a control to always be a fixed percentage of the report’s height and width on any screen, you can use the Specify width and Specify height options in the Options pane.

Note: Some controls (for example, a text control) do not have an automatically computed width on the canvas. However, these controls do have a width in prompt containers.

Here are some key points about filtering using controls:

- Filters use the AND operator.
- Filters are applied as separate steps.
- The filter results are impacted by the type of data used in the control.
- A slider control that has a category data item assigned cannot have a rank.
- A fixed-range slider cannot be the target of a filter.
- If you duplicate a control with a parameter, the parameter is not copied from the original control because the parameter gets its value from only one control.

SAS Visual Analytics provides prompts, which enable the person viewing the report to select a value to filter the objects in the report or objects on the page. These are the available prompt types:

Report prompts
are controls that are placed in the special area above the canvas. A report prompt automatically filters all of the other objects as long as the object uses the same data source as the report prompt control or there is a data source mapping between the report prompt’s data source and objects in the report. For more information, see “Use a Control to Create a Report Prompt” on page 38.

Page prompts
are the controls that are placed in the special row area at the top of the canvas. A page prompt automatically filters all of the other objects on the same page, as long as the object uses the same data source as the page prompt control or if there is data source mapping between the report prompt’s data source and the objects in the report. For more information, see “Use a Control to Create a Page Prompt” on page 39.

You can place any control in the main area of the canvas below the page prompt row. You must define explicit actions (using the Actions pane) between these controls (as the source objects) and one or more target objects. For more information about actions, see “Overview of Report Actions” in SAS Visual Analytics: Working with Report Data.
Data Roles for Controls

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

In general, the basic data roles for controls are category data items and measure data items. For more information, see “About Data Items” in SAS Visual Analytics: Working with Report Data.

All of the controls support parameters. For more information, see “Overview of Parameters in Reports” in SAS Visual Analytics: Working with Report Data.

You can assign these data roles:

- **Button bar control**: Category, Measure, and Parameter. A category data item is required.
- **Drop-down list control**: Category, Measure, and Parameter. A category data item is required.
- **List control**: Category, Measure, and Parameter. A category data item is required.
- **Slider control**: Measure/Date and Parameter. Note that only single-point sliders support parameters.
- **Text input control**: Category, Measure, and Parameter.

For the button bar, drop-down list, list, and text input controls, you can specify the following additional role:

- **Hidden**: specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for Controls

For information about general options, see “Using the Options Pane” on page 7.

**Button Bar Control**

- **Required**: specifies that you want to require users to make a selection in the control.
- **Direction**: specifies whether the button bar is vertical (↑) or horizontal (→). The Horizontal option is selected by default.
- **Initially select first item**: specifies that when a report is re-opened, the first value of the control is selected.
- **Background color**: specifies the background color for the control.
- **Background selection color**: specifies the background color for a selected button.
- **Selected text color**: specifies the text color for a selected button.
Drop-down List Control

**Required**
specifies that you want to require users to make a selection in the control.

**Initially select first item**
specifies that when a report is re-opened, the first value of the control is selected.

**Background color**
specifies the background color for the control.

List Control

**Required**
specifies that you want to require users to make a selection in the control.

**Allow multiple selections**
specifies that multiple selections are enabled in the list. If you clear the Allow multiple selections check box, radio buttons are displayed instead of check boxes, and the Required option is applied automatically.

**Initially select first item**
specifies that when a report is re-opened, the first value of the control is selected.

**Background color**
specifies the background color for the control.

Slider Control

**Input Style**
enables you to specify whether the value in the slider is Single Value or a Range.

**Direction**
specifies whether the slider is vertical ↑ or horizontal →. The Horizontal option is selected by default.

**Act on aggregated data in filtered objects**
specifies that you want to have the slider interactively filter the post-aggregated data. This option enables you specify the Minimum and Maximum options for the slider end points.

**Set value to dynamic minimum**
enables you to automatically adjust the slider to the minimum value in the current data query.

**Set value to dynamic maximum**
enables you to automatically adjust the slider to the maximum value in the current data query.

**Set fixed range**
enables you to specify the Minimum and Maximum options for the slider end points.

*Note:* You cannot have a filter or rank when the Set fixed range option is selected for a slider.

Text Input Control

**Initially select first item**
specifies that when a report is re-opened, the first value of the control is selected.

**Background color**
specifies the background color for the control.
Show or Hide Prompt Areas

You can show (expand) and hide (collapse) the prompt areas of the canvas as follows:

Show or hide all report prompt and page prompt areas

In the main menu, select **Expand report controls and all page controls** or **Collapse report controls and all page controls**.

Show or hide the report prompt area

In the main menu, select **Expand report controls** or **Collapse report controls**.

Show or hide the prompt area for a page

Right-click a page tab, and select **Expand page controls** or **Collapse page controls**.

Show or hide all page prompt areas

Right-click any page tab, and select **Expand all page controls** or **Collapse all page controls**.

Note: You can specify the default behavior for prompt areas as an application setting. See “Modify SAS Visual Analytics Settings” in *SAS Visual Analytics: Designing Reports*.

Use a Control to Create a Report Prompt

If you use a control to create a report prompt, then the user can select a value to filter the data in the report. You can use a report prompt to cascade filters to a page prompt.

To use a control to create a report prompt:

1. Right-click a control in the **Objects** pane, and then select **Add as a report control**.

2. Drag and drop a category, measure, or parameter onto the control. For example, if you add a drop-down list control, then you can assign a category like *Facility City* or *Facility State*. Then, the drop-down list is populated with the cities or states that are used in that category.

   You can also use the **Roles** pane to specify the **Category** and **Measure** roles for the report prompt.

3. (Optional) Update the general options for the report prompt. You can update the **Name**, **Description**, and **Font**.

   Note: If you choose a custom color for the **Font** option, it is saved between SAS Visual Analytics sessions. Your custom colors are displayed in the color palette.

4. (Optional) Update the specific options for the report prompt. The available options depend on the selected control.

   Here are some details about the options for controls:

   - By default, the **Enable selection in the viewers** option is not selected for controls. This means that users who use the report viewer or a mobile device cannot select the control, and must click to see the control name and any incoming filter information. However, users can still modify values for the control.

   - For button bar, drop-down list, and list controls, select the **Required** option if you want to require a user to make a selection in the control. If you select the **Required** option for a list, at least one check box must always be selected.

     Note: List controls cannot be added to the report prompt area directly. They must be inside of a prompt container.

   - For sliders, for the **Value** option, **Range** is selected by default. Select the **Interact on the data in view** option to have the control filter only the aggregated data that is currently displayed in the report. If you clear this option, then the detail data is filtered.
Note: If the **Interact on the data in view** option is not selected, then a slider does not filter crosstabs or time series plots.

Alternatively, you can create an automatic control by dragging and dropping a data item onto the report prompt area or by using the pop-up menu in the **Data** pane. SAS Visual Analytics automatically creates these controls:

**Table 4  Automatic Controls for Report Prompts**

<table>
<thead>
<tr>
<th>Data Item Type</th>
<th>Automatic Control Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category data item with 1-4 distinct values</td>
<td>Button bar</td>
</tr>
<tr>
<td>Category data item with 5-40 distinct values</td>
<td>Drop-down list</td>
</tr>
<tr>
<td>Category data item with 41 or more distinct values</td>
<td>Text input</td>
</tr>
<tr>
<td>Measure or datetime data item</td>
<td>Slider</td>
</tr>
</tbody>
</table>

If the report prompt uses one data source, and the objects on the canvas use another data source, you can change the data source mappings by right-clicking the control, and then selecting **Edit data source mappings**. For more information, see “**Map Data Sources for Actions and Links**” in *SAS Visual Analytics: Working with Report Data*.

**Use a Control to Create a Page Prompt**

If you use a control to create a page prompt, then the user can select a value to filter the data of all the other objects on the same page that use the same data source. You can create cascading (or dependent) page prompts.

Here are some key points about using controls to create a page prompt:

- Page prompts can be affected by report prompts.
- List controls cannot be added to the page prompt area directly. They must be inside of a prompt container.

To use a control to create a page prompt:

1. Right-click a control in the **Objects** pane, and then select **Add as a page control**.
   - Note: You can use a prompt container to create a page prompt.

2. Drag and drop a category, measure, or parameter onto the control. For example, if you add a drop-down list control, then you can assign a category like **Facility City** or **Facility State**. Then, the drop-down list is populated with the cities or states that are used in that category.
   - You can also use the **Roles** pane to specify data roles for the page prompt.

Alternatively, you can create an automatic control by dragging and dropping a data item onto the page prompt area or by using the pop-up menu in the **Data** pane. SAS Visual Analytics automatically creates these controls:

**Table 5  Automatic Controls for Page Prompts**

<table>
<thead>
<tr>
<th>Data Item Type</th>
<th>Automatic Control Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category data item with 1-4 distinct values</td>
<td>Button bar</td>
</tr>
<tr>
<td>Category data item with 5-40 distinct values</td>
<td>Drop-down list</td>
</tr>
<tr>
<td>Data Item Type</td>
<td>Automatic Control Type</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Category data item with 41 or more distinct values</td>
<td>Text input</td>
</tr>
<tr>
<td>Measure or datetime data item</td>
<td>Slider</td>
</tr>
</tbody>
</table>

If the page prompt uses one data source, and the objects on the canvas use another data source, you can change the data source mappings by right-clicking the control, and then selecting **Edit data source mappings**.  
For more information, see “Map Data Sources for Actions and Links” in SAS Visual Analytics: Working with Report Data.

## Working with Correlation Matrices

### About Correlation Matrices

A correlation matrix displays the degree of correlation between multiple intersections of measures as a matrix of rectangular cells. Each cell in the matrix represents the intersection of two measures, and the color of the cell indicates the degree of correlation between those two measures.

A correlation matrix can either compare within a single set of measures or it can compare between two sets of measures.

The correlation values are calculated by using Pearson’s product-moment correlation coefficient. Correlation values are identified as weak, moderate, or strong as follows:

- **Weak**  
  the absolute value is 0.3 or lower

- **Moderate**  
  the absolute value is greater than 0.3 and less than or equal to 0.6

- **Strong**  
  the absolute value is greater than 0.6

### Data Roles for a Correlation Matrix

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a correlation matrix depend on the value that you select for the **Show correlations** option:

- If you select **Between two sets of measures**, then the basic data roles are **X axis** and **Y axis**. Assign at least one measure to each role.

- If you select **Within one set of measures**, then the basic data role is **Measures**. Assign at least two measures.

**Note:** The maximum number of measures is 60.

### Options for a Correlation Matrix

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:
Show border
   specifies that the borders between cells are visible.

Rotate axis labels
   displays the axis labels at an angle.

Explore Data for a Cell
If you have SAS Visual Statistics and you have permissions for the /SASVisualAnalytics_capabilities/buildAnalyticalModel URI, then you can explore the data for a single cell in the correlation matrix as a new object or model. To create a new object based on the selected cell:

1   Select the cell that you want to explore.

2   Right-click the cell, select New object from selection, and then select the object or model type that you want to create.

   TIP   Press the Alt key to place the new object on a new page.

3   Click OK.

Working with Crosstabs

About Crosstabs
A crosstab displays the intersections of category values and measure values as text. If the crosstab contains measures, then each cell of the crosstab contains the aggregated measure values for a specific intersection of category values. If the crosstab does not contain measures, then each cell of the crosstab contains the frequency of an intersection of category values.

You can show total and subtotal percentages by selecting the appropriate check box or check boxes in the Options pane for the crosstab. You can show a percentage of column total, percentage of row total, percentage of column subtotal, or percentage of row subtotal in a crosstab. For more information, see “Create and Add Calculations for Crosstabs” on page 43.

You should consider placing lower cardinality (fewer distinct values) categories on the columns and higher cardinality (more distinct values) categories on the rows. Crosstabs can help you improve readability, especially when there are several category data items to include in your table.

By default, frequency is displayed only when there are no measures in the crosstab. If you add a category data item first, then the Frequency column is automatically added. When you add a measure data item, the Frequency column is automatically replaced by the measure that you added. If you add a measure data item first, then the Frequency column is added only if you manually add it.

You can add a cell graph (either a bar chart or a heat map) to a crosstab column that uses a measure data item. For more information, see “Add Cell Graphs to a Crosstab” on page 44.

Here are some key points about crosstabs:

- You can create a linked selection for totals and subtotals in a crosstab.
- A crosstab does not show data if the query is too large.
- You can place measures on rows in a crosstab.
- Automatic titles are not available for crosstabs. However, you can specify a custom title.
Data Roles for a Crosstab

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a crosstab are columns, rows, and measures. You can assign either a single hierarchy or any number of categories to each column and row role. If you assign measures to the crosstab, then the measure values are displayed in the cells of the crosstab. If you do not assign measures, then the frequency of each intersection of values is displayed in the cells of the crosstab.

Options for a Crosstab

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

- **Use abbreviated numerical value**
  specifies that large measure values use abbreviated numerical values. For example, 1,100,000,000 is displayed as 1.1B. You can specify which columns should use abbreviated numerical values.

- **Indented**
  selects the indented layout for the crosstab.
  
  Note: For the indented layout, subtotals are always enabled.

- **Measure heading placement**
  enables you to place measures on rows in a crosstab. (The default is for measures to be placed on columns in a crosstab.)

- **Show missing labels as blanks**
  displays missing values as empty cells in the crosstab. By default, missing values are represented by a period (.) character.

- **Fit columns to width**
  sets the default widths of the columns in the crosstab based on the space available. This option is selected by default.

- **Condense row height**
  Removes extra white space in all of the rows in the crosstab. This option is selected by default.

- **Alternating background color**
  enables you to specify a color for the alternating row background. The default color is gray. You can use this option to remove the alternating row background color in a crosstab.

- **Totals**
  adds totals to each column, row, or both.
  
  Note: Total values are aggregated based on the aggregations for each measure.

- **Subtotals**
  adds subtotals to each column, row, or both for each node on the row axis after the first node.
  
  Note: For the indented layout, subtotals are always enabled.

- **Placement**
  specifies the location of totals and subtotals. Select Before to place the totals and subtotals before the axis headings. Select After to place the totals and subtotals after the axis headings.
  
  Note: For the indented layout, totals are always placed before the axis headings.
Managing Rows and Columns in Crosstabs

Sort Categories and Measures
To sort by category or measure values in a crosstab, right-click on a column or row heading. You can also sort categories, rather than measures, by right-clicking the category name. For more information, see “Sort Data in a Crosstab” in SAS Visual Analytics: Working with Report Data.

Rearrange Rows and Columns
To rearrange your rows and columns, use the Roles pane. Hold your pointer over the indicator beside the row or column name until the pointer changes from a single arrow to multiple arrows, and then click and drag the row or column to a new position in the list.

Empty columns in the crosstab are removed when the Fit columns to width option in the Options pane is selected. (This option is selected by default.)

Resize Columns
To resize a column, click on it in the crosstab, and then drag and drop the left or right edge of the column heading.

Create and Add Calculations for Crosstabs
You can create a percentage of totals or a percentage of subtotals for a row or column for a data item that has an aggregation of Sum or Count. These derived data items are available for use only for crosstabs.

The option to create a calculation is available for a measure data item, unless it is an aggregated measure (including Frequency).

These calculations are available for crosstabs:

Percent of column total or Percent of row total
Displays the percentage of the total value for the data item on which it is based. You can create a percentage of total only when the source data item has an aggregation of Sum or Count. For example, you might create the percentage of the total value for a measure that contains revenue values.

Note: If a category is assigned to the row, then the Percent of column total option is available.

If a category is assigned to the column, then the Percent of row total option is available.

Percent of column subtotal or Percent of row subtotal
Displays the percentage of the subtotal value for the measure on which it is based. You can create a percentage of subtotal only when the source data item has an aggregation of Sum or Count.

Note: If a hierarchy or more than one category is assigned to the rows or columns in the crosstab, then the percentage of subtotal option is available.

To create and add a calculation:

1. Right-click the column heading, and select Create and add calculation. The Create and Add Calculation window is displayed.
Specify a Name.

3 Select a Type. The available types depend on the column that you selected.

4 Click OK. The calculation is added to the Data pane. However, it can be assigned only to a crosstab.

Add Cell Graphs to a Crosstab

You can add a cell graph to a column in a crosstab. The data source for the crosstab must include at least one measure data item before you can add a cell graph.

The cell graph (either a bar chart or a heat map) fits in a single cell and repeats for each row in a column. For a bar chart, each bar is sized to its relative value within the column. For a heat map, each cell is colored according to its relative value in the column.

To add a cell graph:

1 If it is not already selected, select the crosstab on the canvas that you want to update.

2 Right-click a column or column heading containing a measure data item, and select Add cell graph. Then, select Bar or Heat map. The bar chart or heat map is automatically added to the column.

3 (Optional) Change the cell graph options, which are available under the Cell Graphs heading in the Options pane. For a bar chart, you can change the color of the bar and the placement of the text. For a heat map, you can change the color gradient that is used.

   **TIP** If it is difficult to see the numbers that are represented by the cell graphs, select the Use abbreviated numerical value option to have large measure values use abbreviated numerical values.

4 (Optional) Sort the cell graph column. For more information, see “Sort Data in a Crosstab” in SAS Visual Analytics: Working with Report Data.

Here is an example of a report that contains a simple crosstab with cell graphs. The Expenses column contains a bar chart and the Profit column contains a heat map. Note that the Expenses column is using the Use abbreviated numerical value option. The crosstab is sorted by the Profit column, which has a heat map cell graph.
Working with Decision Trees

About Decision Trees

Note: This topic covers the basic decision tree that is available with SAS Visual Analytics. If SAS Visual Statistics is licensed at your site, then the decision tree contains additional advanced features. The decision tree is located with the SAS Visual Statistics models in the Objects pane. For more information, see "Working with Decision Trees" in SAS Visual Analytics: Working with SAS Visual Statistics.

A decision tree uses the values of one or more predictor data items to predict the values of a response data item. A decision tree displays a series of nodes as a tree, where the top node is the response data item, and each branch of the tree represents a split in the values of a predictor data item. Decision trees are also known as classification and regression trees.
Each branch of the tree displays the name of the predictor for the branch at the top of the split. The thickness of the branch indicates the number of values that are associated with each node. The predictor values for each node are displayed above the node.

Each node in the tree displays the data for the node either as a set of aggregated values (if the response contains continuous data and if response bins are disabled) or as a bar chart (if the response contains discrete data or if response bins are enabled). The aggregated values or bar chart in each node displays the values of the response data item that are selected by the splits in the tree.

Below the decision tree, an icicle plot of the nodes is displayed. The color of the node in the icicle plot indicates either the predicted level for that node (for a discrete or binned response) or the aggregated value for the node (for an unbinned continuous response). When you select a node in either the decision tree or the icicle plot, the corresponding node is selected in the other location.

Decision trees in SAS Visual Analytics use a modified version of the C4.5 algorithm.
Data Roles for a Decision Tree

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a decision tree are:

Response
specifies the response for the decision tree. You can specify any category or measure. The decision tree attempts to predict the values of the response data item. Each node in the tree displays the values of the response data item.

Predictors
specifies predictors for the decision tree. You can specify one or more categories or measures as predictors. The values of predictor data items are displayed above the nodes in the tree. The order of the data items in the Predictors list does not affect the tree.

Note: If a predictor does not contribute to the predictive accuracy of the tree or the contribution has been pruned, then the predictor is not included in the final tree that is displayed.

Options for a Decision Tree

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Missing assignment
specifies how missing values are included in the model.

None
observations with missing values are excluded from the model.

Use in search
missing values are considered a unique measurement level and are included in the model.

As machine smallest
missing interval values are set to the smallest possible machine value and missing category values are treated as a unique measurement level.

Popular
observations with missing values are assigned to the child node with the most observations.

Similar
observations with missing values are assigned to the node deemed most similar by a chi-square test for category responses or an F test for measure responses.

Minimum value
specifies the minimum number of observations that are allowed to have missing values before missing values are treated as a distinct category level.

Growth strategy
specifies the parameters that are used to create the decision tree. Select one of the following values:

Basic
specifies a simple tree with a maximum of two branches per split and a maximum of six levels. For details, see Table 6 on page 48.

Advanced
specifies a complex tree with a maximum of four branches per split and a maximum of six levels. For details, see Table 6 on page 48.
Custom enables you to select the values for each of the parameters.

If you select Custom as the value for Growth strategy, then the following additional options appear:

**Maximum branches**
specifies the maximum number of branches for each node split.

**Maximum levels**
specifies the maximum number of levels in the tree.

**Leaf size**
specifies the minimum number of values (count) for each node.

**Bin response variable**
if the response variable contains continuous data, splits the response values into bins.

**Response bins**
specifies the number of bins that are used for the response data item.

**Note:** This option is available only if the Bin response variable option is enabled.

**Predictor bins**
specifies the number of bins that are used for predictor data items.

**Note:** This option has no effect if the predictor data items contain discrete data.

**Rapid growth**
enables you to use the information gain ratio and k-means fast search methods for decision tree growth. When disabled, the information gain and greedy search methods are used, which generally produce a larger tree and require more time to create.

**Pruning**
specifies the level of pruning that is applied to the tree. Pruning removes leaves and branches that contribute the least to the predictive accuracy of the tree. A higher pruning value specifies that more leaves and branches are removed from the tree.

**Reuse predictors**
specifies that predictors can be used more than once in a branch. That is, a predictor can be used more than once on the path leading to a leaf.

The following parameter values are used for the Basic and Advanced growth strategies:

<table>
<thead>
<tr>
<th>Property</th>
<th>Basic Value</th>
<th>Advanced Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum branches</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Maximum levels</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Leaf size</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bin response variable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Response bins</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Predictor bins</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Pruning</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reuse predictors</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 6 Parameter Values for the Basic and Advanced Growth Strategies**
In addition, the following option is available under Decision Tree / Icicle Plot:

**Statistic to show**
- specifies whether the nodes of the decision tree display the **Count** statistic or the **Percent** statistic. This statistic is also shown in the data tips for the nodes in the icicle plot.

**Derive a Leaf ID Data Item from a Decision Tree**

You can derive a leaf ID data item to represent the results of a decision tree. The leaf ID data item creates values that correspond to the node IDs in the details table for the decision tree.

You can use the leaf ID data item in a filter to select the values for a decision tree node in other types of objects.

To calculate a leaf ID data item from a decision tree:

1. Click the drop-down list, and then select **Derive a leaf ID variable**.
2. In the New Leaf ID window, enter a **Name** for the new derived item.
3. Click **OK** to create the new data item.

**Display the Overview**

For large trees, the overview enables you to select the portions of the tree that are visible.

To display the overview, click from the object toolbar.

**Zoom a Decision Tree**

You can zoom a decision tree by scrolling the mouse wheel. The decision tree zooms in and at the location of the cursor.

If you zoom out on a decision tree with a categorical response or a binned measure, then each leaf node displays a single bar for the greatest value in that node.

If you zoom out on a decision tree with an unbinned measure response, then the color of each leaf node indicates the average response value for the node.

When you have zoomed in on a decision tree, you can reposition the decision tree by clicking the tree and dragging it.

---

### Working with Dot Plots

**About Dot Plots**

A dot plot displays the data for each value of a category data item by using dots. The position of each dot on the **Y** (response) axis represents the value.

By default, a dot plot is sorted in descending order by the value of the first measure.

**Data Roles for a Dot Plot**

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.
The basic data roles for a dot plot are a category and a measure. You can assign one category only, and the
category values are plotted on the category axis. You can assign one measure only, and the measure values are
plotted on the response axis.

In addition to the basic data roles, you can assign these roles:

**Data tip values**
- specifies data items whose values are included in the data tips for the object. Data items can be categories,
measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more
information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Lattice columns**
- creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
- creates a lattice of charts with a row for each value of the category data item that you assign.

**Hidden**
- specifies a category or date data item that is included in the data query without it being displayed. You can
use the hidden data item when you map data sources, add color-mapped display rules, or add external links.
For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

---

**Options for a Dot Plot**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

**Transparency**
- specifies the amount of transparency for the bars.

**Combine excluded into “All Other”**
- summarizes all excluded rows. This option is available when you use summarized data, and it applies to both
ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For
more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

**Marker size**
- specifies the size of each marker in pixels.

**Use filled markers**
- specifies whether the markers are filled or hollow.

---

**Working with Dual Axis Bar Charts**

**About Dual Axis Bar Charts**

A dual axis bar chart displays two bar charts with a shared category axis and separate response axes.

By default, a bar chart is sorted in descending order by the value of the first measure.

**Data Roles for a Dual Axis Bar Chart**

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics:
Working with Report Data.
The basic data roles for a dual axis bar chart are categories and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign one measure for each response axis in the chart.

In addition to the basic data roles, you can assign these roles:

**Lattice columns**
creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
creates a lattice of charts with a row for each value of the category data item that you assign.

**Data tip values**
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Animation**
specifies a datetime data item that is used to animate the chart.

If you assign the **Animation** data role, then the ➤ icon appears at the bottom left corner of the object. Click ➤ to start the animation.

**Note:** A graph with the **Animation** data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

---

**Options for a Dual Axis Bar Chart**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

**Fixed baseline**
specifies the baseline value for the bar chart.

**Transparency**
specifies the amount of transparency for the bars.

**Combine excluded into “All Other”**
summarizes all excluded rows. This option is available when you use summarized data. It applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

**Data labels**
shows the data values as text beside or above the bar, depending on the direction of the bar. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.

**Note:** You can always view a data value as a data tip when you position the cursor over a data value.

**Segment labels**
shows the data values of segments inside the bars. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.
Working with Dual Axis Bar-Line Charts

About Dual Axis Bar-Line Charts
A dual axis bar-line chart combines a bar chart and a line chart on a shared category axis. The bar chart and line chart have separate response axes.

By default, a dual axis bar-line chart is sorted in descending order by the value of the first measure.

Data Roles for a Dual Axis Bar-Line Chart
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a dual axis bar-line chart are categories and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign one measure for the bars and one measure for the line chart. Each of the measures is plotted on a separate axis.

In addition to the basic data roles, you can assign these roles:

Lattice columns
creates a lattice of charts with a column for each value of the category data item that you assign.

Lattice rows
creates a lattice of charts with a row for each value of the category data item that you assign.

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Animation
specifies a datetime data item that is used to animate the chart.

If you assign the Animation data role, then the ▶ icon appears at the bottom left corner of the object. Click ▶ to start the animation.

Note: A graph with the Animation data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Dual Axis Bar-Line Chart
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Fixed baseline
specifies the baseline value for the bar chart.
Transparency
specifies the amount of transparency for the bars.

Combine excluded into “All Other”
summarizes all excluded rows. This option is available when you use summarized data. It applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

Data labels
shows the data values as text beside or above the bar, depending on the direction of the bar. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.

Note: You can always view a data value as a data tip when you position the cursor over a data value.

Segment labels
shows the data values of segments inside the bars. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.

Fill
displays a color fill for the area below the line.

Transparency
specifies the amount of transparency for the line. If Fill is enabled, then this option affects the transparency of the fill.

Markers
shows markers for the data points in the line chart.

---

Working with Dual Axis Line Charts

About Dual Axis Line Charts
A dual axis line chart displays data by using two lines that connect the data values for a shared category axis.

Data Roles for a Dual Axis Line Chart
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a dual axis line chart are categories and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign one measure to each of the measure roles, and the values for each measure are plotted on a separate axis.

In addition to the basic data roles, you can assign these roles:

Lattice columns
creates a lattice of charts with a column for each value of the category data item that you assign.

Lattice rows
creates a lattice of charts with a row for each value of the category data item that you assign.

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Animation
specifies a datetime data item that is used to animate the chart.
If you assign the **Animation** data role, then the ➤ icon appears at the bottom left corner of the object. Click ➤ to start the animation.

**Note:** A graph with the **Animation** data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

**Hidden**

specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

### Options for a Dual-Axis Line Chart

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:

- **Fixed baseline**
  
  specifies the baseline value for the line.

- **Transparency**
  
  specifies the amount of transparency for the line. If **Fill** is enabled, then this option affects the transparency of the fill.

- **Combine excluded rows into “All Other”**
  
  summarizes all excluded rows. This option is available when you use summarized data, and it applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

- **Fill**
  
  displays a color fill for the areas below the lines.

- **Line thickness**
  
  specifies the thickness of the line.

- **Markers**
  
  shows markers for the data points in the line chart.

- **Data labels**
  
  shows the data values as text in the chart.

  **Note:** You can always view a data value as a data tip when you position the cursor over a data value.

### Working with Dual Axis Time Series Plots

#### About Dual Axis Time Series Plots

A dual axis time series plot displays two time series that are overlaid on a shared time axis.

#### Data Roles for a Dual Axis Time Series Plot

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a time series plot are the time axis and measures. You can assign one datetime data item only to the time axis. You can assign one measure for each of the lines in the plot.
In addition to the basic data roles, you can assign these roles:

**Data tip values**
- specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure's aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in *SAS Visual Analytics: Working with Report Data*.

**Hidden**
- specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in *SAS Visual Analytics: Working with Report Data*.

**Options for a Dual Axis Time Series Plot**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:

**Binning interval**
- specifies interval between datetime values in the plot. Select one of the following values:
  - **Automatic**
    - automatically determines the best interval for the plot.
  - **Fixed count**
    - plots a specific number of equally spaced values. Specify the number of values in the **Fixed bin count** option.
  - **Use format**
    - plots all of the datetime values as rendered by the data format.

**Fixed bin count**
- specifies the number of datetime values to plot.

*Note:* This option is available only if **Binning interval** is set to **Fixed count**.

**Transparency**
- specifies the amount of transparency for the plot.

**Line thickness**
- specifies the thickness of the line.

**Markers**
- shows markers for the data points in the plot.

**Marker size**
- specifies the size of each marker in pixels.

**Use filled markers**
- specifies whether the markers are filled or hollow.

**Data labels**
- shows the data values as text in the plot.

*Note:* You can always view a data value as a data tip when you position the cursor over a data value.

**Fill**
- creates a color fill for the areas below the line.
Working with Forecasting Objects

About Forecasting Objects

A forecasting object uses the statistical trends in your data source to predict future data values.

The forecast displays a line with predicted values and a colored band that represents the confidence interval. For example, a 95% confidence interval is the data range where the forecasting model is 95% confident what the future values will be.

Historical values for the forecast model are displayed as markers only, without a line. Historical predicted values (hindcast) are displayed as part of the forecast line. Depending on the forecasting model that is selected, the historical prediction line might not begin at the start of the X axis.

SAS Visual Analytics automatically tests multiple forecasting models against your data, and then selects the best model. To see which forecasting model was used, see the details table in maximize mode.

The forecast model can be any one of the following:

- ARIMA
- Damped trend exponential smoothing
- Linear exponential smoothing
- Seasonal exponential smoothing
- Simple exponential smoothing
- Winters method (additive)
- Winters method (multiplicative)

Note: Forecasting accounts for cyclical patterns by using standard intervals of time (for example, 60 minutes in an hour, 24 hours in a day, and so on). If your data uses nonstandard intervals of time (for example, 48 30-minute cycles per day), then cyclical patterns are not considered in the forecast.

Data Roles for a Forecasting Object

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a forecasting object are the time axis and measures. You can assign only one datetime data item to the time axis. You can assign many measures. The measure values are plotted on the response axis.

Note: If the forecast includes goal seeking, then you cannot assign more than one measure to the Measures role.

In addition to the basic data roles, you can assign these roles:

**Forecast**
- enables What-If analysis for the forecast.

**Underlying factors**
- adds additional measures to the forecast as underlying factors. The forecasting model evaluates the additional measures to determine whether they contribute to the accuracy of the forecast. Any measures that contribute to the accuracy of the forecast are used to adjust the forecast lines and confidence intervals. These measures are displayed as separate lines in the forecasting object.
The measures that you add as underlying factors can also be used in a scenario analysis if they contribute to the accuracy of the forecast.

Note: In some cases, removing measures that do not contribute to the accuracy of the forecast can affect the model data and therefore the forecast results. The measures that are assigned as underlying factors are evaluated as a group, and the model data is truncated to the smallest set of dates that the measures have in common.

**Options for a Forecasting Object**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options under **Time Series** in the **Options** pane:

**Binning interval**
- specifies the interval between datetime values in the plot. Select one of the following values:
  - **Automatic** automatically determines the best interval for the plot.
  - **Use format** plots all of the datetime values as rendered by the data format.

**Transparency**
- specifies the amount of transparency for the plot.

**Measure layout**
- specifies whether the measures share a single response axis (**Shared Axis**) or have separate response axes for each measure (**Separate Axes**). If you select **Automatic**, then the measure layout is determined automatically depending on the format and data range of the measure values.

**Markers**
- shows markers for the data points in the plot.

**Marker size**
- specifies the size of each marker in pixels.

**Use filled markers**
- specifies whether the markers are filled or hollow.

**Line thickness**
- specifies the thickness of each line.

**Data labels**
- shows the data values as text in the plot.
  
  **Note**: You can always view a data value as a data tip when you position the cursor over a data value.

**Text style**
- specifies the text style options for the data labels.

The following additional options are available under **Forecast** in the **Options** pane:

**Confidence interval**
- specifies the degree of confidence for the confidence band.

**Forecast horizon**
- specifies the number of data intervals to forecast.
Working with What-If Analysis

About What-If Analysis

What-If analysis enables you to perform two types of advanced forecasting tasks: scenario analysis and goal seeking.

Scenario analysis
   enables you to forecast hypothetical scenarios by specifying the future values for one or more underlying factors that contribute to the forecast.

   For example, if you forecast the profit of a company, and material cost is an underlying factor, then you might use scenario analysis to determine how the forecasted profit would change if the material cost increased by 10%.

Goal seeking
   enables you to specify a target value for your forecast measure, and then determine the values of your underlying factors that would be required to achieve the target value.

   For example, if you forecast the profit of a company, and material cost is an underlying factor, then you might use goal seeking to determine what value for material cost would be required to achieve a 10% increase in profit.

Scenario analysis and goal seeking can be used together in the same forecast.

Apply What-If Analysis to a Forecast

To apply What-If analysis:

1. In the Roles pane, click What If. The What-If Analysis window appears.
   Note: The What If button is available only if one or more underlying factors contribute to the forecast.

2. For the forecast measures and for each of the underlying factors that contribute to the forecast, a chart displays the values of the measures.
   To perform goal seeking, select Goal Seeking, and then set the target values for the forecast measure.
   Note: Goal seeking is not available if more than one measure is assigned to the Measures role.
   To perform scenario analysis, select Scenario Analysis, and then specify the future values for the underlying factors.

   You can set values by using any of the following methods:
   - specify or enter the value for each data point. If Chart is selected, then drag the marker value upward or downward in the chart to set the value. If Table is selected, then enter the data value in the table cell.
     In table mode, arrows indicate any values that have been modified from their baseline values. To show or hide columns in the table, click ☐, and then select Manage columns.
   - set all of the values for the measure. Click ☐, and select Set series values. The Set Series Values window enables you to set all of the values to a specific value or to adjust the future values relative to the forecasted values of the measure.
     Note: The Progressively by option increments future values by the amount that you specify. For example, if you specify 100, then the first future value is increased by 100, the second future value is increased by 200, the third future value is increased by 300, and so on.
   Note: If you change future values for either scenario analysis or goal seeking, you must apply your changes before you can change future values for a different analysis type.
To reset all of the data points for a measure, click ; and then select **Reset series**. The Reset Series window appears. Select the measure that you want to reset, and then click **OK**.

3 (Optional) If you perform goal seeking, you can set bounds for each underlying factor to limit the minimum and maximum values that are possible.

Click **Add bounds**, and then specify the minimum value in the **Lower Bound** column and the maximum value in the **Upper Bound** column.

4 When you are finished setting the future values for the what-if scenario, click **Apply** to apply the scenario to the forecast.

The forecast is updated to show the results of the scenario.

---

**Remove What-If Analysis from Your Forecast**

To remove scenario analysis and goal seeking from a forecast, follow these steps:

1 In the **Roles** pane, select **What If**. The What-If Analysis window appears.

2 Click ; and then select **Start over** to remove all changes to the original forecast.

The forecast is updated automatically.

---

**Working with Gauges**

**About Gauges**

A gauge is a dashboard indicator that compares an actual value to a target value. Several types of gauges are available:

- **Bullet**
  - displays a linear gauge. The target value is indicated by a line and the actual value is indicated by a narrow bar.

- **Dial**
  - displays an arc-shaped gauge. The target value is indicated by a black arrow pointing inward. The actual value is indicated by a white arrow pointing outward.

- **Slider**
  - displays a linear gauge. The target value is indicated by a small black arrow. The actual value is indicated by a large white arrow.

- **Speedometer**
  - displays an arc-shaped gauge. The target value is indicated by a small white triangle pointing outward. The actual value is indicated by a black pointer pointing outward.

- **Thermometer**
  - displays a linear gauge. The target value is indicated by a line. The actual value is indicated by the background bar.

The scale of the gauge and the colored data ranges on the gauge are controlled by display rules. To change these properties, edit the display rules for the gauge.
Data Roles for a Gauge

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data role for a gauge is a measure.

In addition to the basic data roles, you can assign these roles:

**Target**
- specifies the target value for the gauge.

**Group**
- creates a separate gauge for each value of a selected category.

**Data tip values**
- specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Hidden**
- specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Gauge

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

**Type**
- specifies the type of gauge that is displayed. For descriptions of each type, see “About Gauges” on page 59.

**Direction**
- specifies whether the gauge is **Horizontal** or **Vertical**. This option is not available if the gauge type is **Dial** or **Speedometer**.

**Value label**
- specifies whether the actual value is displayed as a number in the gauge.

**Range labels**
- specifies whether the labels for the tick marks in the gauge are displayed.

**Grouping layout**
- specifies whether the lattice of gauges is laid out horizontally from the top left (**Fill rows**) or vertically from the top left (**Fill columns**).

**Note:** This option has no effect if the **Group** role is not assigned.

**Row limit**
- specifies the maximum number of rows that are laid out if the **Group** role is assigned.

**Column limit**
- specifies the maximum number of columns that are laid out if the **Group** role is assigned.

**Grouped gauge limit**
- specifies the maximum number of gauges that are laid out if the **Group** role is assigned.
Working with Geo Maps

About Geo Maps
A geo map overlays your data on a geographic map. You can display your data either as bubbles, as a scatter plot, or as colored regions on the geo map. You can display your data as a contour map.

To display a geo map, you must define one or more of the categories as geography data items. For more information, see “Working with Geography Data Items” in SAS Visual Analytics: Working with Report Data.

Data Roles for a Geo Map
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a geo map are:

Category
specifies the geography data item that identifies geographic regions for your map.

Size
for the Bubbles map type, specifies the measure that determines the bubble size.
for the Coordinates map type, specifies the measure that determines the marker size.

Color
for the Regions map type, specifies the category or measure that determines the regions’ colors.
for the Bubbles map type, specifies a category or measure that determines the bubble color.
for the Coordinates map type, specifies a category or measure that determines the marker color.
for the Contour map type, specifies a measure that determines the weighting for the shape of the contour plot.

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Animation
specifies a datetime data item that is used to animate the chart.

Note: Animation is not available for contour maps.

If you assign the Animation data role, then the ▶ icon appears at the bottom left corner of the object. Click ▶ to start the animation.

Label
for the Bubbles and Coordinates map types, specifies a data item whose values are displayed instead of the geography values when the Data labels option is enabled.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links.
For more information, see "Understanding the Hidden Data Role" in SAS Visual Analytics: Working with Report Data.

Options for a Geo Map

For information about general options, see "Using the Options Pane" on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Type
specifies the type of data overlay for the map. Select one of the following values:

- **Bubbles**
displays your data as a series of bubbles. Each bubble is located at the center of a geographic region or at the coordinates of a location.

- **Coordinates**
displays your data as a simple scatter plot on the map. Each point is located at the center of a geographic region or at the coordinates of a location.

- **Regions**
displays your data as colored regions on the map.

  Note: The Regions map style is not available for ZIP codes or for custom geographic roles that are based on coordinates.

- **Contour**
displays your data as a contour plot. A contour plot uses shaded areas or lines to indicate the density of data or to indicate the values of a measure that is assigned to the Color data role.

  Note: For best results, the Contour map type should be used with dense data.

Cluster adjacent markers
groups adjacent markers together into a single marker. This option is available only if the map type is Coordinates.

When clustered markers are enabled, each marker displays a number that indicates the number of points that are represented by that marker. As you zoom or pan the map, the clustering is reevaluated.

Note: Clustered markers are not affected by display rules. Display rules do affect the detail markers in a clustered map if your zoom level enables detail markers to be displayed.

Initial marker shape
specifies the shape for the markers. This option is available only if the map type is Coordinates.

If a category is assigned to the Color role, then multiple marker shapes might be used, depending on the number of different values for the category. The marker shape that you specify is used for the first set of values. Multiple marker shapes might also be used depending on the Data element style rotation option for your report.

Marker size
specifies the size of each marker as a percentage of the maximum size. This option is available only if the map type is Coordinates.

Data labels
displays data values on the map. This option is not available for the Regions map type.

Map background
displays a background map.

Map service
specifies the source for the background map.

Note: This option is available only if Map background is enabled.
Transparency
specifies the amount of transparency for the data overlay.

If clustered markers are enabled, then you can specify the following additional options:

**Maximum clusters**
specifies the maximum number of clusters that can be displayed at one time.

**Cluster spacing**
specifies the amount of distance between clusters. Generally, a lower value creates more clusters and a higher value creates fewer clusters.

For contour plots, the following additional options are available:

**Bin count**
specifies the number of grid cells that are used to analyze the data on the map. In general, a higher bin count draws the contour lines more closely around local peaks.

**Levels**
specifies the number of contour levels (value ranges) to display.

**Fill**
displays a color fill for the contour areas. This option can be disabled only if the **Lines** option is enabled.

**Lines**
displays an outline around each contour level on the map.

---

### Zoom a Geo Map

You can zoom the map by using any of the following controls:

- scroll the mouse wheel to zoom in or zoom out at the location of the cursor
- enable the zoom control by selecting **Zoom → Zoom Controls** from the object toolbar. Click 🧐 to zoom in and 💕 to zoom out.
- use the 🕒 cursor tool to click and drag to create a rectangular zoom selection.

To reset the zoom state for the geo map, select **Zoom → Reset zoom** from the object toolbar.

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### Use Cursor Tools to Pan a Map, Create Shape-Based Selections, and Zoom

In a geo map, the cursor can perform different tasks when you click and drag the map. The default cursor action is to pan (scroll) the map.

To change the selected cursor tool, select the icon from the object toolbar that matches the current cursor tool, and then select one of the following icons:

- 🧝 pans (scrolls) the map.
- 📝 creates a rectangular selection.
- 🔄 creates a circular selection.
- 🚀 creates a free-form selection.
- 🕒 zooms the map to the rectangle that you create.
Working with Location Pins in a Geo Map

About Location Pins
A location pin enables you to mark a location on the map and to perform actions based on that location.

Note: Location pins are not saved as part of your report.

Create a New Location Pin
To create a new location pin, you can perform either of the following:
- Search for a location, select the location, and then select **New pin at this location**.
- Click 📍, select **New location pin**, and then click the spot on the map where you would like to create a new location pin.

You can enter a name for the pin and select a color for the pin.

Delete a Location Pin
To delete a pin, click it to select it, and then click ✗. Select **Delete pin**.

Create a Radius-Based Selection in a Geo Map
For the **Bubbles**, **Coordinates**, and **Contour** map types, you can create a radius-based selection to determine distances from a location pin.

To create a radius-based selection:

1. Click a location pin or select a location from search results, and then select **Geographic selection**.
2. Select the type:
   - **Distance** creates a circular selection based on the distance in miles or kilometers.
   - **Travel-distance** creates an irregular selection based on the travel distance using roads.
   - **Travel-time** creates an irregular selection based on the distance that can be traveled in the specified amount of time.

   **Note:** The **Travel-distance** and **Travel-time** selections are available only if you have enabled Esri premium services in your SAS Visual Analytics settings. For more information, see “Modify SAS Visual Analytics Settings” in SAS Visual Analytics: Designing Reports.

3. For the **Travel-distance** and **Travel-time** selections, select the **Travel mode** that is used to calculate distances. Select one of the following:
   - **Driving** calculates distance by using roads.
   - **Trucking** calculates distance by using roads that allow trucks.
   - **Walking** calculates distance by using walking trails and sidewalks where available. For travel time, an average walking speed is used.
Specify the radius for the selection. For the Travel-distance and Travel-time selections, the radius must be less than or equal to 30 miles or 50 kilometers.

(Optional) For the Travel-distance and Travel-time selections, add additional radii to the selection. Each radius has a different background color on the map.

To create a new radius, click Add, and then specify the distance or duration value.

For Travel-time, specify whether to include traffic and what type of traffic should be used to determine travel time.

Click Draw Selection to create the selection.

If your selection includes data points, you can use it to filter your data. To create a selection filter, right-click the map, and select New filter from selection ⇒ Include only selection. To create an exclusion filter, right-click the map, and select New filter from selection ⇒ Exclude selection.

Note: To recall a selection that you displayed previously, click , and then select the check box beside each location pin whose selection you want to display.

Note: Selections are not saved as part of your report.

**Display Demographic Statistics for a Radius-Based Selection**

If you have created a radius-based selection (see “Create a Radius-Based Selection in a Geo Map” on page 64) and you have enabled Esri premium services, then you can display demographic data for your selection. For example, you can display the total population and average income for the area that is within a 10-minute drive from your place of business.

To display demographic data:

1. Create a radius-based selection.

2. Click Show demographics. The Demographics window appears.

3. Select one or more demographic statistics to retrieve for the current selection, and then click OK.
   
   An information window displays the selected demographic statistics for the current selection. If you selected more than one statistic, then you can scroll through the statistics by clicking the left arrow and right arrow buttons.

**Search a Geo Map**

Note: The search feature does not search the values in your data. Instead, it searches a database that is part of Esri ArcGIS Online Services.

To search the map, click , and then enter your search term in the Search field. The search returns businesses and locations that are located within your current map view. The search can return up to 20 results.

Note: Some results are displayed only at closer zoom levels. For example, if your map displays an entire country, then results for small businesses might not be displayed.

**Draw Routes on a Geo Map**

You can draw routes on a geo map. To draw a route on a geo map:

1. Create a location pin or select an existing location pin.
2 Select **Route from here** to draw a route originating from the location pin, or select **Route to here** to draw a route ending at the location pin.

3 Select the **Travel mode** for the route. Select one of the following:

- **Direct**
  displays a straight line between the two points.

- **Trucking**
  calculates a route by using roads that allow trucks.

- **Driving**
  calculates a route by using roads.

- **Walking**
  calculates a route by using walking trails and sidewalks where available.

**Note:** **Trucking**, **Driving**, and **Walking** routes are available only if you have enabled Esri premium services in your SAS Visual Analytics settings. For more information, see “Modify SAS Visual Analytics Settings” in *SAS Visual Analytics: Designing Reports*.

4 Select the origin or destination of the route by doing one of the following:

- select a location pin
- search for a location and select it
- click a point on the map

**Identify a Point on a Geo Map**

You can identify points on a geo map. To identify a point on a geo map, right-click the map, and select **Identify geographic point**. The best match for the selected point is displayed.

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**Working with Heat Maps**

**About Heat Maps**

A heat map displays the distribution of values for two data items by using a table with colored cells. If you do not assign a measure to the **Color** data role, then a cell’s color represents the frequency of each intersection of values. If you assign a measure to the **Color** data role, then a cell’s color represents the aggregated measure value for each intersection of values.

If you apply more than two axis items to the heat map, the heat map object displays a matrix of heat maps. The matrix displays each possible pairing of axis items that are assigned.

**Data Roles for a Heat Map**

For information about setting data roles, see “Working with Data Role Assignments” in *SAS Visual Analytics: Working with Report Data*.

The basic data roles for a heat map are:

- **Axis Items**
  specifies data items that are assigned to the X and Y axes.
Color
specifies a measure that determines the cell color. If you do not assign the Color role, then the cell color indicates frequency.

Options for a Heat Map
For information about general options, see “Using the Options Pane” on page 7.
In addition to the general options, you can specify the following object-specific options in the Options pane:

Bin count
specifies the number of value ranges that are represented as cells. Bin count affects only measures.

Borders
specifies that the borders between cells are visible.

Transparency
specifies the transparency of the cells.

Fit Line
adds a fit line to the heat map.

Note: Fit lines are not available if fewer than two measures are assigned to the axes.
You can select any of the following fit types:
Best Fit
selects the most appropriate model (linear, quadratic, or cubic) for your data. The Best Fit type uses backward variable selection to select the highest-order model that is significant. To see the final model that was used, maximize the object.
Linear
creates a linear fit line from a linear regression algorithm. A linear fit produces the straight line that best represents the relationship between two measures.
For a linear fit, correlation is automatically added to the object. Correlation is not available with other fit types.
Quadratic
creates a quadratic fit line. A quadratic fit produces a line with a single curve. A quadratic fit often produces a line with the shape of a parabola.
Cubic
creates a cubic fit line. A cubic fit produces a line with two curves. A cubic fit often produces a line with an “S” shape.
PSpline
creates a penalized B-spline. A penalized B-spline is a smoothing spline that fits the data closely. A penalized B-spline can display a complex line with many changes in its curvature.
Detailed information about the fit line for your object is available in the details table for the object. To see the details table, maximize the object. See “Maximizing Objects” on page 19.

Working with Histograms

About Histograms
A histogram displays the distribution of values for a single measure. A series of bars represents the number of observations in the measure that match a specific value or value range. The bar height can represent either the exact number of observations or the percentage of all observations for each value range.
Note: If you use the default number of bins, then the minimum and maximum values on the histogram axis might not match the actual extent of your data values. If you specify the number of histogram bins, then the histogram axis matches your data values exactly.

Data Roles for a Histogram

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a histogram are Measure and Frequency.

Options for a Histogram

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Bar direction
specifies whether the bars are vertical Ⅰ or horizontal ⅄.

Transparency
specifies the amount of transparency for the bars.

Bin range
specifies how the boundaries of the bin ranges are determined. Select one of the following:

- System-determined values
  places the boundaries at values that are rounded. The bin ranges might extend beyond the minimum and maximum values in the data.

- Measure values
  places the boundaries according to the actual minimum and maximum values in the data.

Set a fixed bin count
enables the Bin count option.

Note: A fixed bin count is available only if the Bin range option is Measure values.

Bin count
specifies the number of bins (value ranges) for the histogram.

Working with Key Values

About Key Values

A key value displays a single aggregated value for a measure, a category, or both.

If no category is assigned, then the aggregated value that is displayed is for the entire data query. For example, if the aggregation for your measure is Sum, then the key value displays the sum of all of the values in the data query.

If a category is assigned, then the aggregated value that is displayed is for category value that has the greatest or least aggregated value for the measure. For example, if the aggregation for your measure is sum and the Value option is set to Highest value, then the key value displays the greatest sum for the category.
Data Roles for a Key Value

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a key value are a measure and a category. The measure is required and the category is optional.

In addition to the basic data roles, you can assign these roles:

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Key Value

For information about general options, see "Using the Options Pane" on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Style
specifies the style for the key value. Select Text to display the values only. Select Infographic to display the values within a colored circle.

Value
specifies whether the greatest aggregated value (Highest value) or the smallest aggregated value (Lowest value) for the assigned category is displayed.

Note: This option has no effect if the Category role is unassigned.

Highlight
specifies whether the category value or the measure value is highlighted. The highlighted value is displayed in a larger font. In the Text style, the highlighted value is displayed above the other value. In the Infographic style, the highlighted value is displayed at the center of the circle. The other value is displayed only if you select the value in the Additional information option.

For the Infographic style only, you can specify text style options for the highlighted value. (For the Text style, these options are available elsewhere.)

Position
specifies the position of the content within the object.

Use abbreviated numerical value
displays the measure value in an abbreviated form. For example, the value 1,142,571 is abbreviated as 1.1M. The data tip for the measure always displays the full value.

If you select the Text style, then the following additional options are available:

Alignment
Specifies the alignment of the labels and values.

Measure label
displays the measure label. If enabled, then you can specify text style options for the measure label.
Measure value
- displays the measure value. If enabled, then you can specify text style options for the measure value.

Category label
- displays the category label. If enabled, then you can specify text style options for the category label.

Category value
- displays the category value. If enabled, then you can specify text style options for the category value.

Aggregation
- displays the aggregation for the measure value. If enabled, then you can specify text style options for the aggregation label.

If you select the Infographic style, then the following additional options are available:

Additional information
- specifies a single label or value to display in addition to the measure value. If enabled, then you can specify text style options for the label or value.

Circle
- specifies the color of the circle.

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**Working with Line Charts**

**About Line Charts**

A line chart displays data by using a line that connects the data values. If you assign multiple measures to a line chart, then you can create separate Y axes for each measure.

**Data Roles for a Line Chart**

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a line chart are categories and measures. You can assign one category only, and the category values are plotted on the category axis. You can assign many measures, and the measure values are plotted on the response axis. If the line chart contains no measures, then the frequency of the category values is plotted on the response axis.

In addition to the basic data roles, you can assign these roles:

**Group**
- groups the data based on the values of the category data item that you assign. A separate line is created for each data value.

  **Note:** Grouping is not available if you assign multiple measures to the chart.

**Lattice columns**
- creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
- creates a lattice of charts with a row for each value of the category data item that you assign.

**Data tip values**
- specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.
Animation

specifies a datetime data item that is used to animate the chart.

If you assign the Animation data role, then the ▶ icon appears at the bottom left corner of the object. Click ▶ to start the animation.

Note: A graph with the Animation data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

Hidden

specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links.

For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Line Chart

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Fixed baseline

specifies the baseline value for the chart.

Note: This option is not available if the chart displays separate Y axes.

Transparency

specifies the amount of transparency for the chart.

Grouping style

specifies the style overlay that is used when multiple measures are assigned to the chart. Select one of the following:

Overlay Unfilled
displays the lines without color fills.

Overlay Filled
displays the lines with transparent color fills.

Stack Filled
displays the lines with opaque color fills that are stacked. The values of the stacked lines are plotted relative to the lines below them, rather than to the baseline of the chart.

Measure layout

specifies whether the measures share a single response axis (Shared Axis), have separate response axes for each measure (Separate Axes), or have SAS Visual Analytics decide the layout (Automatic).

Line thickness

specifies the thickness of each line.

Markers

shows markers for the data points in the chart.

Marker size

specifies the size of each marker in pixels.

Use filled markers

specifies whether the markers are filled or hollow.

Data labels

shows the data values as text in the chart.

Note: You can always view a data value as a data tip when you position the cursor over a data value.
Sort Data Values

By default, for category data, a line chart is sorted in descending order by the value of the first measure. For datetime data, the chart is sorted in ascending order by the datetime values. To change the sorting, right-click on the data item that you want to sort on, select Sort, and then select a sorting method.

Working with List Tables

About List Tables

A list table displays data as text. The data value for each measure or category that is assigned to the list table is displayed as a column.

By default, a list table contains aggregated data with one row for each distinct combination of category values. However, if the Detail data check box has been selected, then the data is not aggregated.

You can add a sparkline to a column (if the data source contains a date data item) when aggregated data is displayed in a list table. For more information, see “Add Sparklines to a List Table” on page 74.

You can add a cell graph (either a bar chart or a heat map) to a list table column that uses a measure data item. For more information, see “Add Cell Graphs to a List Table” on page 76.

Here are some key points about list tables:

- For very large data sources, the default is 40,000 rows, unless a different default is specified using the Override system data limit option.
- A list table always displays sorted rows.
- You cannot select the totals in a list table. Only rows with data are selectable.
- List tables that show detail data cannot be the source of an action or a link.
- Clear the Fit columns to width check box to see an empty column so that you can drag and drop additional data items while designing a report.
- Automatic titles are not available for list tables. However, you can specify a custom title.

For information about sorting in a list table, see “Sort Data in a List Table” in SAS Visual Analytics: Working with Report Data.

Data Roles for a List Table

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data role for a list table is a column. A column can be any type of data item. You can add multiple columns to a list table.

In addition to the basic data role, you can assign the following role:

Hidden

specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.
Options for a List Table

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

**Detail data**
- Specifies that the data is not aggregated. This option is available when you use aggregated data, and it applies to both ranks and post-aggregate filters.

  **Note:** This option is not available if the list table already has a post-aggregate filter.

**Use abbreviated numerical value**
- Specifies that large measure values use abbreviated numerical values. For example, 1,100,000,000 is displayed as 1.1B. You can specify which columns should use abbreviated numerical values.

**Combine excluded rows into “All Other”**
- Summarizes all excluded rows. This option is available when you use summarized data, and it applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

**Fit columns to width**
- Sets the default widths of the columns in the list table based on the space available. This option is selected by default.

**Enable sorting**
- Sorts the data. When this option is not selected, you cannot click the column headings to sort the table.

**Horizontal lines**
- Displays horizontal lines for the rows in the list table. This option is selected by default.

**Vertical lines**
- Displays vertical lines for the columns in the list table. This option is selected by default.

**Condense row height**
- Removes extra white space in all of the rows in the list table. This option is selected by default.

**Background color**
- Displays a background for all of the rows in the list table. The default color for all rows is white.

**Alternating background color**
- Displays a different background for alternating rows in the list table. This option is not selected by default.

**Totals**
- Adds a total for each numeric column. With this option, you can choose which columns display totals. You can also choose whether totals have labels.

  **TIP** Use this option to turn off or turn on the aggregation labels for totals.

**Placement**
- Specifies the location of totals. Select **Before** to place the totals at the top of the list table. Select **After** to place the totals at the bottom of the list table.

Managing Columns in List Tables

**Sort Columns**

By default, list tables are sorted in ascending order by the first data item that you add. To sort the list table by a column, right-click the column heading, and then select a sorting method. An arrow appears in the column.
heading to indicate the sorting. For more information, see “Sort Data in a List Table” in SAS Visual Analytics: Working with Report Data.

**Rearrange Columns**

To rearrange your columns, use the Roles pane. Hold your pointer over the ⬤ indicator beside the row or column name until the pointer changes from a single arrow to multiple arrows, and then click and drag the row or column to a new position in the list.

**Resize Columns**

To resize a column, click, and then drag and drop the left or right edge of a column heading.

**Add Sparklines to a List Table**

A sparkline is a small line graph without axes or labels that presents a single trend over time. A sparkline is about the size of one or two words, so it fits in a single cell and repeats for each row in a column. Sparklines are frequently used to present stock trends or production rates over time. A sparkline is intended to be both succinct and noteworthy.

In SAS Visual Analytics, you can add sparklines to a column in a list table. The data source for the list table must include a date, datetime, or time data item before you can add a sparkline.

A sparkline in SAS Visual Analytics can have up to 40 bins. (A *bin* is a way to group continuous values into a smaller number of intervals.) When the sparkline data is binned, it is grouped by a boundary. A boundary is a minute, hour, day, month, quarter, or year. For example, if there are two years’ worth of data, then the data will be grouped by month, and the sparkline will have 24 bins (or one for each month). If there is one month (30 days) of data, the sparkline will have 30 bins. If you have two months of data, the sparkline will have two bins because the data is binned by a month boundary. Having a lot of data for the list table does not guarantee that the sparkline provides more detail because SAS Visual Analytics prioritizes bin boundaries over maximum number of bins.

The data tip values on the sparkline show the high and low values of the sparkline and the last value in the sparkline. The data tip values are affected by the boundary at which the data is binned and by the aggregation of the data item. For example, suppose that the aggregation is Sum. If the data is binned by day, then the minimum and maximum values for a given day are displayed in the data tip. However, if the data changes and it is binned by month, then the minimum and maximum values for the sum of all days in the month are displayed in the data tip.

**Note:** SAS Visual Analytics does not let report designers control the binning of the sparkline.

The data for each sparkline is displayed as a miniature time series plot. Here is an example of a report that contains a simple list table with a sparkline and a time series plot, which is filtered to represent the data shown in the sparkline:
In the example, both the time series plot and the sparkline are using Profit for the measure. The time series plot has more detail than the sparkline because in the time series plot, the data is grouped at a more granular level. The sparkline shows the same overall line as the time series plot, but has less detail. The sparkline does not display the trend at the most granular date, datetime, or time level. Instead, the sparkline summarizes the trend depending on the unit of time that is used in the list table. For example, the sparkline might be summarized for the month, quarter, or year, depending on the data. The report designer cannot change the level of summary in the sparkline.

To add a sparkline:

1. If it is not already selected, select the list table on the canvas that you want to update.
2. Right-click the list table, and then select Add Sparkline. The Add Sparkline window is displayed.
3. Enter a Column label.
4. For Time Axis, select a date, datetime, or time data item in the current data source.
5. Select a Measure (line).
6. (Optional) Select the Set baseline check box. Enter a Value, and select a Fill type. Your choices are Gradient or Solid.

   The Set baseline option draws a horizontal line through the graph at the point on the Y axis where the baseline value resides. Everything above or below the baseline is filled in with either a solid or gradient color.
7 Click OK. The sparkline is added to the last column in the list table. You can move the sparkline to another location in the list table.

To edit a sparkline, right-click in the sparkline column in the list table, and then select Edit sparkline. The Edit Sparkline window is displayed. Update the information, and then click OK to save your changes.

To delete a sparkline, right-click in the sparkline column in the list table, and then select Delete sparkline.

Add Cell Graphs to a List Table

You can add a cell graph to a column in a list table. The data source for the list table must include at least one measure data item before you can add a cell graph.

The cell graph (either a bar chart or a heat map) fits in a single cell and repeats for each row in a column. For a bar chart, each bar is sized to its relative value within the column. For a heat map, each cell is colored according to its relative value in the column.

To add a cell graph:

1. If it is not already selected, select the list table on the canvas that you want to update.
2. Right-click a column or column heading containing a measure data item, and select Add cell graph. Then, select Bar or Heat map. The bar chart or heat map is automatically added to the column.
3. (Optional) Change the cell graph options, which are available under the Cell Graphs heading in the Options pane. For a bar chart, you can change the color of the bar and the placement of the text. For a heat map, you can change the color gradient that is used.

   **TIP** If it is difficult to see the numbers that are represented by the cell graphs, select the Use abbreviated numerical value option to have large measure values use abbreviated numerical values.

4. (Optional) Sort the cell graph column. For more information, see “Sort Data in a List Table” in SAS Visual Analytics: Working with Report Data.

Here is an example of a report that contains a simple list table with cell graphs. The Expenses column contains a bar chart and the Profit column contains a heat map. Note that the Expenses column is using the Use abbreviated numerical value option. The list table is sorted by the Profit column, which has a heat map cell graph.
Working with Needle Plots

About Needle Plots
A needle plot displays vertical lines that connect the data points to a horizontal baseline. Needle plots are useful when you want to show values that are both above and below a given value.

By default, a needle plot is sorted in descending order by the value of the first measure. For a grouped needle plot, the data is sorted by the category values in alphabetical order.

Note: If the plot contains a rank, then, by default, the data is sorted based on the values of the rank.

Data Roles for a Needle Plot
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a needle plot are:

X axis
specifies the data item that is assigned to the X axis.

Y axis
specifies the measure that is assigned to the Y axis.

In addition to the basic data roles, you can assign these roles:

Group
groups the data based on the values of the category data item that you assign.

Lattice columns
creates a lattice of charts with a column for each value of the category data item that you assign.

Lattice rows
creates a lattice of charts with a row for each value of the category data item that you assign.

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Needle Plot
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Fixed baseline
specifies the baseline value for the needle plot.
Transparency
 specifies the amount of transparency for the needles.

Markers
 shows markers at the end of each needle in the plot.

Marker size
 specifies the size of each marker in pixels.

Use filled markers
 specifies whether the markers are filled or hollow.

Sorting Data for a Needle Plot
By default, the X axis is sorted in ascending order. If a category with discrete data is assigned to the X axis, then you can change the sorting order. You cannot change the sort for axes that contain continuous data.

Working with Network Analysis Objects

About Network Analysis Objects
A network analysis object displays the relationships between data item values as a series of linked nodes.

You can create two types of network analysis:

Hierarchical
 creates a hierarchical structure by using a hierarchy.

Ungrouped
 creates a structure by using a source data item and a target data item. A node is created for each value of the source data item, and a link is created from each node to the node that corresponds to the value of the target data item.

For example, if your source data item specifies the name of every employee in an organization, and your target data item specifies the manager of each employee, then the network analysis has a node for each employee that is linked to the node for the employee’s manager.

Note: A display rule that identifies missing values might return unexpected results for a network analysis object.

Data Roles for a Network Analysis Object
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

Basic Data Roles for a Hierarchical Network Analysis Object
The basic data role for a hierarchical network analysis object is Levels. The hierarchy in the Levels role specifies the nodes of the network analysis.

Basic Data Roles for an Ungrouped Network Analysis Object
The basic data roles for an ungrouped network analysis object are Source and Target. The Source specifies a data item that contains all of the node values for the plot. The Target specifies a data item that creates the links between nodes.

The Target data item must contain a subset of the values of the Source data item.
To represent terminal (target-only) values in an ungrouped network analysis, you can add rows to your data where the terminal value is the value for the source data item and the target data item is missing.

For example, in the following table, the final row represents a terminal value:

**Example Data Table**

<table>
<thead>
<tr>
<th>Employee</th>
<th>Manager</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMP1</td>
<td>MGR1</td>
<td>40000</td>
</tr>
<tr>
<td>EMP2</td>
<td>MGR1</td>
<td>55000</td>
</tr>
<tr>
<td>EMP3</td>
<td>MGR1</td>
<td>50000</td>
</tr>
<tr>
<td>MGR1</td>
<td></td>
<td>75000</td>
</tr>
</tbody>
</table>

**Additional Data Roles for a Network Analysis Object**

In addition to the basic data roles, you can specify the following data roles for a network analysis:

- **Size**
  - specifies a measure that determines the size of the nodes in the network analysis.
  - **Note:** You can assign internal network metrics to the **Size** role. See "Network Metrics" on page 82.

- **Color**
  - specifies a data item that determines the color of the nodes in the network.
  - **Note:** You can assign internal metrics to the **Color** role. See "Network Metrics" on page 82.

- **Link width**
  - specifies a measure that determines the width of the links in the network.

- **Link color**
  - specifies a data item that determines the color of the links in the network.

- **Label**
  - specifies a data item whose values are displayed inside each node if the **Node labels** option is enabled.

- **Data tip values**
  - specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Options for a Network Analysis Object**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify object-specific options in the **Options** pane. You can specify the following options under **Network Analysis**:

- **Type**
  - specifies the type of network to display.
    - **Hierarchical** uses a hierarchy data item to create the network.
    - **Ungrouped** uses a source and a target. A node is created for each value of the source data item, and a link is created from each node to the node that corresponds to the value of the target data item.
**Additional levels**
for hierarchical networks only, specifies the number of levels that are displayed beneath the current level.

**Node labels**
shows the node values as text inside each node.

**Link direction**
specifies whether the links in the network have arrows. Select one of the following values:

- **None**
specifies that the links do not have arrows.
- **Source**
adds arrows to each link, pointing from the target node to the source node.
- **Target**
adds arrows to each link, pointing from the source node to the target node.
- **Both**
adds arrows to both ends of each link.

**Detailed link attributes**
displays every link between each pair of nodes. If this option is disabled, then links between nodes are aggregated.

This option also determines whether the links are aggregated in the details table in the explore mode.

**Link curvature**
specifies the amount of curvature for the links.

**Map background**
displays the network as an overlay on a geographic map.

*Note:* This option is available only if geographies are assigned to all of the data roles that create nodes. For hierarchical diagrams, all of the **Levels** must be geographies. For ungrouped diagrams, the **Source** and **Target** must be geographies.

**Map service**
specifies the source for the background map.

*Note:* This option is available only if **Map background** is enabled.

**Transparency**
specifies the amount of transparency for the background map.

*Note:* This option is available only if **Map background** is enabled.

You can specify the following options under **Network Layout**:

**Communities**
specifies the number of communities (local node groupings) to calculate within each cluster of nodes. The total number of communities that is calculated might be less than the selected value, depending on the network structure and size.

*Note:* This option is available only if the **Community** metric is assigned to the **Color** role.

**Node size**
adjuts the size of all of the nodes in the network.

**Force strength**
specifies the force strength parameter that is used in the force-directed layout algorithm. The force strength parameter specifies the relative strength of local forces to global forces with regard to laying out the positions of nodes and links. In general, a greater value creates more space between the nodes throughout the network.

*Note:* This option is not available if **Map background** is enabled.
Node distance
specifies the distance parameter that is used in the force-directed layout algorithm. The node distance parameter specifies the maximum distance for which the layout algorithm models global forces between nodes. In general, a larger value creates more space between the nodes throughout the network.

Note: This option is not available if Map background is enabled.

If you have specified a source node (select a node, then right-click the diagram and select Set as source for selection), then you can specify the following options under Node Selection:

Source node
displays the current node selection.

Predecessors
selects the number of levels of predecessors (parents) of the source node to select. A 0 specifies the source node. You can specify a range by making multiple selections. For example, select both 0 and 1 to specify that the source node and the first level of predecessors are selected.

Successors
selects the number of levels of successors (children) of the source node to select. A 0 specifies the source node. You can specify a range by making multiple selections. For example, select both 0 and 1 to specify that the source node and the first level of successors are selected.

Arrange Nodes in a Network Analysis Object

Note: If your network displays a map background, then you cannot alter the node layout.

Move Nodes
You can move any node in the network by selecting the node and then dragging it. You can move multiple nodes in the network by selecting the nodes that you want to move, and dragging them.

Note: The positions of the nodes in your network are saved with your report.

Refresh the Node Layout
You can refresh your node layout by selecting Reset node layout. The network creates a new node layout based on your current node layout. This is especially useful after you have moved nodes manually. Refreshing the node layout adjusts the spacing and orientation of your nodes.

Select Nodes in a Network Analysis Object
You can select nodes in the network by using any of the following methods:

- If the rectangular selection tool is selected, you can select nodes by clicking and dragging.
  If the rectangular selection tool is not selected, then click in the object toolbar, and then select .
- Hold down the Ctrl key, and click the nodes that you want to select.
- Select a series of linked nodes by setting a node as the source node.
  Select a node, right-click the node, and then select Set as source for selection.
  In the Options pane, specify the range of levels of Predecessors (parents) and Successors (children) of the source node to select. 0 specifies that the source node is selected.
  For example, if you specify a range of 0 to 1 for Predecessors and a range of 0 to 2 for Successors, then the source node, one level of predecessors, and two levels of successors are selected.
- Right-click the object, select Selection, and then select any of the following:
Select all
selects all of the nodes in the network.

Invert selection
deselects any selected nodes and selects the nodes that are not currently selected.

Clear selection
deselects all nodes.

Largest cluster
selects all of the nodes in the largest cluster in the network.

Smallest cluster
selects all of the nodes in the smallest cluster in the network.

Shortest path
selects the nodes that form the shortest path between the selected nodes. If you select more than two nodes, then the shortest path between each pairing of the selected nodes is selected. If there are ties for the shortest path, then all of the shortest paths are selected.

Display the Overview
For large networks, the overview enables you to select the portions of the network that are visible.

To display the overview, click from the object toolbar.

Control the View of a Network Analysis Object

You can control the view of a network by using the following controls:

Table 8  View Controls for Network Analysis

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoom</td>
<td>Zoom in and out at the location of the cursor by scrolling the mouse wheel. You can also enable the zoom control by selecting Zoom Controls from the object toolbar. Click 🕐 to zoom in, or ☯️ to zoom out.</td>
</tr>
<tr>
<td>Pan (scroll)</td>
<td>If the pan tool is selected, you can pan (scroll) the map by clicking the map and dragging it. If the pan tool is not selected, then click ☑️ in the object toolbar, and then select ⌘️.</td>
</tr>
</tbody>
</table>

Network Metrics

You can assign network metric variables to the Size and Color data roles.

You can select any of the following metrics:

Community
A metric that identifies local groupings of nodes.

Note: When you refresh your data or reload the report, the values for the community metric might be different.
Reach Centrality
A metric that indicates how many links away the farthest connected link is. Nodes that are in the middle of the network have a smaller value.

Stress Centrality
A metric that indicates how frequently a node would be crossed when taking the shortest paths between nodes.

Closeness Centrality
A metric that indicates how close a node is to all of its connected nodes.

Betweenness Centrality
A metric that indicates how often a given node is part of the shortest paths between nodes as a fraction of all of the shortest paths between each pair of nodes.

Disconnected Network ID
An ID that identifies each group of connected nodes. All nodes that are connected have the same value for disconnected network ID.

Working with Location Pins in a Network Analysis Object with a Map Background

About Location Pins
If your network has a map background, then you can create location pins on the map. A location pin enables you to mark a location on the map and to perform actions based on that location.

Note: Location pins are not saved as part of your report.

Create a New Location Pin
To create a new location pin, you can perform either of the following:

- Search for a location, select the location, and then select New pin at this location.
- Click📍, select New location pin, and then click the spot on the map where you would like to create a new location pin.

You can enter a name for the pin and select a color for the pin.

Delete a Location Pin
To delete a pin, click it to select it, and then click DELETE. Select Delete pin.

Create a Radius-Based Selection in a Geo Map
For network analysis objects that have a map background, you can create a radius-based selection to determine distances from a location pin.

To create a radius-based selection:

1. Click a location pin or select a location from search results, and then select Geographic selection.
2. Select the type:
   - Distance
     creates a circular selection based on the distance in miles or kilometers.
   - Travel-distance
     creates an irregular selection based on the travel distance using roads.
Travel-time creates an irregular selection based on the distance that can be traveled in the specified amount of time.

**Note:** The **Travel-distance** and **Travel-time** selections are available only if you have enabled Esri premium services in your SAS Visual Analytics settings. For more information, see "Modify SAS Visual Analytics Settings" in SAS Visual Analytics: Designing Reports.

3 For the **Travel-distance** and **Travel-time** selections, select the **Travel mode** that is used to calculate distances. Select one of the following:

- **Driving** calculates distance by using roads.
- **Trucking** calculates distance by using roads that allow trucks.
- **Walking** calculates distance by using walking trails and sidewalks where available. For travel time, an average walking speed is used.

4 Specify the radius for the selection. For the **Travel-distance** and **Travel-time** selections, the radius must be less than or equal to 30 miles or 50 kilometers.

5 (Optional) For the **Travel-distance** and **Travel-time** selections, add additional radii to the selection. Each radius has a different background color on the map.

   To create a new radius, click **Add**, and then specify the distance or duration value.

6 For **Travel-time**, specify whether to include traffic and what type of traffic should be used to determine travel time.

7 Click **Draw Selection** to create the selection.

If your selection includes data points, you can use it to filter your data. To create a selection filter, right-click the map, and select **New filter from selection** ➔ **Include only selection**. To create an exclusion filter, right-click the map, and select **New filter from selection** ➔ **Exclude selection**.

**Note:** To recall a selection that you displayed previously, click ⬊, and then select the check box beside each location pin whose selection you want to display.

**Note:** Selections are not saved as part of your report.

### Display Demographic Statistics for a Radius-Based Selection

If your network has a map background and you have created a radius-based selection (see “Create a Radius-Based Selection in a Geo Map” on page 83) and you have enabled Esri premium services, then you can display demographic data for your selection. For example, you can display the total population and average income for the area that is within a 10-minute drive from your place of business.

To display demographic data:

1 Create a radius-based selection.

2 Click **Show demographics**. The Demographics window appears.

3 Select one or more demographic statistics to retrieve for the current selection, and then click **OK**.

   An information window displays the selected demographic statistics for the current selection. If you selected more than one statistic, then you can scroll through the statistics by clicking the left arrow and right arrow buttons.
Search a Geo Map

Note: The search feature does not search the values in your data. Instead, it searches a database that is part of Esri ArcGIS Online Services.

To search the map, click [ ], and then enter your search term in the Search field. The search returns businesses and locations that are located within your current map view. The search can return up to 20 results.

Note: Some results are displayed only at closer zoom levels. For example, if your map displays an entire country, then results for small businesses might not be displayed.

Draw Routes on a Geo Map

You can draw routes on a geo map. To draw a route on a geo map:

1. Create a location pin or select an existing location pin.
2. Select Route from here to draw a route originating from the location pin, or select Route to here to draw a route ending at the location pin.
3. Select the Travel mode for the route. Select one of the following:
   - Direct: displays a straight line between the two points.
   - Trucking: calculates a route by using roads that allow trucks.
   - Driving: calculates a route by using roads.
   - Walking: calculates a route by using walking trails and sidewalks where available.

   Note: Trucking, Driving, and Walking routes are available only if you have enabled Esri premium services in your SAS Visual Analytics settings. For more information, see “Modify SAS Visual Analytics Settings” in SAS Visual Analytics: Designing Reports.
4. Select the origin or destination of the route by doing one of the following:
   - select a location pin
   - search for a location and select it
   - click a point on the map

Identify a Point on a Geo Map

You can identify points on a geo map. To identify a point on a geo map, right-click the map, and select Identify geographic point. The best match for the selected point is displayed.
Working with Numeric Series Plots

About Numeric Series Plots

A numeric series plot displays data by using a line that connects the data values for two or more measures. The data is sorted in ascending order by the measure that is assigned to the X axis.

Data Roles for a Numeric Series Plot

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a numeric series plot are the X axis and Y axis. You can assign only one measure to the X axis. You can assign many measures to the Y axis.

In addition to the basic data roles, you can assign these roles:

- **Group**
  - groups the data based on the values of the category data item that you assign. A separate line is created for each data value.
  - **Note:** Grouping is not available if you assign multiple measures to the Y axis.

- **Label**
  - displays a label for each point in the plot.

- **Lattice columns**
  - creates a lattice of plots with a column for each value of the category data item that you assign.

- **Lattice rows**
  - creates a lattice of plots with a row for each value of the category data item that you assign.

- **Data tip values**
  - specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

- **Hidden**
  - specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Numeric Series Plot

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:

- **Transparency**
  - specifies the amount of transparency for the plot.

- **Line thickness**
  - specifies the thickness of each line.
Markers
shows markers for the data points in the plot.

Marker size
specifies the size of each marker in pixels.

Use filled markers
specifies whether the markers are filled or hollow.

Data labels
shows the data values as text in the plot.

Note: You can always view a data value as a data tip when you position the cursor over a data value.

---

Working with Parallel Coordinates Plots

About Parallel Coordinates Plots
A parallel coordinates plot displays data as lines moving through categories and binned measures. The thickness of a line indicates the relative number of observations in that bin. You can restrict the active lines to one or more bins in order to focus on only the data that interests you.

Data Roles for a Parallel Coordinates Plot
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data role for a parallel coordinates plot is Variables. You can assign one or more measure or category variables.

Options for a Parallel Coordinates Plot
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Number of bins
specifies the number of bins to use in the parallel coordinates plot.

Maximum polylines
specifies the maximum number of polylines generated by the parallel coordinate algorithm.

---

Working with Path Analysis Objects

About Path Analysis Objects
A path analysis object enables you to perform path analytics. Path analytics displays flows of data from one event (value) to another as a series of paths.

The following display shows the parts of a path analysis object.
Figure 3  Parts of a Path Analysis Object

1 Nodes contain the events in each path. The node displays the width of each link that enters and exits the node. The same event can appear at multiple nodes in the diagram.

2 Links between nodes make up the paths in the diagram. The width of each link can represent either the frequency of the path or the value of a weight measure.

3 Drop-off links are links that end at the current node. Drop-off links are displayed only if some links continue onward from the current node.

Figure 4  A Path in a Path Analysis Object

A path in a path analysis object consists of a distinct sequence of events and represents one or more transactions. A transaction is a sequence of events that are associated with a specific transaction identifier value.

For example, if your data contains the activity of visitors to a website, then your transaction identifier might be the unique session identifier for each visitor. The events in your data might be the individual pages on the website that the visitor accessed. In this example, each transaction is the sequence of pages that were accessed by a specific visitor, and each path is a sequence of pages that contains all of the transactions that follow that sequence.
Data Roles for a Path Analysis Object

Here are the basic data roles for a path analysis object:

**Event**
- specifies a category whose values identify the events that are represented as nodes in the diagram.

**Sequence order**
- specifies a datetime data item or a measure whose values identify the order of the events for each transaction.

**Transaction identifier**
- specifies a data item whose values identify the transactions in the diagram.

Note: The paths in a path analysis object exclude any missing values in the data items that are assigned to the Event, Transaction identifier, or Sequence order role.

In addition to the basic data roles, you can specify the following role:

**Weight**
- specifies a measure for the weight of each event in a transaction. The weight values for each transaction and for each event in a path are aggregated to determine the path weight.

Note: The measure that is assigned to the Weight role must have one of the following aggregation types: sum, average, minimum, or maximum.

Note: For a path analysis that is colored by event or by a drop-off link and where the Weight measure has an aggregation type other than sum, the links at each node overlap. This is because the link widths are not additive.

Specify Options for a Path Analysis Object

In the Options pane, you can specify the following:

**Link color**
- specifies the method that is used to group and color the paths or links in the diagram.

Select one of the following:

- **Path**: displays each path as a separate group with a distinct color.
- **Event**: colors each link according to the event that it represents.
- **Drop off**: colors the links in the diagram based on whether they are drop-off links. A drop-off link represents a link that ends at the current node, but other links continue onward from the current node.

**Link width**
- specifies whether the width of a link in a path represents the path frequency (Frequency) or the aggregated value of the weight measure (Weight).

Note: If you do not assign the Weight data role, then Frequency is always used for the link width.

Note: If the link width represents the weight value, then any paths that do not have a value greater than zero are hidden.

**Minimum path length**
- specifies the minimum length for a path that is displayed. The path length that you specify indicates the number of nodes in the path.
For example, if the **Minimum path length** is 3 and the **Maximum path length** is 5, then the diagram displays only paths that have lengths of 3, 4, or 5 nodes.

**Maximum path length**

specifies the maximum length for a path that is displayed. The path length that you specify indicates the number of nodes in the path.

For example, if the **Minimum path length** is 3 and the **Maximum path length** is 5, then the diagram displays only paths that have lengths of 3, 4, or 5 nodes.

**Note:** A hyphen character ( - ) specifies that there is no maximum path length.

**Minimum frequency**

specifies the minimum path frequency for a path that is displayed. For example, if you specify a minimum path frequency of 5, then the diagram displays only paths that have a frequency of 5 or greater.

**Maximum frequency**

specifies the maximum path frequency for a path that is displayed. For example, if you specify a maximum path frequency of 10, then the diagram displays only paths that have a frequency of 10 or fewer.

**Note:** A hyphen character ( - ) specifies that there is no maximum frequency.

**Path ranking direction**

specifies whether the ranking selects the top value or the bottom value.

**Path ranking count**

specifies the count for the path ranking. By default, the path ranking selects the top or bottom 200 paths.

If you specified a measure for the **Weight** role, then ranking is based on the aggregated value of the weight measure for each path. If there is no measure for the **Weight** role, then ranking is based on the frequency of each path.

**Compress**

combines repeated, consecutive events in each path into a single event.

**Node labels**

displays the event name for each node.

**Link labels**

displays the width value for each link.

**Nodes**

displays link width values at each node.

**Outline**

displays a box around each node.

**Vertical layout**

displays the diagram vertically.

---

### Managing the Path Filters for a Path Analysis Object

#### About Path Filters

You can subset the paths in a path analysis object by creating a path filter. A path filter selects or excludes paths based on the nodes or events in each path.

#### Create a New Path Filter By Using the Add Path Filter Window

To create a new path filter by using the Add Path Filter window, follow these steps:

1. In the object toolbar, click the ☐ drop-down list, and then select **Add path filter**. The Add Path Filter window appears.
2 From the **Operator** drop-down list, select the filter type.

3 From the **Events** drop-down list, select the events for the filter.

4 From the **Type** drop-down list, select one of the following:
   
   - **Include only**
     
     specifies that the path filter selects only paths that contain one or more of the selected events.
   
   - **Exclude**
     
     specifies that the path filter excludes all paths that contain one or more of the selected events.

5 Click **OK** to apply the new path filter.

**TIP** You can create a path filter when only the **Event** role is assigned to the object. For large data sources, you might want to create your path filter before assigning all of the data roles to avoid long loading times.

---

**Create a New Path Filter from Selected Nodes**

To add a new path filter from selected nodes in the diagram, follow these steps:

1 Select one or more nodes in the diagram.
   
   Note: To select multiple nodes, press the Ctrl key.

2 Click the \( \) drop-down list, select **New path filter from selection**, select either **Include only** or **Exclude**, and then select the filter type. The filter type can be any of the following:

   - **Paths containing all the selected nodes**
     
     includes or excludes paths that contain all of the selected nodes. This filter type is based on specific nodes in the diagram, rather than on the event values.
   
   - **Paths containing any of the selected nodes**
     
     includes or excludes paths that contain any of the selected nodes. This filter type is based on specific nodes in the diagram, rather than on the event values.
   
   - **Paths containing the selected events on any node**
     
     includes or excludes paths that contain any of the selected events on any node. This filter type is based on the event values of the selected nodes.
   
   - **Paths starting with the selected events**
     
     includes or excludes paths that start with any of the selected events.
   
   - **Paths ending with the selected events**
     
     includes or excludes paths that end with any of the selected events.
   
   - **Paths containing the selected event sequence**
     
     includes or excludes paths that contain the selected sequence of events at any position in the path. This filter type is based on the event values of the selected nodes.
     
     Note: This filter type is not available if multiple nodes are selected for the same event level.
   
   - **Selected full paths**
     
     includes or excludes the full paths that are selected.
     
     Note: This option is available only if **Path** is selected for the **Link color** option and one or more paths are selected.

The new filter appears in the **Filters** pane.
Remove Path Filters
To remove all path filters, click the drop-down list from the object toolbar, and then select Remove path filters.
To remove a specific path filter, select the Filters pane, and click beside the filter that you want to remove.

Display the Overview
For large diagrams, the overview enables you to select the portions of the diagram that are visible.
To display the overview, click from the object toolbar.

Zoom a Path Analysis Object
You can zoom a path analysis object by using either of the following controls:

- scroll the mouse wheel over the diagram to zoom in or zoom out at the location of the cursor
- in the overview, adjust the size of the rectangular selection that is displayed

Note: Zooming is not available if the diagram does not exceed the bounds of the object when viewed at full size.

Use Cursor Tools to Pan the Diagram and Create Shape-Based Selections
In a path analysis object, the cursor can perform different tasks when you click and drag the diagram. The default cursor action is to pan (scroll) the diagram.
To change the selected cursor tool, select the icon from the object toolbar that matches the current tool, and then select one of the following icons:

- pans (scrolls) the diagram.
- creates a rectangular selection.

Explore Path Data as a Bar Chart
You can explore a path selection as a new bar chart object to see the values of the Event and Weight data items.
To explore a path selection as a bar chart:

1. Select one or more nodes in the diagram.
   Note: To select multiple nodes, press the Ctrl key.
2. Click the drop-down list, select Create Bar Chart from selection, select either Include only or Exclude, and then select the filter type. The filter type can be any of the following:
   
   Paths containing all the selected nodes
   includes or excludes paths that contain all of the selected nodes. This filter type is based on specific nodes in the diagram, rather than on the event values.
Paths containing any of the selected nodes
includes or excludes paths that contain any of the selected nodes. This filter type is based on specific
nodes in the diagram, rather than on the event values.

Paths containing the selected events on any node
includes or excludes paths that contain any of the selected events on any node. This filter type is based
on the event values of the selected nodes.

Paths starting with the selected events
includes or excludes paths that start with any of the selected events.

Paths ending with the selected events
includes or excludes paths that end with any of the selected events.

Paths containing the selected event sequence
includes or excludes paths that contain the selected sequence of events at any position in the path. This
filter type is based on the event values of the selected nodes.

Note: This filter type is not available if multiple nodes are selected for the same event level.

Selected full paths
includes or excludes the full paths that are selected.

Note: This option is available only if Path is selected for the Link color option and one or more paths are
selected.

The new bar chart object displays the data items that are assigned to the Event and Weight data roles.

TIP To create the new bar chart on a new page of the report, hold the Alt key.

Working with Pie Charts

About Pie Charts
A pie chart displays a part-to-whole relationship in a circle divided into multiple slices for each value of a
category data item based on a single measure data item. Each slice represents the relative contribution of each
part to the whole. In a pie chart, the legend is sorted by contribution.

TIP To sort the pie chart’s legend, right-click the legend label. Select Sort, and then select either
Ascending or Descending.

Here are some key points about pie charts:

- The default chart style is a donut chart.
- The donut hole label always shows the sum of the response values of the individual slices.
- A pie chart cannot display negative values.
- A pie chart is not displayed if there are duplicate categories in the assigned data source.
- A pie chart does not show a slice with a missing or zero response.
- Effective pie charts limit the number of slices to 5 or 6. In SAS Visual Analytics, you can use a rank to reduce
the number of slices in a pie chart. For more information, see “Add a New Rank” in SAS Visual Analytics:
Working with Report Data.
The “Other” slice in a pie chart does not display data tip values. In addition, the “Other” slice always sums the included values, regardless of the aggregation method selected for the measure. For example, if the aggregation method selected is Count, then the “Other” slice displays the sum of the individual counts.

**Data Roles for a Pie Chart**

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a pie chart are categories and measures. You can assign one category only, and the category values divide the pie chart into slices (segments). You can assign multiple measures, and the measure values determine the size of each slice of the pie. If the pie chart contains no measures, then the frequency of the category values determines the size of the slices in the pie.

In addition to the basic data roles, you can assign these roles:

**Group**

creates individual pie charts for each value of the category data item that you assign. Depending on the value that you selected for the **Grouping style** property, the pie charts for each group value are displayed either as a set of stacked rings or as multiple separate charts.

Here are some key points about the Group role:

- Grouping is not available if you assign multiple measures to the object.
- A custom sort is not available for a pie chart with a Group role.

**Lattice columns**

creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**

creates a lattice of charts with a row for each value of the category data item that you assign.

**Data tip values**

specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure's aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Animation**

specifies a datetime data item that is used to animate the chart.

If you assign the Animation data role, then the ➤ icon appears at the bottom left corner of the object. Click ➤ to start the animation.

**Note:** A graph with the Animation data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

**Hidden**

specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

**Options for a Pie Chart**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

**Chart style**

specifies whether the chart displays as a pie chart or a donut chart.
Donut hole label
specifies whether the label is displayed in the center of the donut chart. Labels for large measure values use abbreviated numerical values. For example, $1,100,000,000$ is displayed as $1.1B$.

Ring width
specifies the size of the hole at the center of the donut chart. This width is limited by the amount of space that is required to draw the ring or rings for the donut chart. By default, the donut hole is 70%, so the Ring width is 30%.

Start point
offsets the layout of the pie chart by the specified value, which is in degrees. The default value for the Start point option is 90.

Direction
specifies whether the pie slices are laid out clockwise or counterclockwise. The slices are laid out in descending order.

“Other” slice
groups small values together into a slice labeled “Other.” The Minimum percentage for “Other” slice option specifies the threshold for this grouping.

Note: If the “Other” slice option is selected for a pie chart, and the All Other option is selected for a category-specific rank, then the rank is not displayed.

Minimum percentage for “Other” slice
specifies the threshold percentage for a distinct value to be displayed as a separate slice. Any values that are smaller than the specified percentage are grouped together into a slice labeled “Other.”

Grouping style
specifies how the values are displayed when the Group data role is assigned or when there are multiple measures assigned to the plot.

Select one of the following values:

Multiples
displays the pie charts for the group values or measures as multiple separate charts.

Stack
displays the pie charts for the group values or measures as a set of stacked rings.

Label
displays the names of the measures in the chart.

Category labels
displays the category values in the chart.

Actual values
displays the measure values in the chart.

Percent of total values
displays the measure values in the chart as a percentage of the total.

Data label location
specifies where the data labels are placed. Select one of the following values:

Auto
places the labels automatically based on the space available. SAS Visual Analytics first tries to place the label inside the slice. If there is not enough space to place the label inside a slice, then the label is placed outside the slice. There might be a case in which the space is so small, the label is dropped completely.

TIP: If the labels on a chart are not displayed when Auto is selected for the Data label location option, try increasing the Ring width option. A wider ring has more space for data labels.
Callout
places the labels outside of the chart with a line connecting each label to the slice that it represents.

Inside
places the labels inside each slice of the chart.

Outside
places the labels outside of the chart.

Note: The Callout and Outside selections for Data label location are not supported for a grouped pie chart.

Working with Scatter Plots

About Scatter Plots
A scatter plot displays the values of measures by using markers. When you apply more than two measures, the object displays a scatter plot matrix. A scatter plot matrix is a series of scatter plots that display every possible pairing of the measures that are applied to the plot.

Data Roles for a Scatter Plot
For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data role for a scatter plot is a measure. You can assign any number of measures. If you assign a single measure to a scatter plot, then the values are plotted along a line.

In addition to measures, you can assign these roles:

Color
colors the points in the plot according to the values of the category data item that you assign.

Lattice columns
creates a lattice of charts with a column for each value of the category data item that you assign.

Lattice rows
creates a lattice of charts with a row for each value of the category data item that you assign.

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure's aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Scatter Plot
For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane. You can specify the following options under Scatter Plot:
**Transparency**
specifies the amount of transparency for the markers.

**Initial marker shape**
specifies the shape for the markers. If the Color role is assigned, then multiple marker shapes might be used, depending on the number of different values for the category assigned to the Color role. The marker shape that you specify is used for the first set of values. Multiple marker shapes might also be used depending on the Data element style rotation option for your report.

**Marker size**
specifies the size of each marker in pixels.

**Use filled markers**
specifies whether the markers are filled or hollow.

You can specify the following options under **Fit Line**:

**Type**
specifies the type of fit line to display. For information about the fit types that are available, see “Applying Data Analysis” on page 97.

**Transparency**
specifies the amount of transparency for the fit line.

### Applying Data Analysis

For scatter plots, you can apply the following data analyses:

**Correlation**
identifies the degree of statistical correlation between the variables in the plot. The strength of a correlation is described as a number between -1 and 1. A value that is close to -1 implies a strong negative correlation, a value that is close to 0 implies little or no correlation, and a value that is close to 1 implies a strong positive correlation.

Correlation is applied to your plot automatically when you add a linear fit line. It is not available with other fit types. The correlation value is displayed in the details table for the object. To see the details table, maximize the object. See “Maximizing Objects” on page 19.

**Fit Line**
plots a model of the relationship between the variables in the plot.

You can select any of the following fit types:

**Best Fit**
selects the most appropriate model (linear, quadratic, or cubic) for your data. The Best Fit method uses backward variable selection to select the highest-order model that is significant. To see the final model that was used, maximize the object.

**Linear**
creates a linear fit line from a linear regression algorithm. A linear fit line produces the straight line that best represents the relationship between two measures.

For a linear fit, correlation is automatically added to the plot. Correlation is not available with other fit types.

**Quadratic**
creates a quadratic fit line. A quadratic fit produces a line with a single curve. A quadratic fit line often produces a line with the shape of a parabola.

**Cubic**
creates a cubic fit line. A cubic fit line produces a line with two curves. A cubic fit line often produces a line with an “S” shape.
PSpline creates a penalized B-spline. A penalized B-spline is a smoothing spline that fits the data closely. A penalized B-spline can display a complex line with many changes in its curvature.

Detailed information about the data analyses for your object is available in the details table for the object. To see the details table, maximize the object. See “Maximizing Objects” on page 19.

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**Working with Schedule Charts**

**About Schedule Charts**

A schedule chart displays the duration of events by using bars. The edges of each bar indicate the start and end times of an event.

**Data Roles for a Schedule Chart**

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a schedule chart are:

- **Task**
  - specifies a category that identifies the events in the chart.

- **Start**
  - specifies a date or datetime data item that indicates the starting point of each event.

- **Finish**
  - specifies a date or datetime data item that indicates the ending point of each event.

In addition to the basic data roles, you can assign these roles:

- **Group**
  - groups the data based on the values of the category data item that you assign. Depending on the value that you selected for the Grouping style property, the group values are shown as either individual bars or as segments of each bar.

- **Label**
  - displays a label beside each bar.

- **Lattice columns**
  - creates a lattice of charts with a column for each value of the category data item that you assign.

- **Lattice rows**
  - creates a lattice of charts with a row for each value of the category data item that you assign.

- **Data tip values**
  - specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

- **Hidden**
  - specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.
Options for a Schedule Chart

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific option in the Options pane:

**Transparency**
- specifies the amount of transparency for the bars.

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Working with Step Plots

About Step Plots

A step plot displays vertical lines that connect the data points to a horizontal baseline. A step plot enables you to see the exact point on the X axis when a change in the Y axis measure occurs.

By default, a step plot is sorted in descending order by the value of the first measure. For a grouped step plot, the data is sorted by the category values in alphabetical order.

**Note:** If the plot contains a rank, then, by default, the data is sorted based on the values of the rank.

Data Roles for a Step Plot

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a step plot are:

**X axis**
- specifies the data item that is assigned to the X axis.

**Y axis**
- specifies the measure that is assigned to the Y axis.

In addition to the basic data roles, you can assign these roles:

**Group**
- groups the data based on the values of the category data item that you assign.

**Label**
- displays a label for each horizontal line segment.

**Lattice columns**
- creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
- creates a lattice of charts with a row for each value of the category data item that you assign.

**Data tip values**
- specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Hidden**
- specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links.
For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Step Plot

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

- **Transparency**: specifies the amount of transparency for the lines.
- **Line thickness**: specifies the thickness of each line.
- **Markers**: shows markers for each data point.
- **Marker size**: specifies the size of each marker in pixels.
- **Use filled markers**: specifies whether the markers are filled or hollow.

Working with Targeted Bar Charts

About Targeted Bar Charts

A targeted bar chart displays a bar chart with a target value. The height of each bar represents the value and a line represents the target value for each bar.

By default, a bar chart is sorted in descending order by the value of the measure.

**Note:** If the chart contains a rank, then, by default, the data is sorted based on the values of the rank.

Data Roles for a Targeted Bar Chart

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a targeted bar chart are the category, the measure, and the target.

In addition to the basic data roles, you can assign these roles:

- **Lattice columns**: creates a lattice of charts with a column for each value of the category data item that you assign.
- **Lattice rows**: creates a lattice of charts with a row for each value of the category data item that you assign.
- **Data tip values**: specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure's aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.
- **Animation**: specifies a datetime data item that is used to animate the chart.
If you assign the **Animation** data role, then the ➤ icon appears at the bottom left corner of the object. Click ➤ to start the animation.

**Note:** A graph with the **Animation** data role assigned can be the source of an action. However, the action is disabled in the web viewer or on a mobile device.

**Hidden**

- specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in *SAS Visual Analytics: Working with Report Data*.

**Options for a Targeted Bar Chart**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:

**Direction**

- specifies whether the bars are vertical ![vertical] or horizontal ![horizontal].

**Fixed baseline**

- specifies the baseline value for the bar chart.

**Spacing**

- specifies the percentage of space between the bars. The default is 15%. For example, suppose that you specify a value of 80% for the **Spacing** option. This increases the space between the bars, and the bars become skinnier.

  - If a **Group** data role is assigned, then the **Spacing** option’s default is 0%.

**Transparency**

- specifies the amount of transparency for the bars.

**Combine excluded into “All Other”**

- summarizes all excluded rows. This option is available when you use summarized data. It applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

**Data labels**

- shows the data values as text beside or above the bar, depending on the direction of the bar. You can specify the text size, emphasis (bold, italic, or both), and color for the labels.

  - **Note:** You can always view a data value as a data tip when you position the cursor over a data value.

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**Working with Text Topics**

**About Text Topics**

A text topics object displays a set of words from a character data item. The size of each word in the cloud indicates the importance (topic term weight) of the word.

A text topics object analyzes each value in a document collection as a text document that can contain multiple words. Words that often appear together in the document collection are identified as topics. For the selected topic, the text topics object displays the terms with the greatest topic term weight values. The topic term weight indicates the importance of the term within the topic.
A text topics object can also display whether the documents in a topic express positive, negative, or neutral sentiment.

The Documents table and the details table (in maximize mode) contain additional information about the terms, topics, and documents in the text topics object. For more information, see “Explore Text Topics Results” on page 103.

To enable text topics, you must set a unique row identifier for your data source. For more information, see “Set the Unique Row Identifier for Your Data” on page 105.

Note: Depending on the number of rows in your data source and the length of the values in your document collection, a text topics object might require a significant amount of time to display and to respond to selections.

Note: The data source for a text topics object must be encoded in UTF-8. If the data source has a different encoding, then some characters might not be displayed accurately, and an error message might appear.

Note: Text topics objects in SAS Visual Analytics use different parameters and parsing mechanisms from SAS Text Miner. Your results might be different from the results that SAS Text Miner produces.

**Data Roles for a Text Topics Object**

For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

For a text topics object, the basic role is a Document collection. A document collection is a category data item that contains the words that you will analyze. You must also specify the Data source language for the document collection. The languages that are available depend on the license for your deployment.

Note: To enable text topics, you must set a unique row identifier for your data source. See “Set the Unique Row Identifier for Your Data” on page 105.

Note: The unique row identifier data item cannot be assigned to the Document collection role.

In addition to the basic role, you can specify the following role:

- **Document details**
  - specifies data items that are displayed as columns in the Documents table at the bottom of the object.

**Options for a Text Topics Object**

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane. You can specify the following options under Text Topics:

- **Term parsing and role identification**
  - specifies whether advanced options are hidden (Automatic) or shown (Custom.)

- **Analyze document sentiment**
  - enables sentiment analysis for the terms.
  - Sentiment analysis determines whether a document has a positive sentiment, negative sentiment, or neutral sentiment based on the content of the document.
  - When sentiment analysis is enabled, the topics chart displays the number of positive, neutral, and negative documents in each topic. In addition, sentiment values are displayed in the Documents table.

- **Identify term roles**
  - identifies terms by their parts of speech. In addition, this option identifies groups of nouns as single terms and identifies text entities such as names, addresses, telephone numbers, and so on.
  - Note: This option is equivalent to the advanced options Include parts of speech, Extract noun groups, and Use entity extraction.
Maximum topics
specifies the maximum number of topics to create. Specify a number from 2 to 25.

You can specify the following additional advanced options:

Include parts of speech
specifies that terms are classified by parts of speech (for example, a noun, a verb, or an adjective). The part of speech for each term is displayed in the data tip for the term.

Extract noun groups
specifies whether to identify groups of nouns as terms.

Extract entities
specifies whether to identify text entities such as names, addresses, telephone numbers, and so on. If this option is disabled, then text entities are not treated differently from other text.

Stem terms
specifies whether all forms of a given word are identified as a single term. For example, if you select Stem words, then the words “sell,” “sells,” “selling,” and “sold” are identified as a single term “sell.”

Use stop list (if available)
specifies whether to use a stop list to exclude common words such as “the,” “with,” and “is” when identifying terms. If no stop list is available, then a message appears at the bottom of the word cloud.

Minimum number of documents
specifies the minimum number of documents that a term must appear in. Specify a number from 1 to 20. If a term does not appear in the minimum number of documents, then it is not included in the analysis.

Cell weight
specifies whether to weight the frequency of each term for every document that it appears in. Selecting Logarithmic de-emphasizes terms that appear many times in relatively few documents.

Term weight
specifies a weighting algorithm for the terms in the document collection. The Entropy weighting algorithm emphasizes terms that have a low frequency across the document collection.

Topic label length
specifies the number of terms that are included in a topic name. Specify a number from 2 to 8. This property does not affect the number of terms that are used to select topics—only the topic names are changed.

You can specify the following options under Model Display:

Legend visibility
specifies whether the legend is displayed for the topics bar chart and for the terms word cloud.

Minimum relevance
specifies the minimum relevance value for a document to be displayed when a topic is selected.

Positive documents
displays documents that have positive sentiment.

Neutral documents
displays documents that have neutral sentiment.

Negative documents
displays documents that have negative sentiment.

Explore Text Topics Results

Documents Table Results
The Documents table displays each of the documents that contains the selected term. For each document, the Relevance value indicates how relevant the document is to the selected topic.
Note: If your data contains a small number of strong topics, then topics with zero documents might be displayed.

If sentiment analysis is enabled, then the Sentiment value identifies how positive or negative the document is. You can filter the documents to exclude documents with positive, negative, or neutral sentiment. A sentiment value above .5 is positive, a value of .5 is neutral, and a value below .5 is negative.

Details Table Results in Maximize Mode
In the maximize mode, the details table contains the following tabs:

Topics
displays all of the topics in the document collection. If sentiment analysis is enabled, then the number of positive, neutral, and negative documents for each topic is displayed.

Note: You can sort any column by clicking the column heading.

Terms
displays all of the terms in the current topic. For each term, the Document count value indicates the number of documents in the topic that contain the term.

If the Identify term roles property or the Include parts of speech property is enabled, then the Role value identifies the grammatical role of each term.

Note: You can sort any column by clicking the column heading.

View the Full Text of Documents
In the Documents table, only the first 250 characters of each document are displayed. To view the full text of your documents, select the documents that you want to view and then right-click the Documents table and select View full document.

Note: Depending on the length and the character format of the category that is assigned to the Document collection role, the Document Text window might not display the entire text value.

Explore Documents as a List Table
To explore your documents as a list table, select the documents that you want to explore, and then right-click the Documents table and select Create list table from selected documents.

Derive Topics
You can use the topics in a text topics object to create new derived items in your data source. The value for the derived item is either a 1 or a 0 to indicate whether each row contains the topic.

To derive topics, right-click the text topics object, and then select Derive topics. The New Topics Items window appears. Select the topics that you want to derive, and then click OK. The derived topics items appear in the Data pane.

Export the Model Score Code
Model scoring refers to the process of generating predicted values for a data set that might contain the response data item of interest. Score code is exported as a SAS program that can be executed on new data sets in a SAS programming environment. All data items that are used by the model are included in the score code.

To generate the score code, right-click the text topics object, and then select Export model. In the Export Model window, click OK.
Set the Unique Row Identifier for Your Data

Text topics objects require that a unique row identifier category be assigned for your data source. The unique row identifier contains a value that is unique for each row of your data source.

To set the unique row identifier column for a data source, right-click a category in the Data pane, and then select Set as unique row identifier. If the category does not have unique values for every row, then Set as unique row identifier is disabled.

Working with Time Series Plots

About Time Series Plots

A time series plot displays data over time by using a line that connects the data values. If you assign multiple measures to a time series plot, then you can create separate Y axes for each measure.

Data Roles for a Time Series Plot

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a time series plot are the time axis and measures. You can assign one datetime data item only to the time axis. You can assign many measures, and the measure values are plotted on the response axis.

In addition to the basic data roles, you can assign these roles:

Group
- groups the data based on the values of the datetime data item that you assign. A separate line is created for each data value.

Note: Grouping is not available if you assign multiple measures to the plot.

Data tip values
- specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
- specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Time Series Plot

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

Binning interval
- specifies interval between datetime values in the plot. Select one of the following values:
Automatic determines the best interval for the plot.

Fixed count plots a specific number of equally spaced values. Specify the number of values in the Fixed bin count option.

Use format plots all of the datetime values as rendered by the data format.

Fixed bin count specifies the number of datetime values to plot.

Note: This option is available only if Binning interval is set to Fixed count.

Transparency specifies the amount of transparency for the plot.

Grouping style specifies the grouping style for the lines in the plot.

- Overlay unfilled displays the lines without color fills.
- Overlay filled displays the lines with a transparent color fill.
- Stack filled displays the lines with opaque color fills that are stacked. The values of the stacked lines are plotted relative to the lines below them, rather than to the baseline of the chart.

Measure layout specifies whether the measures share a single response axis (Shared axis) or have separate response axes for each measure (Separate axes).

Markers shows markers for the data points in the plot.

Marker size specifies the size of the markers in the plot.

Use filled markers specifies whether the markers in the plot are filled.

Line thickness specifies the thickness of the line.

Data labels shows the data values as text in the plot.

Note: You can always view a data value as a data tip when you position the cursor over a data value.

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**Working with Treemaps**

**About Treemaps**

A treemap displays a hierarchy or a category as a set of rectangular tiles. Each tile represents a category value or a hierarchy node. The size of each tile represents either the frequency count or the value of a measure. If you assign a measure to the Color role, then the color of each tile represents the value of that measure.

Note: A treemap cannot display negative values.
Data Roles for a Treemap

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a treemap are:

**Tile**
specifies a category or a hierarchy that is used to create the tiles in the treemap.

**Size**
specifies a measure that determines the size of each tile. If you do not specify the Size role, then the tile size is determined by the frequency count.

*Note:* If any of the aggregated values for the Size role results in a negative size value or a value of zero, then an error appears.

**Color**
specifies a measure that determines the color of the tiles.

**Data tip values**
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure's aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Hidden**
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Treemap

For information about general options, see “Using the Options Pane” on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:

**Arrangement**
specifies the layout of the tiles in the treemap. Select one of the following values:

**Flow**
arranges the tiles from largest to smallest, with the largest tile at the top left.

**Standard**
arranges the tiles into squares, with the largest tiles generally at the bottom left.

**Toggle**
arranges the tiles into a single row or column, with the largest tile on the left or at the top.

The orientation of the tiles alternates between hierarchy levels. The top level is arranged as a row, the second level is a column, and so on.

**Level indicator**
displays the name of the category or the selected hierarchy level above the treemap.

**Data labels**
shows a text label for each tile in the treemap.

**Text style**
specifies style options for the labels in the treemap.
Working with Vector Plots

About Vector Plots
A vector plot displays the change in data by using directed line segments.

Data Roles for a Vector Plot
For information about setting data roles, see “Working with Data Role Assignments” in SAS Visual Analytics: Working with Report Data.

The basic data roles for a vector plot are:

X axis
specifies the measure that is assigned to the X axis.

Y axis
specifies the measure that is assigned to the Y axis.

X Origin
specifies the starting point on the X axis for each line.

Y Origin
specifies the starting point on the Y axis for each line.

In addition to the basic data roles, you can assign these roles:

Color
specifies a data item that determines the color of the lines.

Group
groups the data based on the values of the category data item that you assign. Depending on the value that you selected for the Grouping style property, the group values are shown as either individual bars or as segments of each bar.

Lattice columns
creates a lattice of charts with a column for each value of the category data item that you assign.

Lattice rows
creates a lattice of charts with a row for each value of the category data item that you assign.

Data tip values
specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

Hidden
specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

Options for a Vector Plot
For information about general options, see “Using the Options Pane” on page 7.
In addition to the general options, you can specify the following object-specific options in the Options pane:

**Transparency**
- specifies the amount of transparency for the lines.

**Arrowheads**
- displays an arrowhead at the end of each line.

**Line thickness**
- specifies the thickness of each line.

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### Working with Waterfall Charts

#### About Waterfall Charts

A waterfall chart (also known as a progressive bar chart) shows how the initial value of a measure increases or decreases during a series of operations or transactions. The first bar begins at the initial value, and each subsequent bar begins where the previous bar ends. The length and direction of a bar indicate the magnitude and type (positive or negative, for example) of the operation or transaction. The resulting chart is a stepped bar showing how incremental changes lead to the final value of the measure.

#### Data Roles for a Waterfall Chart

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic data roles for a waterfall chart are a category and a measure. You can assign one category only, and the category values are plotted on the category axis. You can assign one measure only, and the measure values are plotted on the response axis. If a waterfall chart contains no measures, then the frequency of the category values is plotted on the response axis.

In addition to the basic data roles, you can assign these roles:

**Lattice columns**
- creates a lattice of charts with a column for each value of the category data item that you assign.

**Lattice rows**
- creates a lattice of charts with a row for each value of the category data item that you assign.

**Data tip values**
- specifies data items whose values are included in the data tips for the object. Data items can be categories, measures, or both. If you change a measure’s aggregation, then the data tip reflects that change. For more information, see “Understanding the Data Tip Values Data Role” in SAS Visual Analytics: Working with Report Data.

**Hidden**
- specifies a category or date data item that is included in the data query without it being displayed. You can use the hidden data item when you map data sources, add color-mapped display rules, or add external links. For more information, see “Understanding the Hidden Data Role” in SAS Visual Analytics: Working with Report Data.

#### Options for a Waterfall Chart

For information about general options, see "Using the Options Pane" on page 7.

In addition to the general options, you can specify the following object-specific options in the Options pane:
Fixed baseline
  specifies the baseline value for the chart.

Combine excluded into “All Other”
  summarizes all excluded rows. This option is available when you use summarized data, and it applies to both ranks and post-aggregate filters. The effect of this option can be influenced by certain types of actions. For more information, see “Use the Combine Excluded into “All Other” Option” on page 16.

Trend line
  adds a trend line connecting each of the bars in the chart.

Spacing
  specifies the percentage of space between the bars. The default is 15%. For example, suppose that you specify a value of 80% for the Spacing option. This increases the space between the bars, and the bars become skinnier.

  If a Group data role is assigned, then the Spacing option’s default is 0%.

Transparency
  specifies the amount of transparency for the bars.

Initial bar
  adds a bar with an initial value for the chart. You can enter a custom value in the Value field, and a custom label in the Label field.

Final (cumulative) bar
  adds a final, cumulative bar to the chart. You can enter a custom label in the Label field.

Color by direction of value change
  colors the bars based on whether the measure values are increasing or decreasing from the previous value.

Data labels
  shows the data values as text in the chart.

  Note: You can always view a data value as a data tip when you position the cursor over a data value.

The following object-specific options are available under the Style heading in the Options pane:

Initial
  specifies the color of the bar for the initial value if Initial bar is enabled.

Final
  specifies the color of the bar for the final value if Final (cumulative) bar is enabled.

Increase
  specifies the color for bars with increasing values.

Decrease
  specifies the color for bars with decreasing values.

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Working with Word Clouds

About Word Clouds

A word cloud analyzes each value in a category data item as a single text string. The size of each word in the cloud can indicate either the frequency of that word or the value of a measure. The color of each word can indicate the value of a measure.
Data Roles for a Word Cloud

For information about setting data roles, see "Working with Data Role Assignments" in SAS Visual Analytics: Working with Report Data.

The basic role for a word cloud is **Word**. Specify a category whose values are used in the word cloud.

In addition to the basic role, you can specify these roles:

- **Size**
  - specifies a measure that determines the size of each word. If you do not specify a measure, then the word size indicates the frequency of each word.

- **Color**
  - specifies a measure that determines the color of each word.

Options for a Word Cloud

For information about general options, see "Using the Options Pane" on page 7.

In addition to the general options, you can specify the following object-specific options in the **Options** pane:

- **Arrangement**
  - specifies whether the words are arranged as a **Cloud** or in **Rows**.

- **Font scale**
  - specifies the amount of difference in font sizes between the largest and smallest words in the cloud. The number value specifies the ratio in points of the largest font size to the smallest font size.

- **Word display limit**
  - specifies the maximum number of words that are displayed in the word cloud.