

VIEWS

International SAS Programmer Community



News, Hints, Tips and Information for SAS® Users

Issue 78, 1st Quarter 2025

This newsletter is the home of Foundation SAS and brings you information about making the most of SAS 9 and Altair SLC. This issue is another one that has been delayed, but this time due to software issues on my blog server, which have now been resolved. This newsletter issue includes an InfoGeographic map from LeRoy Bessler, and I have discovered an AI assistant that seems to write working SAS programs. As usual I have publicised some SAS-related events for the next few months, and I have also added some more SAS formats, options and functions that you may or may not have come across before, but you might find interesting, and even useful.

If you would like to contribute an article, to re-visit and improve an existing article, or just discuss the possibility of doing so, please feel free to send an email to me at views-uk@hollandnumerics.org.uk.

Philip R Holland (Newsletter Editor)

Membership of VIEWS is **free** and you can register for notification of all future VIEWS News issues by registering at blog.hollandnumerics.org.uk, and then emailing views-uk@hollandnumerics.org.uk, or using the blog site menu, to request access to the VIEWS UK forum. Members will receive an email notification whenever a new issue of the free quarterly VIEWS News is published on the web site, please inform us when you change your email address, otherwise your registration may be cancelled.

Ask The Consultant

This part of VIEWS News is where you can get your technical questions answered. Send your questions to the Editor.

Making tiny geographic areas on web-enabled choropleth maps actually discoverable

Q: How can tiny geographic areas on a web-enabled choropleth map be made discoverable?

A: [SAS 9.4] A choropleth map (also called a thematic statistical map or, by me, an InfoGeographic) is colour-coded based on ranges of a response (i.e. numeric measurement) variable.

A map delivered in any HTML file is a marvellous tool as long as the geographic area that interests you is big enough to be seen. The world's land areas range from 17,098,242 square kilometres for Russia to 2 square kilometres for Monaco. Other notable small areas are less than 1 sq km for the Holy See (Vatican City), and 47 sq km for the Pitcairn Islands, the world's least populous country (40 people in 2024, many of them are

descendants of the mutineers of HMS Bounty who took their action in 1789).

On a personal computer screen (or on a cell phone screen, using finger gymnastics for scrolling or magnifying) it can be difficult, when not impossible, to find the area fill for countries with very familiar names, but small areas. That is true for almost all of the world's island countries. On my personal computer screen, with the web browser zoom set to the maximum of 500%, it is impossible to see the colour fill in the map of Africa for (Rank 57) the British Overseas Territory of Saint Helena, Ascension, and Tristan da Cunha. If you pass your mouse over the three dots (actually Tristan da Cunha, at the bottom of the trio, is an island group consisting of Tristan da Cunha, Nightingale, the volcanic Inaccessible, and Gough Islands), it is impossible (at least for me) to raise the data tips, but the yellow button at the island group's centroid can be used to display them.

For web delivery, ODS HTML5 has the advantage of allowing you to imbed the image file, which makes the result easily relocatable and convenient for email, as no separate image file must be sent. The first well-annotated maps (three lines: geographic area code, response value, rank of value) to be created with SAS Software's GMAP procedure, and done for print (it was still pre-web) were created at Miller Brewing Company by my colleague Steven J. Subichin in the middle to late 1980's. I coined the term "InfoGeographic" in the early years of GIS (Geographic Information Systems). I admit to being not only a Data Artist, but also a repeat InfoGeographer. Let me show you my latest work.

In 2024, I began a project "Exploration and Revelation for COVID-19 Data: An InfoGeographic Atlas and Other Visual Data Insights", which may appear in past conference proceedings. Those proceedings are not available yet, and the content of those papers is out-of-date and pre-empted by what I can share now. Data visualization tools used also include bar charts and scatter plots. The maps now cover Population, Total Cases, Case Rate (Cases as Percent of Population), Total Deaths, and Mortality Rate (Total Deaths as Percent of Total Cases). There are World Maps, Continent Maps, and Region Maps.

The atlas features Country Rank (for the response of interest), and five response ranges for colour-coding: Top N, Above Median, Median, Below Median, and Bottom N. The value of N varies based on the number of countries in the map, and is never more than about 20% of the total count of countries. The data tips (mouse-over text) contain 23 variables in, or derived from, the source data set. For each of the five response variables, Rank within the World and Rank in the Continent or in the Region is provided. For variables that are counts (Population, Cases, and Deaths), also Percent of World Total and Percent of Total in the Continent or in the Region are provided.

In the map of Africa (next page) it is feasible to annotate the rank of each country. In cases where full annotation would suffer too many collisions, annotating only the Top N and Bottom N (e.g. N=10) covers presumably the most interesting countries with respect to relative significance of the response values.

<https://hollandnumerics.org.uk/forums/forum/views-uk>

Total Cases for Africa With All Annotated By Rank Of Value And With Range Content Countries Footnotes With Ranks and Values

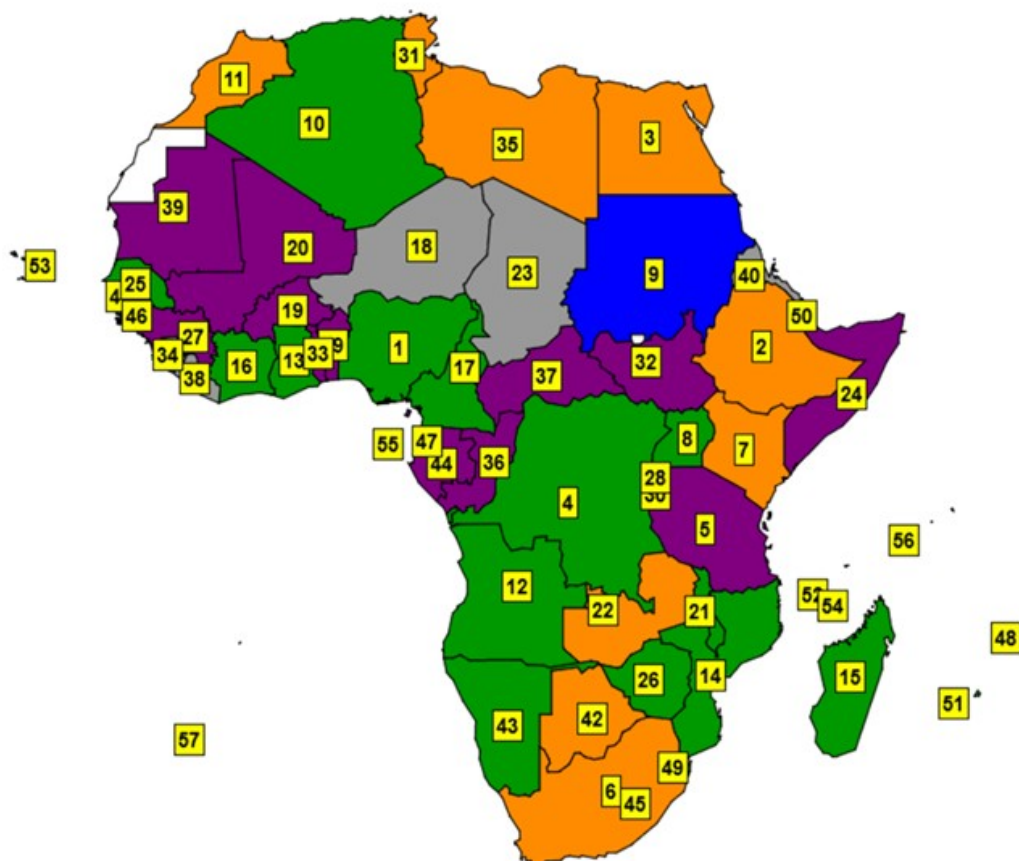
Grand Total = 13,130,999 for 57 Countries in Ranges: ■ 2,166 - 12,626 (10 lowest) ■ 15,440 - 63,773 (below median)

■ 63,993 - 63,993 (median) ■ 64,474 - 321,419 (above median) ■ 330,417 - 4,072,636 (10 highest) □ No Data

Links: [Bar Chart](#) [Population](#) [Total Deaths](#) [Case Rate](#) [Mortality Rate](#) [This Map with Alphabetic Order Footnote](#) [Index To Population Maps](#)

For a country too small to see its color or raise its mouseover tips, look for it in the footnotes and then its Rank number in a yellow button.

The empty shape at the border between Sudan and South Sudan has self-administered status until resolution of the Abyei Conflict.



No Total Cases Data for: Western Sahara

■ Top 10 Total Cases Countries (highest to lowest): 1:South Africa:4,072,636 | 2:Morocco:1,278,269 | 3:Tunisia:1,153,361 | 4:Egypt:516,023 | 5:Libya:507,269 | 6:Ethiopia:501,117 | 7:Reunion:494,595 | 8:Zambia:349,304 | 9:Kenya:344,094 | 10:Botswana:330,417

■ Above Median Total Cases Countries (highest to lowest): 11:Mauritius:321,419 | 12:Algeria:272,010 | 13:Nigeria:267,173 | 14:Zimbabwe:266,048 | 15:Mozambique:233,731 | 16:Namibia:172,239 | 17:Uganda:171,888 | 18:Ghana:171,834 | 19:Rwanda:133,208 | 20:Cameroon:125,137 | 21:Angola:106,720 | 22:Democratic Republic of the Congo:99,338 | 23:Malawi:89,168 | 24:Senegal:89,050 | 25:Cote d'Ivoire:88,384 | 26:Eswatini:75,191 | 27:Madagascar:68,471 | 28:Cape Verde:64,474

■ Median Total Cases Countries (highest to lowest): 29:Sudan:63,993

■ Below Median Total Cases Countries (highest to lowest): 30:Mauritania:63,773 | 31:Burundi:54,455 | 32:Seychelles:51,220 | 33:Gabon:49,051 | 34:Tanzania:43,223 | 35:Mayotte:42,027 | 36:Togo:39,527 | 37:Guinea:38,572 | 38:Lesotho:36,135 | 39:Mali:33,164 | 40:Benin:28,036 | 41:Somalia:27,334 | 42:Congo:25,213 | 43:Burkina Faso:22,109 | 44:South Sudan:18,819 | 45:Equatorial Guinea:17,130 | 46:Djibouti:15,690 | 47:Central African Republic:15,440

■ Bottom 10 Total Cases Countries (highest to lowest): 48:Gambia:12,626 | 49:Eritrea:10,189 | 50:Guinea-Bissau:9,614 | 51:Niger:9,515 | 52:Comoros:9,109 | 53:Liberia:8,090 | 54:Sierra Leone:7,779 | 55:Chad:7,698 | 56:Sao Tome and Principe:6,734 | 57:Saint Helena, Ascension Island, & Tristan da Cunha:2,166

For each map there is also a clickable-to version with all country, rank and response value information in one wrapped alphabetic order by country footnote (next page).

All 57 Countries in Alphabetic Order with Rank and TotalCases Value: Algeria : 12 : 272,010 | Angola : 21 : 106,720 | Benin : 40 : 28,036 | Botswana : 10 : 330,417 | Burkina Faso : 43 : 22,109 | Burundi : 31 : 54,455 | Cameroon : 20 : 125,137 | Cape Verde : 28 : 64,474 | Central African Republic : 47 : 15,440 | Chad : 55 : 7,698 | Comoros : 52 : 9,109 | Congo : 42 : 25,213 | Cote d'Ivoire : 25 : 88,384 | Democratic Republic of the Congo : 22 : 99,338 | Djibouti : 46 : 15,690 | Egypt : 4 : 516,023 | Equatorial Guinea : 45 : 17,130 | Eritrea : 49 : 10,189 | Eswatini : 26 : 75,191 | Ethiopia : 6 : 501,117 | Gabon : 33 : 49,051 | Gambia : 48 : 12,626 | Ghana : 18 : 171,834 | Guinea : 37 : 38,572 | Guinea-Bissau : 50 : 9,614 | Kenya : 9 : 344,094 | Lesotho : 38 : 36,135 | Liberia : 53 : 8,090 | Libya : 5 : 507,269 | Madagascar : 27 : 68,471 | Malawi : 23 : 89,168 | Mali : 39 : 33,164 | Mauritania : 30 : 63,773 | Mauritius : 11 : 321,419 | Mayotte : 35 : 42,027 | Morocco : 2 : 1,278,269 | Mozambique : 15 : 233,731 | Namibia : 16 : 172,239 | Niger : 51 : 9,515 | Nigeria : 13 : 267,173 | Reunion : 7 : 494,595 | Rwanda : 19 : 133,208 | Saint Helena, Ascension Island, & Tristan da Cunha : 57 : 2,166 | Sao Tome and Principe : 56 : 6,734 | Senegal : 24 : 89,050 | Seychelles : 32 : 51,220 | Sierra Leone : 54 : 7,779 | Somalia : 41 : 27,334 | South Africa : 1 : 4,072,636 | South Sudan : 44 : 18,819 | Sudan : 29 : 63,993 | Tanzania : 34 : 43,223 | Togo : 36 : 39,527 | Tunisia : 3 : 1,153,361 | Uganda : 17 : 171,888 | Zambia : 8 : 349,304 | Zimbabwe : 14 : 266,048 |

Alphabetic order is essential for expeditiously finding any particular country of interest to the viewer. The rank numbers enable the viewer to **find** the country on the map. The colour-coding is a visual link to each country's response range, and the ranges are defined in the legend in TITLE2 and TITLE3.

The five range rank-order footnotes below the first map of Africa provide usable insight into each range's content. And there, too, rank numbers enable the viewer to **find** the country on the map.

The Rank "buttons" displayed on the map are not only the needed mouse-click point to light up the data tips for the country, but also a static visual (not a mouse-click) link to that same Rank with its Country Name and Response Value in the footnote(s). Either version of the footnotes serves as LINEAR tables for ALL of the data. The map "shows you where it's at" and the footnote "tells you what it is". Of course, the data tips are the immediate lookup tool, on the spot, but they disappear. Better than the bar chart described below would be a link (yet to be developed) from each map to an excel spreadsheet of everything in the map's countries' data tips.

Country = South Africa
Continent = Africa
Population = 59,893,884
Total Cases = 4,072,636
Total Deaths = 102,595
Case Rate (Cases As Percent of Population) = 6.7998
Mortality Rate (Deaths As Percent of Cases) = 2.5191
Percent of Population in Continent = 4.199659114%
Percent of Cases in Continent = 31.0154315
Percent of Deaths in Continent = 39.602183%
Rank of Population in Continent = 6 of 58
Rank of Total Cases in Continent = 1 of 57
Rank of Total Deaths in Continent = 1 of 56
Rank of Case Rate in Continent = 10 of 57
Rank of Mortality Rate in Continent = 11 of 56
Percent of Population in World = 0.751529505%
Percent of Cases in World = 0.52652721
Percent of Deaths in World = 1.4668700%
Rank of Population in World = 24 of 236
Rank of Cases in World = 37 of 232
Rank of Deaths in World = 19 of 226
Rank of Case Rate in World = 150 of 232
Rank of Mortality Rate in World = 22 of 226

Each map is linked with a companion bar chart (see right). It provides a list of all countries in the map, ranked by the response variable, and includes each of the other four possible response variables, and percentages of map grand total for population, cases and deaths. The large number of decimal places in the percentage columns prevents the country with the smallest percentage from being listed with a string of all zeroes.

57 Countries in Africa Ranked By Total Cases (Grand Total = 13,130,999)
[Go Back To The Map](#)

Rank	% of Continent Population	% of Continent Cases	% of Continent Deaths	Population	Total Deaths	Case Rate	Mortality Rate	Total Cases
South Africa	1 4.199659114%	31.01543150%	39.602183%	59,893,884	102,595	6.7998	2.5191	4,072,636
Morocco	2 2.626490717%	9.734742954%	6.2918815%	37,457,976	16,300	3.4125	1.2752	1,278,269
Tunisia	3 0.866390217%	8.783497737%	11.357425%	12,356,116	29,423	9.3343	2.5511	1,153,361
Egypt	4 7.752440181%	3.929807625%	9.5845042%	110,990,096	24,830	0.4649	4.8118	516,023
Libya	5 0.477670184%	3.963140954%	2.4847142%	6,812,344	6,437	7.4463	1.2690	507,269
Ethiopia	6 8.851194488%	3.816289987%	2.9236019%	123,379,928	7,574	0.4062	1.5114	501,117
Reunion	7 0.068299601%	3.766621260%	0.3555106%	974,062	921	50.7765	0.1862	494,595
Zambia	8 1.403605588%	2.66017945%	1.5706544%	20,017,670	4,069	1.7450	1.1649	349,304
Kenya	9 3.788316944%	2.620470842%	2.1959825%	54,027,484	5,689	0.6369	1.6533	344,094
Botswana	10 0.184432243%	2.516312734%	1.0808140%	2,630,300	2,900	12.5620	0.8474	330,417

On the map for any specific response variable, there are links to each of the other four response variables' maps. So, for any particular geographic area (World, a Continent or a Region), there are ten maps (five variables with two different footnote systems to exploration-enable them) and associated bar charts for each of the ten. The web page for any map has a link to the index of all of the population maps in the atlas. From any web page, the viewer can get to any map for any geographic area.

Any country with missing data for the response variable is listed in a preliminary footnote, and its map is painted white.

The code is too complicated to publish here. An email to me will get you both the code and source data. The code will enable you to create every map in the COVID-19 atlas: World, Europe, Africa, Asia, Oceania, South America, North America, Central America, Caribbean Islands, and my five regions of Asia, Middle East, Central Asia, Indian Sub-Continent, South-East Asia, and combined North Asia and East Asia (Russia, China, Mongolia, Japan, South Korea, and North Korea). In addition, or instead, I can email you a zip file of The Atlas.

Still under investigation and partially reported at aforementioned conferences are scatter plots, and attempts at fits, to explore and investigate the relationship, if any, between the five response variables and fifteen variables provided in the COVID-19 data source: Population, Life Expectancy, People Per Sq. Km., Diabetes Incidence, Smoking Incidence, Median Age, Measures of Age Distribution, Cardiac Deaths Per 1000, GDP Per Capita, Extent of Poverty, Human Development Index, and Measures of Health Care.

For a simpler example of using PROC SGMAP, see Chapter 15 in "Visual Data Insights Using SAS ODS Graphics: A Guide to Communication-Effective Data Visualization", published by Apress at link.springer.com/book/10.1007/978-1-4842-8609-8 and reviewed on Amazon at www.amazon.com/Visual-Insights-Using-Graphics-Communication-Effective/dp/1484286081.

I thank Marcia Surratt at SAS Technical Support for her assistance during this mapping project.

LeRoy Bessler, Bessler Consulting and Research

Did You Know?

If you have a useful hint or tip, please send it to the Editor, and share it with the VIEWS membership.

Have I found an AI assistant that understands the SAS language?

[SAS 9 and Altair SLC] I gave the following prompt to <https://huggingface.co/chat>, which is an open-source and free chatbot I had not used before:

Write a SAS program using PROC SGPLOT to draw a heart shape

and it suggested the following SAS language program (using the default model <https://huggingface.co/chat/settings/Qwen/Qwen2.5-72B-Instruct>):

```
/* Generate data for the heart shape */
data heart;
  do t = 0 to 2 * constant('pi') by 0.01;
    x = 16 * sin(t)**3;
    y = 13 * cos(t) - 5 * cos(2*t)
      - 2 * cos(3*t) - cos(4*t);
    output;
  end;
run;

/* Plot the heart shape using PROC SGPLOT */
proc sgplot data=heart;
  series x=x y=y /
    lineattrs=(color=red thickness=2);
  xaxis display=none;
  yaxis display=none;
  title "Heart Shape";
run;
```

and the following explanation:

Explanation:

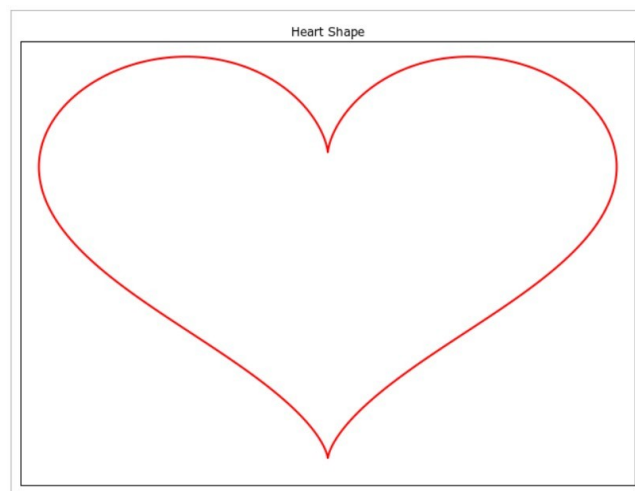
Data Generation:

- The **data heart;** step generates the x and y coordinates for the heart shape using parametric equations.
- The variable **t** is the parameter that ranges from 0 to (2 pi) in small increments (0.01 in this case).
- The x and y coordinates are calculated using the parametric equations for a heart shape: $[x = 16 \sin(t)^3]$ $[y = 13 \cos(t) - 5 \cos(2t) - 2 \cos(3t) - \cos(4t)]$.

Plotting:

- The **proc sgplot** step is used to create the plot.
- The **series** statement plots the x and y coordinates as a line.
- **lineattrs=(color=red thickness=2)** sets the colour of the line to red and the thickness to 2.
- **xaxis display=none** and **yaxis display=none** hide the x and y axes for a cleaner look.
- **title "Heart Shape";** adds a title to the plot.

This program, without any amendments, created the following HTML output:



For me this is an AI first!! Although I did not request any specific colour for the heart, so I wonder why red was chosen?

However, it does look a lot like my own programming style, so maybe an article or two of mine has been included in its training data? Therefore, I think I may have to find a new SAS programming test for AI assistants! I wanted to find something simple to program, but not in the public domain for the AI assistants to just copy. However, do we actually want AI assistants to be able to write SAS programs, or should we continue to hide our best programs on restricted sites?

Philip R Holland (Newsletter Editor)

Formats, Options, and Functions

This section is devoted to the description of useful, or unusual, SAS Formats, Options, and Functions. Please read the SAS documentation to find out more about them.

[SAS and Altair SLC] The **PROC FORMAT** syntax for the lowest possible numeric or character value in **INVALUE**, **PICTURE** and **VALUE** clauses (excluding missing numeric values, but including missing character values) is **LOW**. The highest possible numeric or character value is **HIGH**.

[Altair SLC] The locations of R and Python installations on the platform, which are used by **PROC R** and **PROC PYTHON**, are specified by the **RHOME=** and **PYTHONHOME=** System options, respectively.

[SAS and Altair SLC] Blanks and other characters can be removed from character variables using the **COMPRESS()** function, the **COMPBL()** function, which will reduce multiple blanks to single blanks, and the **KCOMPRESS()** function, which should be used when processing character variables containing double-byte characters.

In Brief

- Back issues of *VIEWS News* are available from the VIEWS UK forum at blog.hollandnumerics.org.uk. Please register for free membership on the blog, and then request free access to the VIEWS UK forum.
- The SAS Professional Forum group on LinkedIn, which currently has over 41,100 members. Everyone is welcome to request to join, but discussions here are restricted to SAS-related topics: www.linkedin.com/groups?gid=70702.
- The SAS Opportunities group on LinkedIn, which currently has over 22,600 members. Everyone is welcome to request to join, but discussions here are also restricted to SAS-related topics: www.linkedin.com/groups?gid=805217.
- Altair SLC Personal Edition provides named users with free access to Altair SLC and Analytics Workbench software (formerly WPS) including a SAS language compiler with coding and workflow tools on unlimited data volumes, with interfaces to a wide range of databases, as well as integrated R and Python programming environments. When the Personal Edition software is downloaded, it includes a licence for up to 12 months. At the end of this term, users should download a new copy of the software to renew their licence and/or to upgrade to the latest available full version. Download the software from altairone.com/Marketplace. No technical support service is offered with the Personal Edition, but assistance can be requested using the Community forums at community.altair.com. The next General Access version of Altair SLC due out in April 2025 will be 5.25.1 (2025).
- Altair Engineering Inc. is now part of Siemens AG according to a press release dated 26 March 2025: Customers and partners of Altair Engineering can expect the same exceptional service and support that you have come to rely on from Altair. Siemens teams are working seamlessly to ensure a smooth transition, and will continue to work with the familiar faces and experts you know and trust. At the same time, you will gain access to an even broader set of tools, resources, and expertise to elevate your business to new heights.
- Do you use Microsoft Visual Studio Code Editor?
 - You may be interested in a SAS-related extension called **SASjs - DevOps for SAS**. You can develop SAS applications and run code on local SAS installations, SAS Viya, SAS 9 EBI, SASjs Server or local Altair SLC! Just set up the target, and click the running man to execute your SAS code. The SASjs Server could be your local SAS installation. SASjs is an open source project, and can be obtained from the Visual Studio Code Marketplace, where the current version is v2.6.0.
 - The SAS Institute has also been developing its own extension called **SAS**. You can develop SAS applications and run code on local SAS installations, SAS Viya, or SAS OnDemand for Academics! Just set up the target, and click the running man to execute your SAS code. The extension can be obtained from the Visual Studio Code Marketplace, where the current version is v1.13.1.

- Another Microsoft Visual Studio Code Editor extension has just been released called **Altair SLC**. This extension currently only allows you to connect to local Altair SLC installations, even if, until now, you have only been able to use Altair Analytics Workbench to access Altair SLC. The current version in the Visual Studio Code Marketplace is v0.7.1 (pre-release).

Diary

Are you organising an event that would be of interest to the VIEWS readership? Let us know as we are interested in all non-profit making events related to SAS.

May 2025

6-9 **SAS Innovate**, Orlando, FL, USA

Whether you're a business leader, technical user or SAS Partner, SAS Innovate is a no-risk, all-reward opportunity to learn how to succeed with data and AI. Full details can be found at www.sas.com/en_us/events.

20-22 **Michigan SAS Users Group 1-Day Conference**, Livonia, MI, USA

Join MSUG for a full day of SAS-related presentations by local and nationally recognized experts on Wednesday 21 May, plus affordable half-day training options on 20 and 22 May, all at Schoolcraft College in Livonia, MI. More details at www.misug.org.

June 2025

1-4 **PharmaSUG US**, San Diego, CA, USA

Join us for the premier event of the year for statistical programmers, statisticians, data managers, researchers, and others who analyze data in the life sciences - PharmaSUG 2025! Full details at www.pharmasug.org.

November 2025

16-19 **PhUSE EU Connect**, Hamburg, Germany

The PhUSE Community allows you to enhance your learning and gain insights from our experts on today's most critical industry topics through a variety of engaging presentations, workshops, and networking opportunities. Individuals from all areas of the industry will be gathered in one place, providing an opportunity not only for you to advance your career but also to heighten the pharmaceutical industry's influence and findings. Full details at www.phuse.eu.

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