



Enhancing Reports

Enhancing Reports

1 Basics

2 Details

3 Advanced

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1 Basics

2 Details

3 Advanced

New Content with Viya 3.4

The presence of an orange triangle in the lower left corner of a slide means:

- This slide has new content that is specific to Viya 3.4
- This content either was not available or not supported with previous releases

This Orange Triangle

VA 8.3 Features – Enhancing Reports

- Retain Expand/Collapse state of Options pane
- Precision Grid and Smart Guide
- Container Templates
- Draggable Reference Lines

VA 8.3.1 Features – Enhancing Reports

- Report Summary

Report Theme Samples

Marine (Default)



Aqua



High Contrast



Options

Report Clutter - Small

General

Theme

Report theme:
Marine

Report background:
☐

Font:
AvenirNext

Layout

Options
Roles
Actions
Rules
Filters
Ranks

Report Layout

Next To and No Overlapping

- Not considered Tiled or Grid
- Enables you to place report objects directly next to other reports without overlap
- Objects can be individually sized which may cause unexpected results

Use specific width and height as a % of the canvas and not a fixed pixel requirement

Options

Crosstab 1

Layout

Width

☒ Specify width 40 ✓

☐ Extend width if available

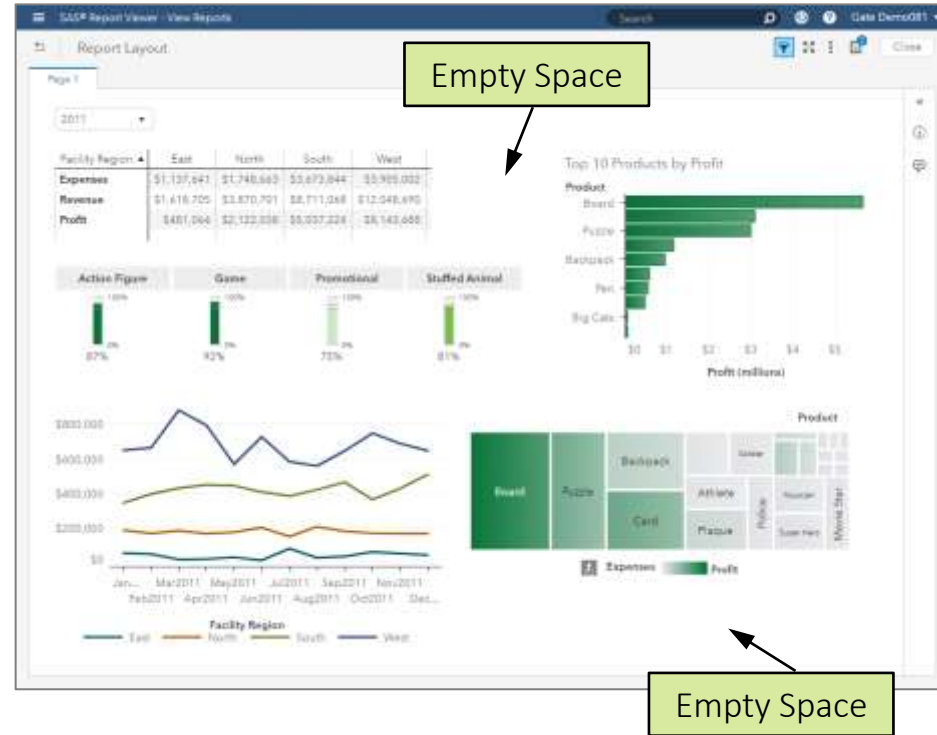
☒ Shrink width if necessary

Height

☒ Specify height 23.32 ✗

☐ Extend height if available

☒ Shrink height if necessary



Duplicate Page

All of the data, controls, objects, actions, rules, etc are copied to the duplicated page.

The screenshot shows the SAS Visual Analytics interface with the 'Duplicate Page' dialog open. The dialog title is 'Duplicate Page'. At the top, there is a search bar and a user profile icon. Below the title bar, there is a list of pages: 'Page 1', 'Page 1 (1)', 'Page 1 (2)', and 'Page 1 (1)(1)'. A red box highlights the 'Page 1 (1)(1)' page, and a green box labeled 'Duplicate of Page 1(1)' points to it. A context menu is open for 'Page 1 (1)(1)', with the 'Duplicate page' option highlighted in a red box. The background shows a dashboard with filters for Year (2011) and Region (East), and two charts: 'Profit by Product' and 'Top 5 Products by Profit'.

Product	Product Description	Profit
Card	Playing Cards	\$62,255.52
Card	Dos	\$59,047.19
Board	Rise-and-Fall	\$52,150.34

Prompt Container

- Able to group prompts together in a collapsible container
- Available for use in:
 - Report Prompt area
 - Page Prompt area
 - Report canvas
- Pro Tips:
 - Pin **Object** pane to drag-and-drop Controls to Prompt Container
 - Use **Outline** pane to switch the order of Controls in Prompt Container



Containers Types

Pro Tip: Use the Outline pane to move objects into a container.

Standard

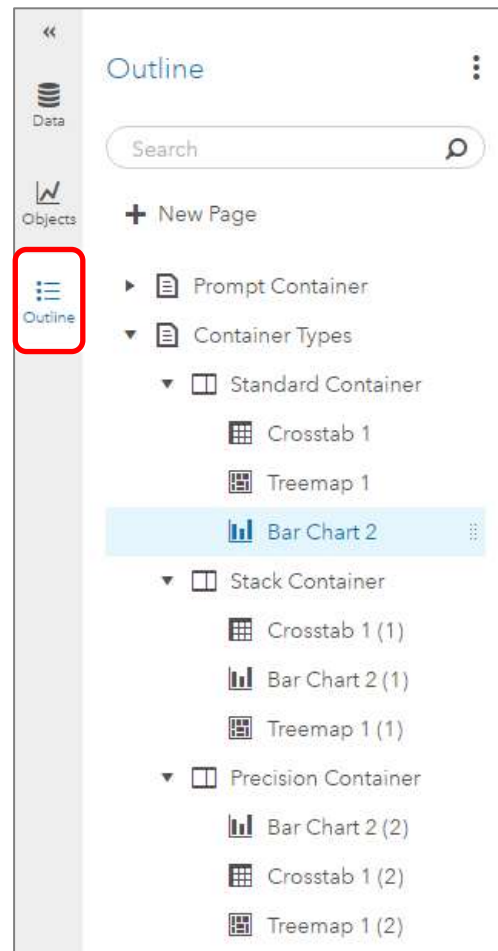
Objects are laid out horizontally or vertically without overlap. Avoid scrollbars will require either the container or objects to be resized

Stacking

Objects are displayed as if they are in a slide deck and only one object is displayed at a time.

Precision

Able to adjust the size and placement of objects which can overlap. Layout Width and Height are percentage based not pixel size.

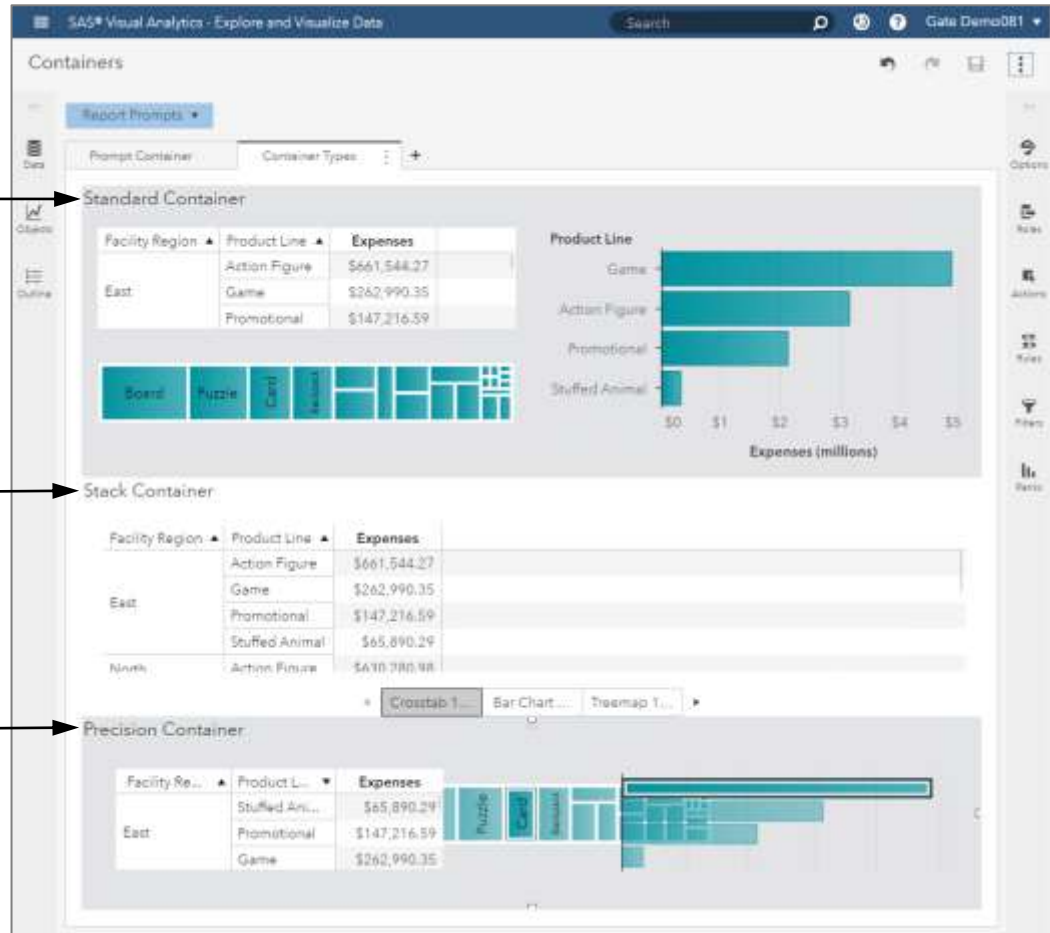


Container Examples

Standard Container
Notice no scrollbars, content
resized to fit in container

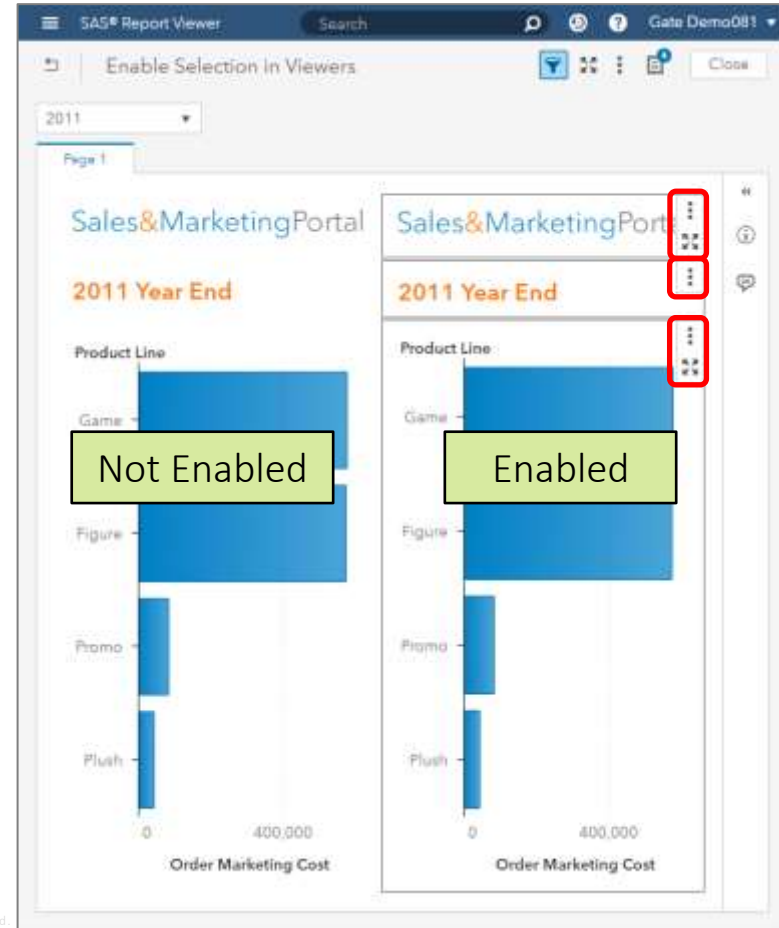
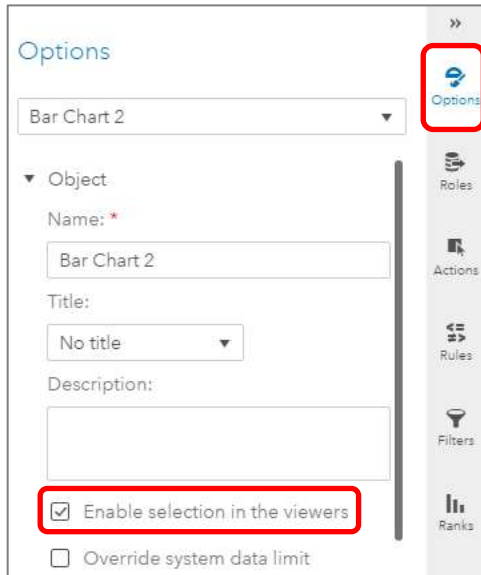
Stack Container
Notice the navigation bar.
Available styles are buttons,
dots, or links

Precision Container
Notice how these objects
overlap. Able to send objects
to front or back



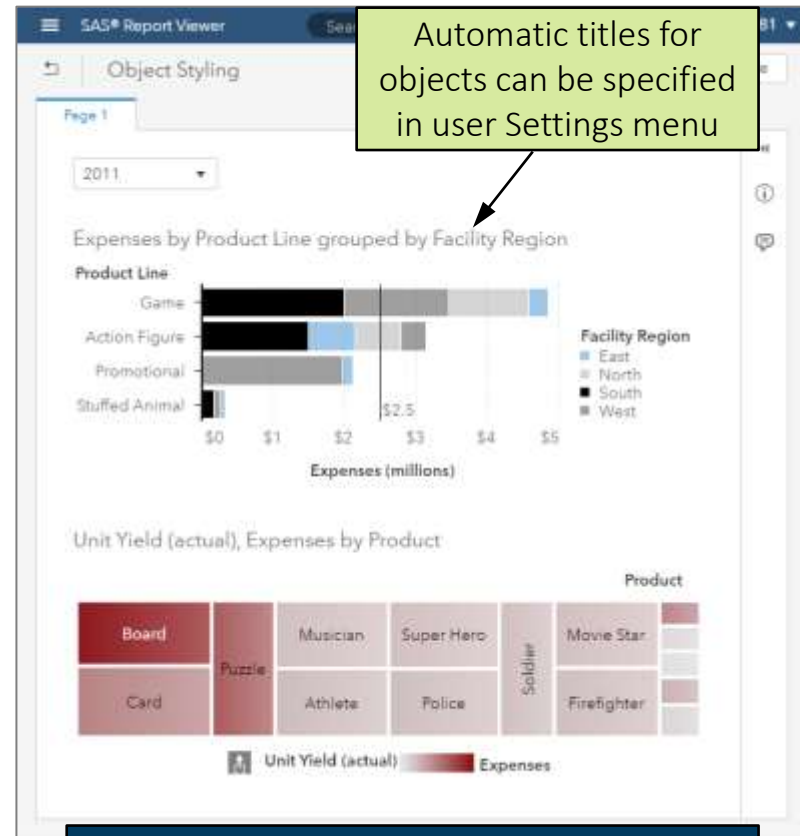
Enable Selection In Viewers

- Controls the Overflow menu in SAS Report Viewer and SAS Mobile BI
- Graph objects by default are enabled
- Text and Image objects by default are not enabled



Object Styling: Options Pane

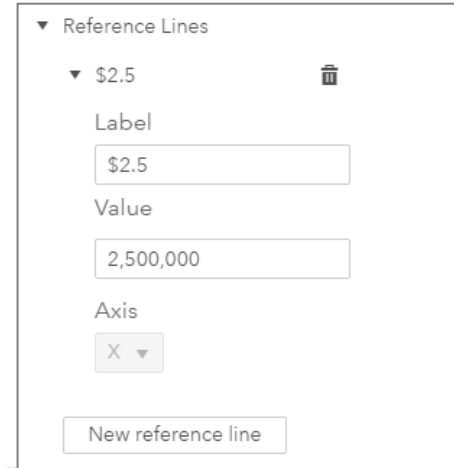
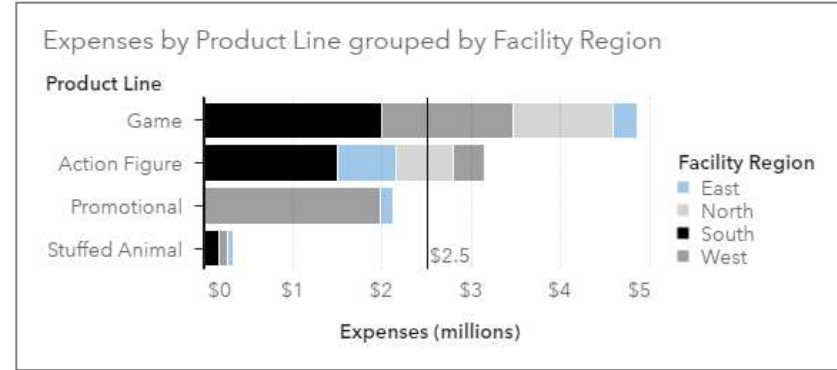
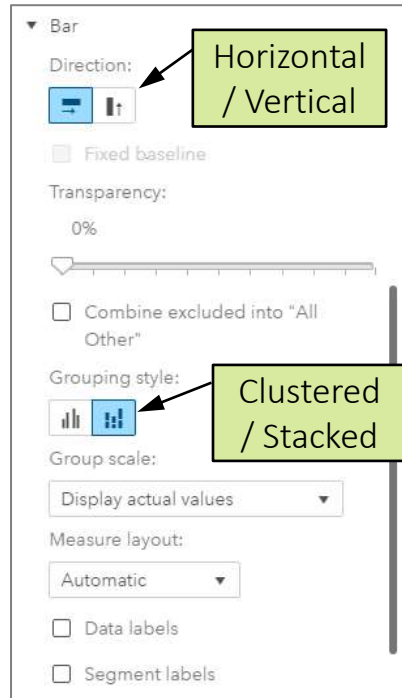
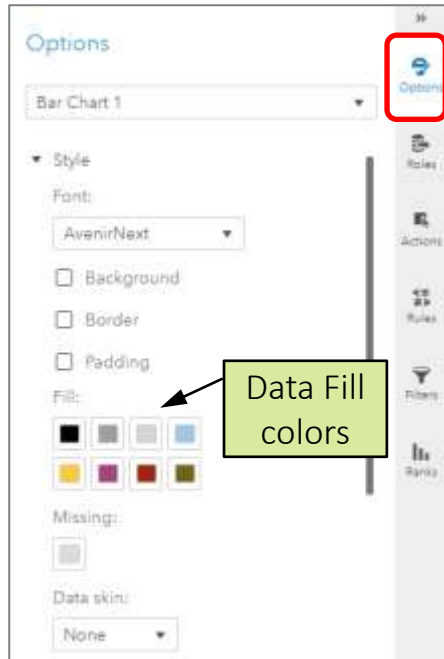
Object	Name, Title, Enable selection in the viewers, Override system data limit
Style	Background, Data skin, Fill, Font, Gradient, Line/Marker
Graph Frame	Data tip background, Data tip style, Grid lines
Axis Options	Axis label, Axis line, Fixed maximum and minimum, Rotate value label
Legend	Placement, Visibility
Data Options	Combine excluded into "All Other"
Layout	Extend and Shrink height and width if available, Specify height, Specify width
Reference Lines	Manage object reference lines



Listed Options are a subset and object dependent, see documentation for full list of features

Object Styling Example

- Available options are context sensitive and will vary depending on the object
- Options use small visuals with hover text for description



In-Line Editing

- Double-click on text to open editor
- Available for:
 - Page Names
 - Object Titles
 - Object Names
 - Text Objects

The screenshot displays the SAS Visual Analytics interface with several components highlighted to demonstrate in-line editing:

- Page Name:** A green box highlights the 'Page Name' field in the top navigation bar, which is currently set to '2011'. An arrow points to the 'Enable Selection' button next to it.
- Object Name:** A green box highlights the 'Object Name' field in the 'Outline' pane, which is currently set to 'Image 1'. An arrow points to the 'Enable Selection' button next to it.
- Text Object:** A green box highlights the 'Text Object' field in the 'Text Object' pane, which is currently set to '2011 Year End'. An arrow points to the 'Enable Selection' button next to it.

The main content area shows two bar charts titled 'Sales & Marketing Portal' and 'Sales & Marketing Portal'. The first chart is titled '1 Year End' and the second is titled '2011 Year End'. Both charts show data for 'Product Line' and 'Game' categories.

The bottom of the image shows a toolbar with various editing tools, including a text editor with the text '2011 Year End' and a '15' in the bottom right corner.



Demonstration:

In-Line Editing

(Duration: 1:11)



Enhancing Reports

1 Basics

2 Details





3 Advanced

Display Rules

Allows you to conditionally highlight data that meet defined criteria. You can define Display Rules for objects at the:

- Report – Level
- Graph – Level
- Table – Level
- Gauge – Level

There are three kinds of display rules, but not every level supports all rule types

<i>Expression</i>	Based on a measure data item expression, accepts numeric parameters
<i>Color-Mapped Values</i>	Based on a category data item value
<i>Gauge</i>	Based on a measure data item interval definition     Bullet Icon Slider Thermometer

Display Rules to Trigger Alerts

- Alerts are only available for Expression based Display Rules
- An email is generated and sent to the Recipient list
- An alert is not created or updated until the report is saved

New Display Rule

Expenses

Rule Type: Expression

Operator: >

Value: Expense Maximum

Format: AvenirNext

Background Color:

Placement: Expenses

☒ Allow alerts for this rule

Recipients: SAS Administrator

Notification frequency: Daily Interval (days): 1

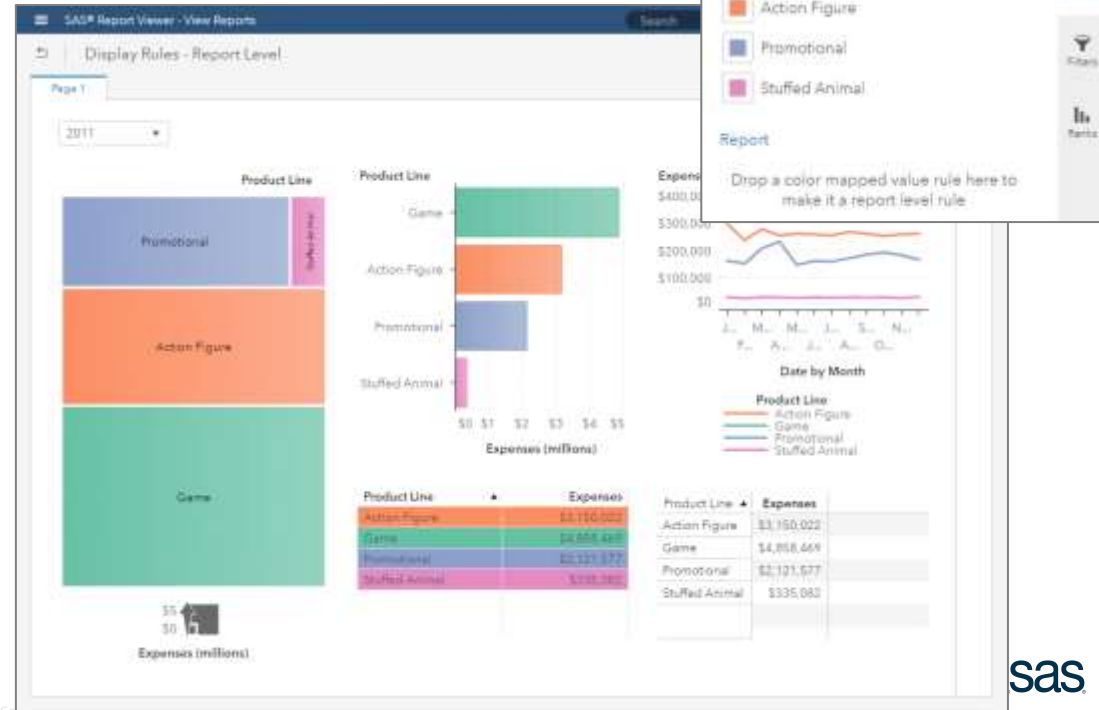
Query frequency: System default Interval: 1

OK Cancel

Display Rules: Report - Level

- Available rule:
Color-Mapped Values
- Applies display rule at report level
 - Across all applicable objects
 - Across all report pages
- Ensure consistent category color assignment across missing values and filtering
- If defined, layered object level display rules take precedence

Promote to report-level display rule



Display Rules: Table - Level

List Table

Available rules:

1. Gauge



Bullet



Icon



Slider



Thermometer

2. Expression

- Column source does not have to be assigned role in table

3. Color-Mapped

Display Rules can be layered, drag and drop to re-order rules.

ListTable

2011

Product Line		Expenses	Profit
Action Figure	\$3,150,022		(\$138,990)
Game	\$4,858,469		\$11,756,594
Promotional	\$2,121,577		\$3,740,530
Stuffed Animal	\$335,082		\$425,880

Display Rules

List Table 1

+ New rule

Column - Expenses

Expenses

Right of text, with Expenses as x

- 0 <= x < 1,250,000
- 1,250,000 <= x < 2,500,000
- 2,500,000 <= x < 3,750,000
- 3,750,000 <= x <= 5,000,000

Column - Profit

Profit

Profit < 0

Table Rows

Any Category

Promotional

Display Rules: Table - Level

Crosstab

Available rule:

Expression

- Style text and/or background
- Column source must be assigned role in crosstab, no Hidden Role
- Intersection identifies cells for rule application
 - If no intersection defined, then ALL cells, if true, will be formatted

Crosstab

		Year ▲	2010	2011	Total
Region ▲	Product Line ▲	Expenses	Expenses	Expenses	
East	Action Figure	\$690,013	\$661,544	\$1,351,557	
	Game	\$252,847	\$262,990	\$515,837	
	Promotional	\$381,241	\$147,217	\$528,458	
	Stuffed Animal	\$36,851	\$65,890	\$102,742	
Subtotal: East		\$1,360,952	\$1,137,641	\$2,498,594	
North	Action Figure	\$654,418	\$630,281	\$1,284,699	
	Game	\$1,042,992	\$1,118,382	\$2,161,373	
Subtotal: North		\$1,697,410	\$1,748,663	\$3,446,072	
Total		\$3,058,362	\$2,886,304	\$5,944,666	

Specify Intersections

Specify the levels in which a display rule is applied:

- ☐ Region
- ☐ Region / Product Line
- ☐ Year
- ☐ Region / Year
- ☐ Region / Product Line / Year
- ☐ Grand Total

Display Rules

Crosstab 1

+ New rule

Measure - Expenses

Expenses

abc Expenses > 0

Region

Expenses

abc Expenses > 300000

Region / Year

Expenses

abc Expenses > 0

Grand Total

Expenses

abc Expenses > 125000

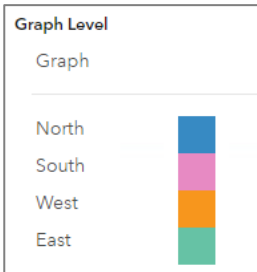
Facility Region / Product Line / Date by Year

Notice the intersection mapping

Display Rules: Graph - Level

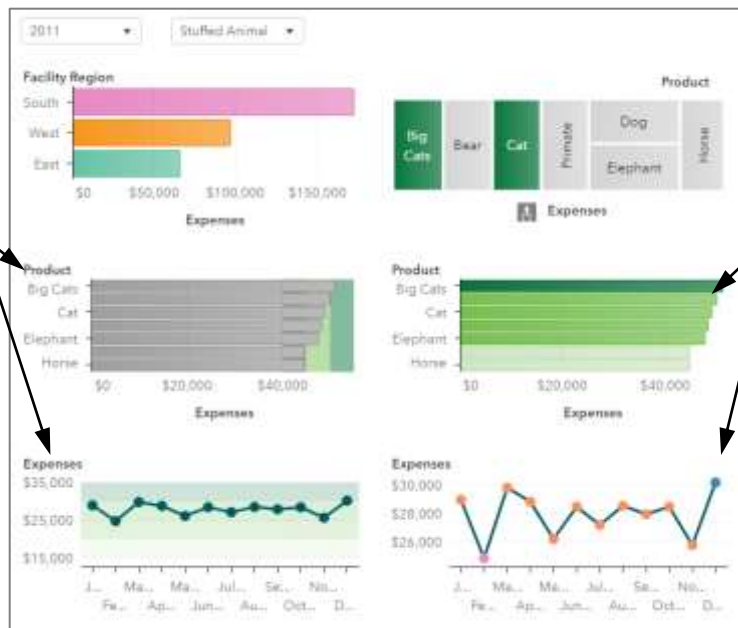
Available rules:

1. Expression
 - Style graph or background
 - Column source does not have to be assigned a role in graph
2. Color-Mapped Values



Display Rule Applied to the Background

Display Rule Applied to the Graph



Display Rules: Gauge - Level



Available rule:

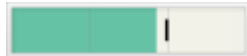
Gauge: Based on an interval definition



Bullet



Dial



Thermometer



Speedometer



Slider

Display Rules configuration interface for Gauge 1.

Display Rules

Gauge 1

Add an interval + Recalculate

Interval	Lower Bound	Operator	Upper Bound	Color	Actions
1	2,000,0	<= x <	2,166,6	Grey	Recalculate
2	2,166,6	<= x <	2,333,3	Green	Recalculate
		<= x <=	2,500,0	Blue	Recalculate

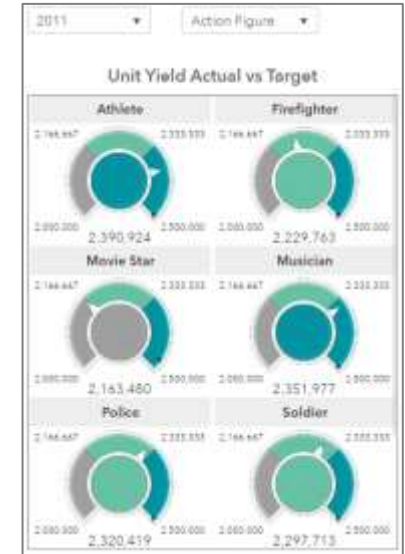
Recalculate Intervals

Number of intervals: 3

Lower bound: 2,000,000

Upper bound: 2,500,000

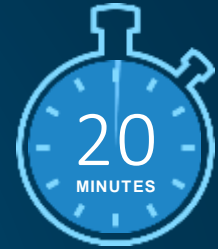
Calculates Intervals with prompted criteria, removes color selections



Display Rules

Supported Combination Summary

Display Rule	Expression	Color-Mapped	Gauge
Report – Level		✓	
Table – Level: List Table	✓	✓	✓
Table – Level: Crosstab	✓		
Graph – Level	✓	✓	
Gauge - Level			✓



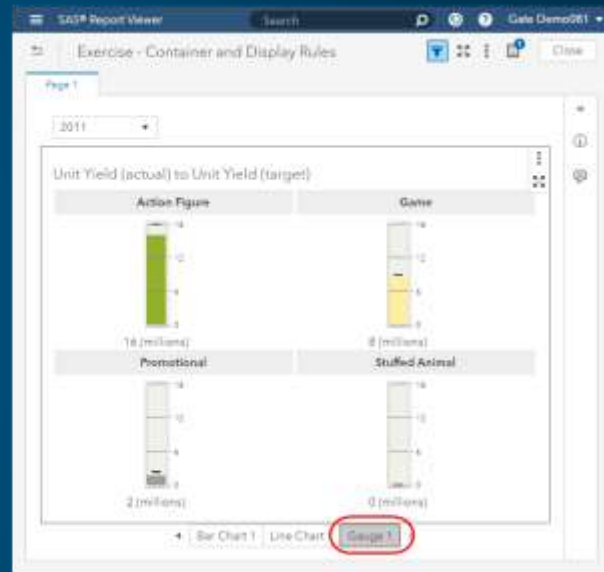
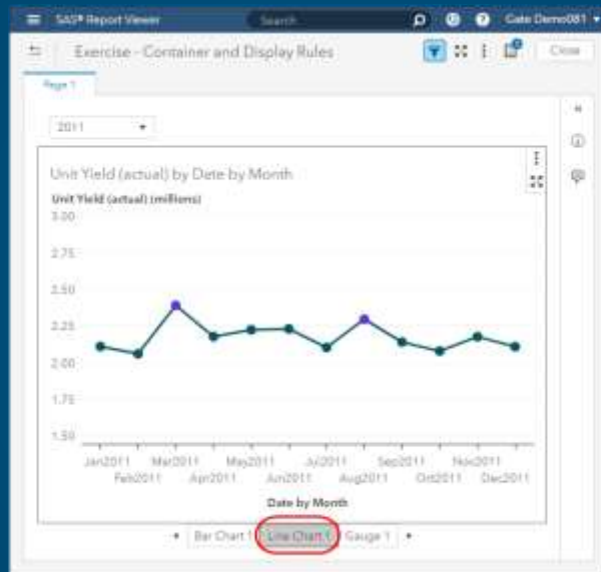
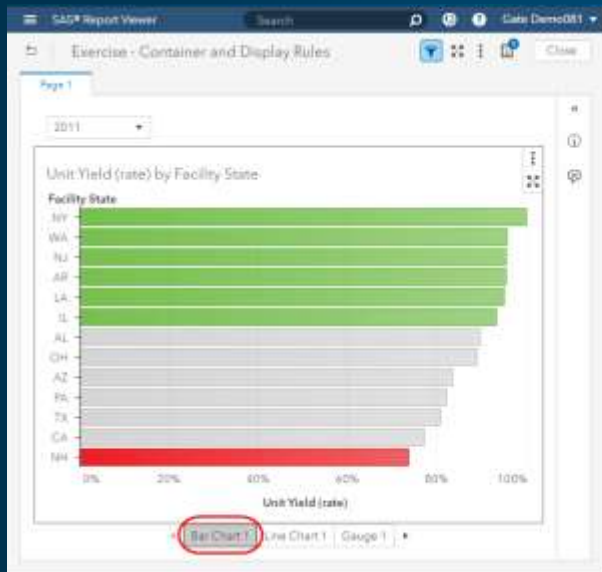
Hands-On Exercise

Complete the steps in:

Desktop\Hands-On\VIYAVISUAL\GELVIYAVISUAL_04EnhancingReports_01DisplayRuleAndContainer

Tasks:

- Create a report using Display Rules, Containers and Images



Enhancing Reports

1 Basics

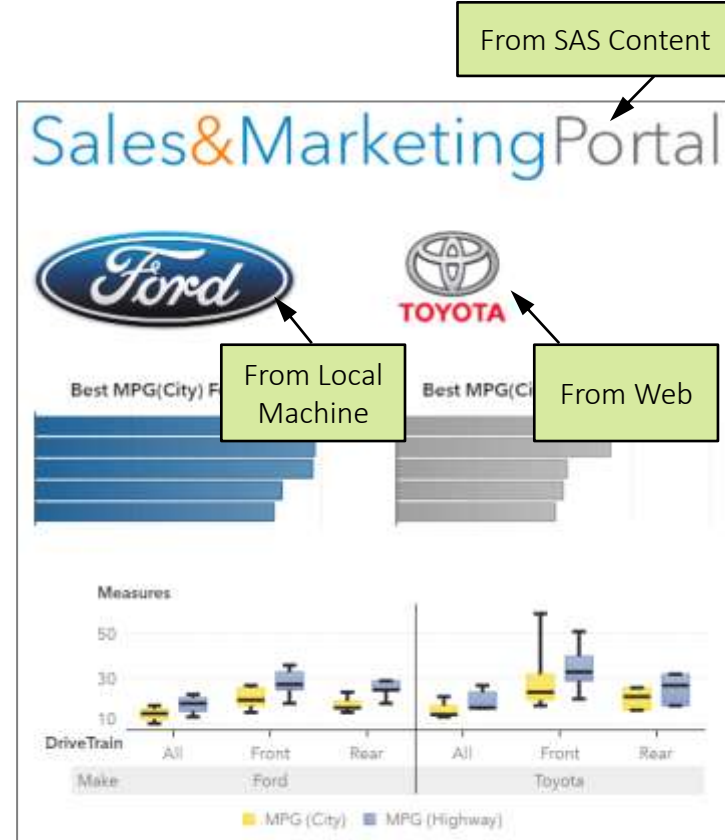
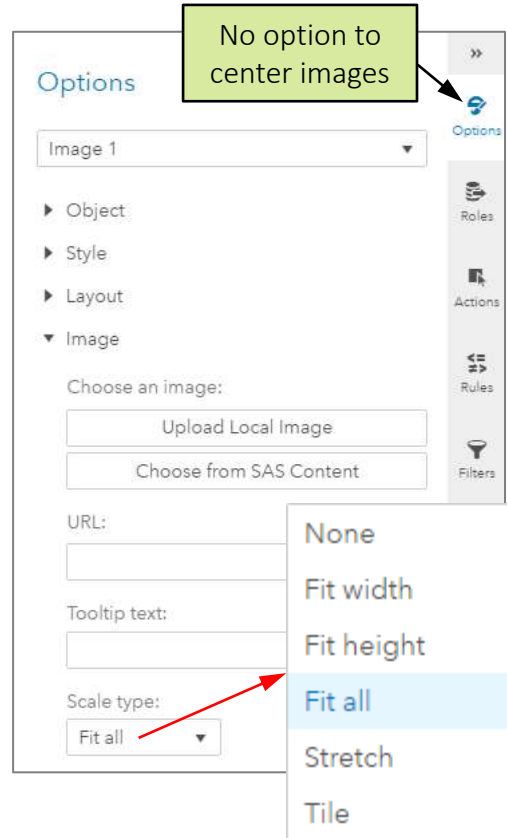
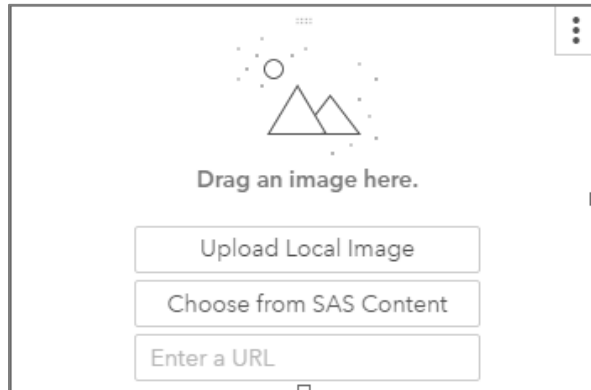
2 Details

3 Advanced

Images

Able to insert images from:

- Local machine
- SAS Content
- Web via URL

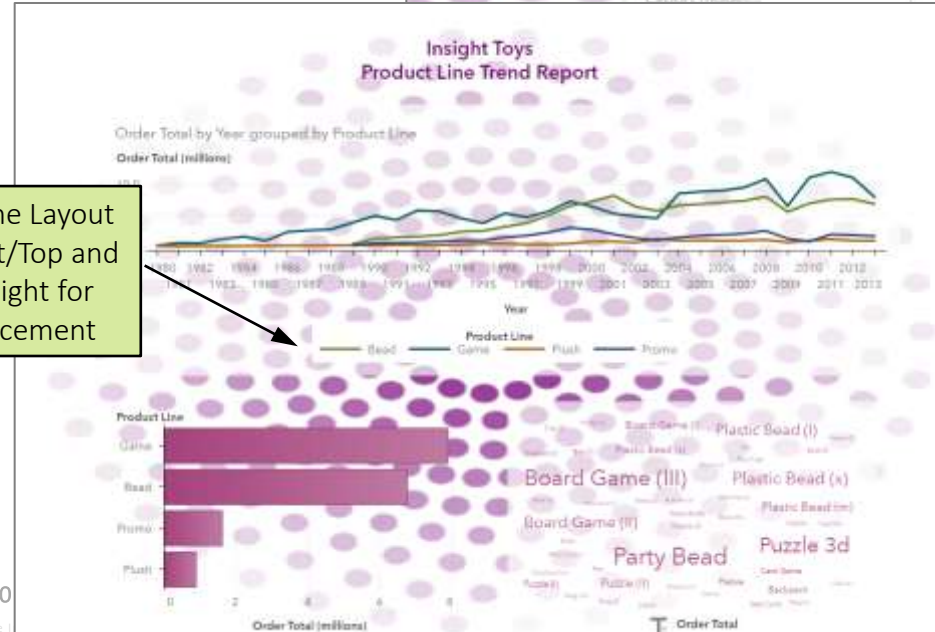


Images

Set as Background

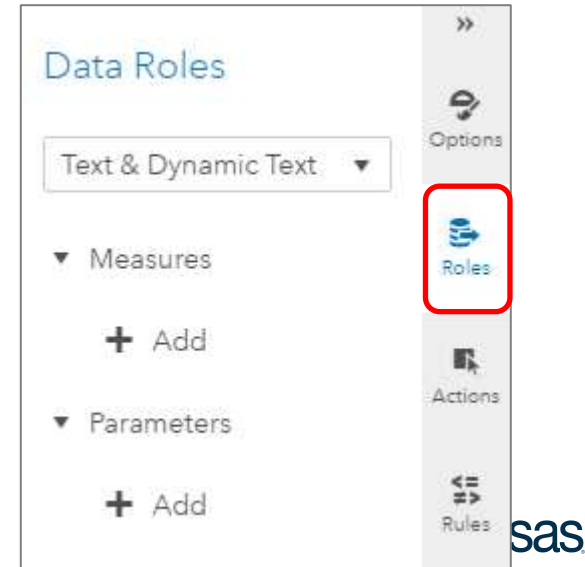
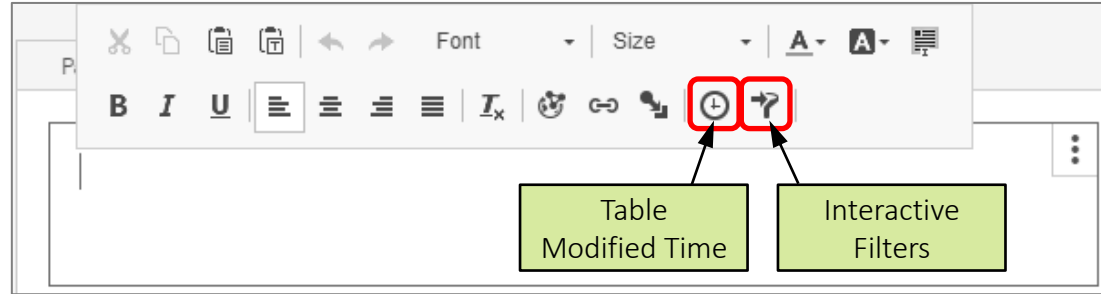
- No out-of-the-box option to set an image as a background
- Workaround:
 1. Add Container with Type = Precision; adjust size to desired background effect
 2. Add objects to report; configure transparency of Background, Graph Frame, etc
 3. Use the overflow menu to *Send to Back* or *Send to Front*

Hint: Use the Layout Options Left/Top and Width/Height for object placement

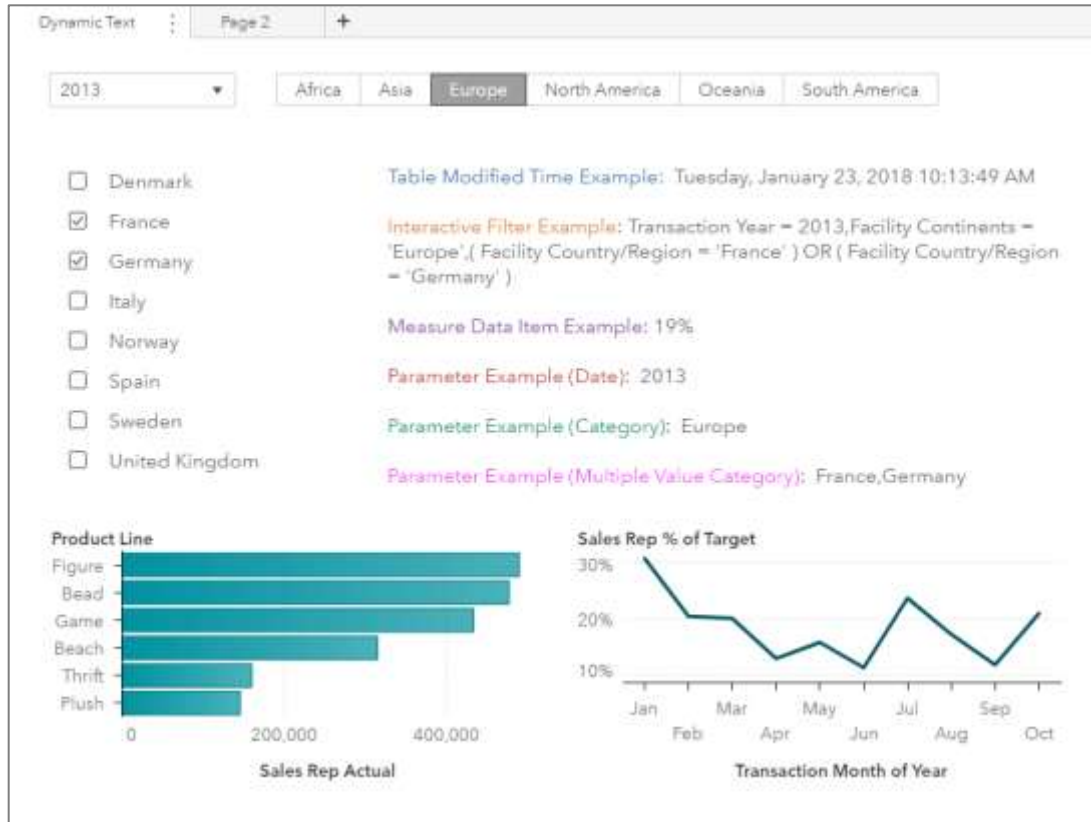


Text & Dynamic Text

- Static Text
- Dynamic Text
 - Out-of-the-Box
 - Table Modified Time
 - Interactive Filters
 - Data Driven
 - Measure data items
 - Parameter data items
 - Multiple Value Parameters are limited to 25 characters
- Supports Display Rules



Text & Dynamic Text Example



Font Size A A

B I U [List Icon] [Align Left Icon] [Align Center Icon] [Align Right Icon] [Text Color Icon] [Background Color Icon] [Link Icon] [Unlink Icon] [Clock Icon] [Refresh Icon]

Table Modified Time Example: {Table Modified Time}

Interactive Filter Example: {Interactive Filters}

Measure Data Item Example: {Sales Rep % of Target}

Parameter Example (Date): {YearParameter}

Parameter Example (Category): {ContinentParameter}

Parameter Example (Multiple Value Category): {CountryParameter}

Edit Mode

Pro Tip: Add the Dynamic Text data item first then go back and add any static text before or after.

Data Roles

Text 1 ▾

Measures

- Sales Rep % of Target
- + Add

Parameters

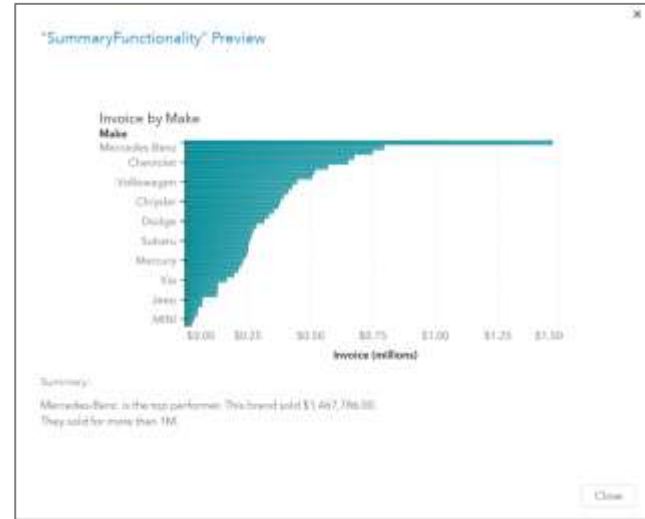
- ☒ YearParameter
- ☒ ContinentParameter
- ☒ CountryParameter
- + Add

Report Summary

Text intended to help describe the report in a few short sentences to replicate a speech-template. Based on Apache Velocity.

Able to include:

- Dynamic values
- Conditional text
- Natural Language Generation



Summary displays when opening a report, from SAS Drive's report information icon, or when distributing the report.

Report Summary - Example

SAS® Visual Analytics - Explore and Visualize Data

SummaryFunctionality

Page 1

Invoice by Make

Make	Invoice (millions)
Mercedes-Benz	\$1,467,786.00
Chevrolet	\$1,467,786.00
Volkswagen	\$1,467,786.00
Chrysler	\$1,467,786.00
Dodge	\$1,467,786.00
Subaru	\$1,467,786.00
Mercury	\$1,467,786.00
Kia	\$1,467,786.00
Jeep	\$1,467,786.00
MINI	\$1,467,786.00

Options

- SummaryFunctionality
- General
- Style
- Layout
- Summary

Code editor to generate Summary

```
Bar - Make 1["Make"[0]] is the top performer. This brand sold $[NumberTool.currency]([Bar - Make 1["Invoice"][0]]).  
## [Bar - Make 1["Invoice"][0]] > 1000000  
They sold for more than 1M.  
Else They did not reach 1M.  
End
```

Speech Text

Mercedes-Benz is the top performer. This brand sold \$1,467,786.00. They sold for more than 1M.

Summary preview

Displays the generated text

Activate live selection for the variables

Preview Summary

Close

Natural Language Generation

- Based on Apache Velocity Tools and enhanced by SAS
- Functions/tools: \$NumberTool.integer(), \$LangTool.verbform(), ...
- Conditional programming:

```
1 #if(some condition)
2     Text to display
3 #elseif(some other condition)
4     Another text to display
5 #else
6     Yet another text to
7 display
#end
```

Report Summary – Example Syntax

Return the first value of Make used in “Bar – Make1” object

`["Bar - Make 1"]["Make"][0]` is the top performer. This brand sold

`$NumberTool.currency(["Bar - Make 1"]["Invoice"][0])`.

Use the NumberTool.currency to format first Invoice value in “Bar – Make1” object

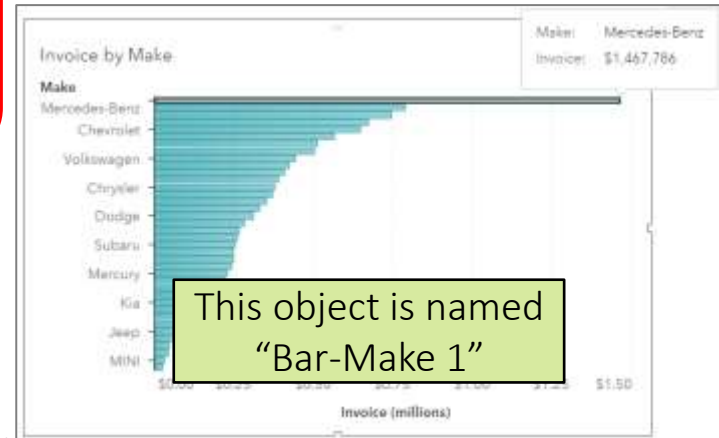
`#if(["Bar - Make 1"]["Invoice"][0]> 1000000)`

They sold for more than 1M.

`#else` They did not reach 1M.

`#end`

If/Then/Else block





Hands-On Exercise

Complete the steps in:

Desktop\Hands-on\VIYAVISUAL\GELVIYAVISUAL_04EnhancingReports_02ReportSummary

Tasks:

- Create a report with a bar chart
- Create a summary which identifies the top 3
- Share that report via email

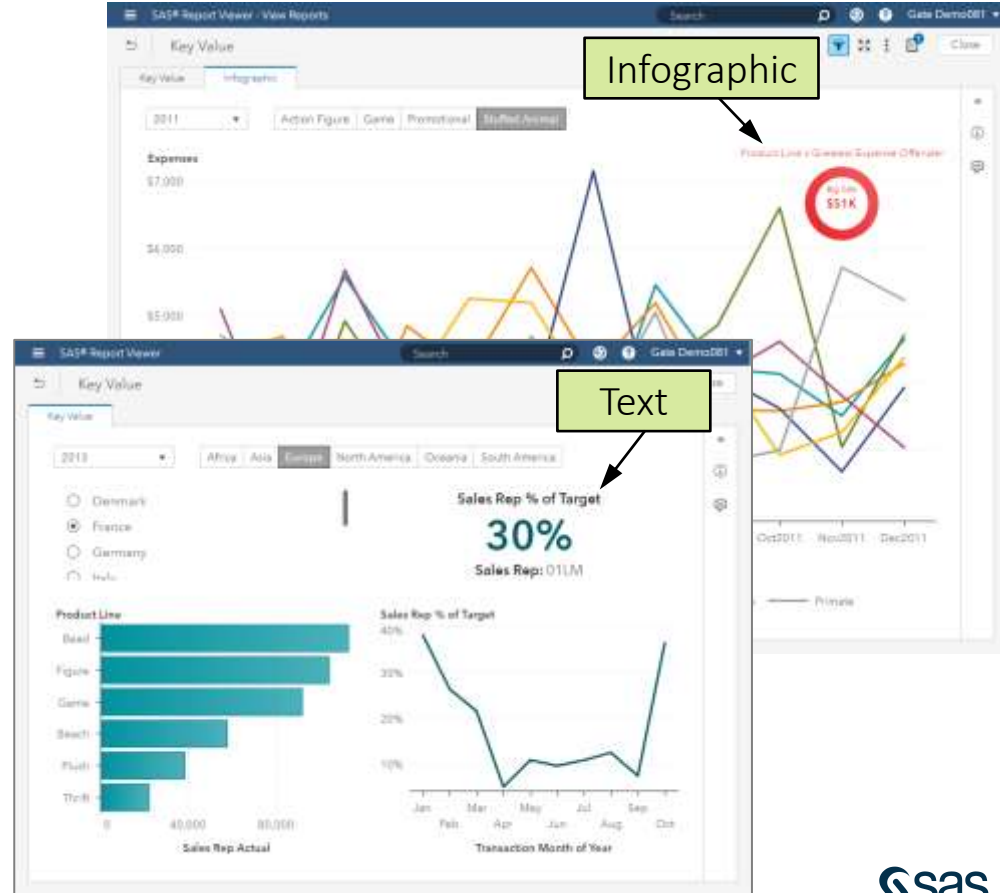
Key Value

Displays a single aggregated value for:

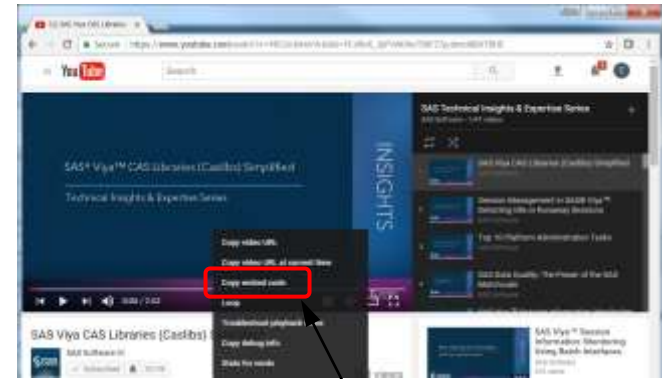
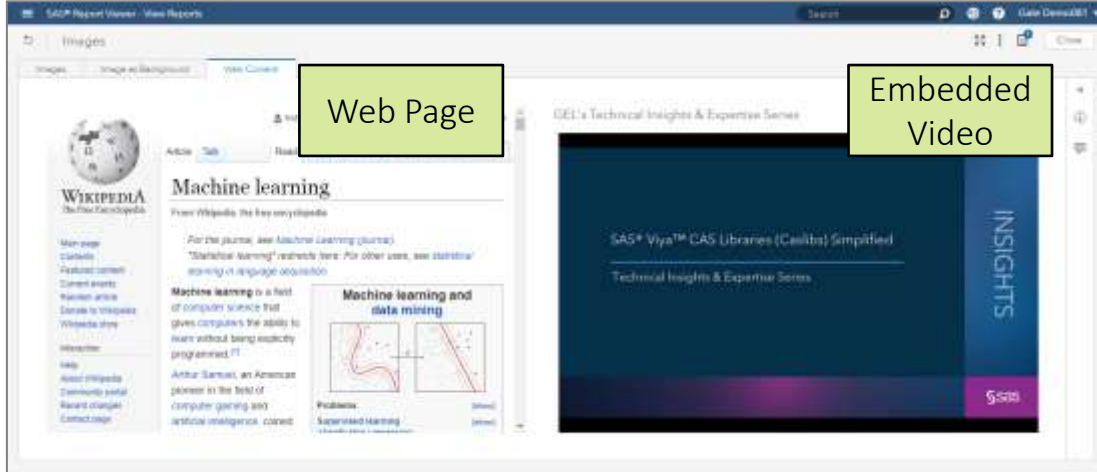
- Measure data item
- Category data item
- Both

Options:

- Style: Text or Infographic
- Value: Highest Value or Lowest
- Highlight: Measure or Category



Web Content



- Displays a web page or embedded video in an inline frame (iframe):
Caution some websites use security settings that do not allow them to be embedded
- Embed YouTube Videos:
Use the embed code URL after the src tag

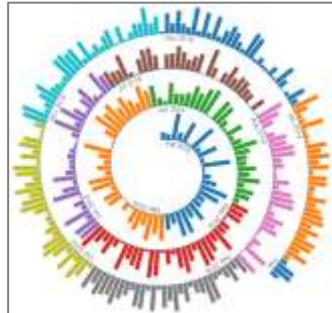
```
<iframe width="640" height="360" src="https://www.youtube.com/embed/MICAc8AAV9c?list=PLVBcK_IpFVi80HeTBtFZ7pubwoBBATBHE" frameborder="0" allowfullscreen></iframe>
```

Data-Driven Content

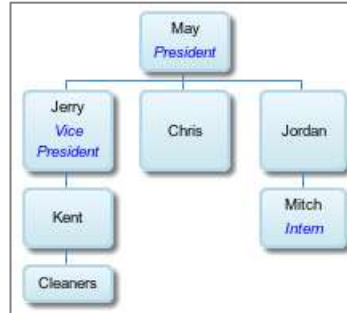
Enrich VA reports with third-party visualizations.

Supports any JavaScript charting framework such as:

- D3.js
- Google Charts
- CanvasJS
- etc



D3.js
Condegram Spiral Plot



Google Charts
Org Chart



CanvasJS
Pyramid Charts

Data Driven Content – What's the benefit?

- Enables usage of third party visualizations libraries within VA reports
- Permits 2 ways interactions between VA report objects and third party visualizations

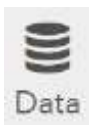
Supports VA integration
for Roles, Actions, Filters,
and Ranks definitions



Data-Driven Content – Support

VA Data and Objects

- Assign VA data items to Roles
- Define Actions between report Objects and Data-Driven Content



JSON-like Messages

- Data
- Columns metadata
- Row Selection, etc
- Instructional Text

Third-Party Code must code for

- Event listener
- Event handler
- Action handler



Data-Driven Content

To learn more and download example code visit:

- VA 8.2 Tech Exchange: Data-Driven Content and Calculations
- GitHub:
SASSoftware/SAS-VisualAnalytics-ThirdPartyVisualizations
- R&D: www.sas.com/~drande/content/
- Communities.sas.com: #D3Thursday

Name	Last modified	Size	Description
Report Structures			
vaCodegenDefault.html	04-Jul-2017 22:01	-	
vaBarChart.html	04-Aug-2017 18:13	5,30	
vaBoxPlot.html	21-Sep-2017 11:08	4,86	
vaLine.html	21-Sep-2017 18:32	4,36	
vaScatter.html	23-Feb-2017 15:49	2,56	
vaScatterBarChart.html	23-Feb-2017 15:49	4,06	
vaScatterLine.html	04-Aug-2017 18:14	5,56	
vaScatterPie.html	21-Sep-2017 11:50	5,56	
vaScatterTable.html	04-Aug-2017 18:14	3,14	
vaScatterTable.html	04-Aug-2017 18:15	6,06	
vaScatterTable.html	23-Feb-2017 15:49	4,46	
vaScatterTable.html	04-Aug-2017 18:13	3,14	
vaScatterTable.html	04-Aug-2017 18:13	5,06	
vaScatterTable.html	04-Aug-2017 18:16	3,06	
vaScatterTable.html	21-Sep-2017 11:51	6,56	
vaScatterTable.html	13-Feb-2017 14:59	-	
vaScatterTable.html	17-Feb-2017 13:55	476	
vaScatterTable.html	17-Feb-2017 15:19	596	
vaScatterTable.html	17-Feb-2017 15:20	396	
vaScatterTable.html	04-Aug-2017 18:16	3,56	
vaScatterTable.html	04-Aug-2017 18:16	3,46	
vaScatterTable.html	03-Nov-2017 15:45	1,06	
vaScatterTable.html	04-Aug-2017 18:16	1,06	
vaScatterTable.html	04-Aug-2017 18:16	1,56	

Data Driven Content – Code Snippets

Pushing data to 3rd party visualization

```
if (window.addEventListener) {
    // For standards-compliant web browsers
    window.addEventListener("message", onMessage, false);
} else {
    window.attachEvent("onmessage", onMessage);
}

// Retrieve data and begin processing
function onMessage(event) {
    if (event && event.data)
    {
        //process event.data
    }
}
```

Pulling data from 3rd party visualization

```
function sendSelection(selectedRows, resultName) {
    var selections = [];
    if (selectedRows)
    {
        selectedRows.forEach(function (row) {
            selections.push({row: row});
        });
    }
    var message = {
        resultName: resultName,
        selections: selections
    };
    sendMessage(message);
}

function sendMessage(message)
{
    var url = (window.location != window.parent.location)
        ? document.referrer
        : document.location.href;
    window.parent.postMessage(message, url);
}
```

Wrapper functions are available on GitHub
to ease development of web pages

Data-Driven Content – Developing a web page

Download the SAS provided JavaScript functions from

<https://github.com/sassoftware/sas-visualanalytics-thirdpartyvisualizations>

Add references to the .js files provided by SAS:

Get example using #D3Thursday
on <https://communities.sas.com/>

```
<script type="text/javascript" src="./util/messagingUtil.js"></script>
```

```
<script type="text/javascript" src="./util/contentUtil.js"></script>
```

Use `setOnDataReceivedCallback()` function to trigger an event when the object receives data from VA

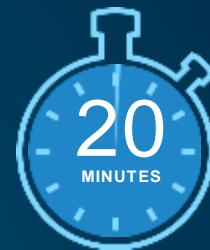
Use `postSelectionMessage()` function to send data back to VA

Use `postInstructionalMessage()` function to send informational feedback to report developer

Data-Driven Content – Utilities & Helpers

util/contentUtil.js	setupResizeListener()	Handles the window resizing events
	validateRoles()	Validate that the received data contains the required fields with the correct types.
	initializeSelections()	Retrieves the information about the selected row ID's
	convertDateColumns()	Converts SAS formatted dates to JavaScript Date objects

thirdPartyHelpers/google.js thirdPartyHelpers/d3.js thirdPartyHelpers/c3.js	Provide functions to build the data source, format the data, format the axis specifically for each framework.
---	---



Hands-On Exercise

Complete the steps in:

Desktop\Hands-on\VIYAVISUAL\
GELVIYAVISUAL_04EnhancingReports_03WorkingWithDataDrivenContent

Tasks:

- Create a simple HTML page with jQuery
- Create a report which includes a Data Driven Content object
- Adapt the html to brush other objects in the report

Additional Resources



SAS® Visual Analytics 8.3 Documentation

- Working with Report Content
<http://pubshelpcenter.unx.sas.com:8080/test/?cdcId=vacdc&cdcVersion=8.3&docsetId=vaobj&docsetTarget=titlepage.htm&locale=en>
- Working with Content
<http://pubshelpcenter.unx.sas.com:8080/test/?cdcId=vacdc&cdcVersion=8.3&docsetId=vaobj&docsetTarget=p12m20004c0837n114lxcpbllcnbw.htm&locale=en>