

VIEWS

International SAS Programmer Community



News, Hints, Tips and Information for SAS® Users

Issue 44, 4th Quarter 2008

David Johnson was an excellent speaker (on almost any topic!), a well-respected SAS author, and a regular contributor to SAS-L. His advice and comments on SAS will be greatly missed.

Philip R Holland (Newsletter Editor)

*More memories of David Johnson can be found at
tinyurl.com/62ns9n*

Those of us who have been in the SAS world for a few years generally don't appreciate that we might be getting older. It was, therefore, difficult for me to write an obituary for well-known and well respected SAS consultant, David Johnson, who died at an age close to mine.

The autumn SAS conference season has now ended, so those of us wanting to present at events in 2009 can concentrate on actually writing their papers. I've included reports from the 2008 PhUSE and SAS UK events in this issue. As well as the conference reports I have more articles from familiar sources again in this issue of *VIEWS News*: including some advice on the use of horizontal bar charts from LeRoy Bessler, creating drill-down bubble plots from Phil Mason, and yet more tips on using regular expressions from the Amadeus Software Consultancy Team. Along with our regular sections, including some new SAS Formats, Options, and Functions in SAS 9.2, I hope you will find at least some of them relevant to your use of SAS software.

If you would like to contribute an article, or discuss the possibility of doing so, please send an email to me at newsletter@views-uk.org. A list of possible subjects for your articles can be found on the *VIEWS* web site, and anyone is very welcome to add to that list by sending emails with your own questions to newsletter@views-uk.org.

Philip R Holland (Newsletter Editor)

*Membership of VIEWS is **free** and you can register for notification of all future VIEWS events by emailing us at membership@views-uk.org, making certain you include your name and postal address. If you would like to receive email notification whenever a new issue of the free quarterly VIEWS News is published on the web site, please remember to also include your email address.*

In Memoriam

David Johnson 1956-2008

David Johnson was an outstanding volunteer and leader in the SAS user conference community. Always gracious and conscientious, David was also innovative as SUGI conference section chair. He was a pleasure and honour to serve as a presenter. David will be missed.

LeRoy Bessler, Assurant Health

Did You Know?

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

Show Them What Is Important: Using a Horizontal Bar Chart Also As a Table

[SAS 8] Simple techniques to show readers what is important are ranking and subsetting. Visuals accelerate inference or decision; tabular detail assures reliable inference or decision.

A communications sage said "Let part stand for the whole." What can fit on one sheet of paper or web page is usually sufficient. My own experience has been that, except when you need to provide a comprehensive lookup table, presenting the top N observations from a data set is enough, e.g. Rank the Top 10 Countries in the European Union By Population.

Top 10 EU Countries Ranked by Population Account for 82.4% of the Total

Germany	82,369,552
France	64,057,792
United Kingdom	60,943,912
Italy	58,145,320
Spain	40,491,052
Poland	38,500,696
Romania	22,246,862
Netherlands	16,645,313
Greece	10,722,816
Portugal	10,676,910

Subtotal for these countries = 404,800,225

Though presenting partial information, the above graph's subtitle reassures the viewer that nevertheless a significant portion of the data has been accounted for. All of the numbers in the titles and footnotes of these graphs are automatically filled in.

Rather than limit the listing to the Top N observations, one can instead limit the ranked listing to only enough observations to present P% of the total of the measure of interest, e.g. Rank the Top Countries That Account for At Least 80% of the European Union's Population.

Top 9 of 27 EU Countries by Population
Are Enough To Account for
At Least 80% of the Total (491,018,683)

Germany		82,369,552
France		64,057,792
United Kingdom		60,943,912
Italy		58,145,320
Spain		40,491,052
Poland		38,500,696
Romania		22,246,862
Netherlands		16,645,313
Greece		10,722,816

Subtotal for these countries = 394,123,315

Here is common code used to prepare input and create some of the symbolic variables:

```
PROC MEANS DATA = work.Input NOPRINT SUM N;
  VAR Measure;
  OUTPUT OUT = work.Summary SUM = Total
         N = Count;
RUN;

DATA _NULL_;
  SET work.Summary;
  CALL SYMPUT('Total', Total);
  CALL SYMPUT('TotalForDisplay',
    TRIM(LEFT(PUT(Total, COMMA13.))));
  CALL SYMPUT('CountForDisplay',
    TRIM(LEFT(PUT(Count, 3.))));
RUN;

PROC SORT DATA = work.Input;
  BY DESCENDING Measure;
RUN;
```

Here is common code used for all of the graphs:

```
%LET FontSize = 32PT;
%LET Font = Verdana;

GOPTIONS RESET = ALL;
GOPTIONS DEVICE = GIF;
GOPTIONS BORDER; /* Put the graph in a box. */
GOPTIONS CBACK = CXFFFF00;
/* Use RGB Yellow for background. */
GOPTIONS HTEXT = &FontSize. FTEXT = "&Font.";
/* Height & font for those parts of the graph
which you do not explicitly assign,
or for which no controls are available */
GOPTIONS GSFMODE = REPLACE GSFNAME = anyname;

FOOTNOTE1 ANGLE = +90 FONT = NONE
  HEIGHT = 1 ' ';
/* blank "right-side-note"
for space at the side of the image. */
FOOTNOTE2 ANGLE = -90 FONT = NONE
  HEIGHT = 1 ' ';
/* blank "left-side-note"
for space at the side of the image. */

PATTERN1 V = SOLID COLOR = CX006600;
/* Use an RGB Medium Dark Green for bars. */

/* Remove all axis paraphernalia: */
AXIS1 LABEL = NONE MAJOR = NONE MINOR = NONE
  STYLE = 0;
```

```
AXIS2 LABEL = NONE MAJOR = NONE MINOR = NONE
  STYLE = 0 VALUE = NONE
  OFFSET = (1PCT, 1PCT);
/* Offset horizontal axis to insert space
between bar midpoint label and bar start,
and between bar end and bar value. */
```

Here is code for the TopN graph:

```
%let MaxN = 10;

DATA work.TopN;
  RETAIN TotToRpt 0;
  SET work.Input;
  OUTPUT;
  TotToRpt = TotToRpt + Measure;
  IF _N_ = &MaxN.;
  PctOfTotal = (TotToRpt / &Total.) * 100;
  CALL SYMPUT('N_TotToRptForDisplay',
    TRIM(LEFT(PUT(TotToRpt, COMMA13.))));
  CALL SYMPUT('MaxNpctOfTotal',
    TRIM(LEFT(PUT(PctOfTotal, 5.1))));
  STOP;
RUN;

TITLE1 FONT = "&Font."
  COLOR = CX000000 /* RGB black */
  HEIGHT = 3PCT ' ' /* Insert space at top. */
  HEIGHT = &FontSize.
  JUSTIFY = CENTER /* Force a new line. */
  "Top &MaxN. EU Countries Ranked
by Population"
  JUSTIFY = CENTER /* Force a new line. */
  "Account for &MaxNpctOfTotal.% of the Total";
FOOTNOTE3 FONT = "&Font."
  COLOR = CX000000 /* RGB black */
  HEIGHT = &FontSize. JUSTIFY = RIGHT
  "Subtotal for these
countries = &N_TotToRptForDisplay. ";

FILENAME anyname "C:\TopN.GIF";

PROC GCHART DATA = work.TopN;
  HBAR BarVar / SUMVAR = Measure DISCRETE SUM
    SUMLABEL = NONE DESCENDING
    MAXIS = axis1 RAXIS = axis2;
  FORMAT Measure COMMA13.;
RUN;
QUIT;
```

Here is code for the TopPct graph:

```
%LET MaxPct = 80;

DATA work.TopPct;
  RETAIN TotToRpt 0 TotForPct 0;
  SET work.Input;
  IF _N_ EQ 1 THEN DO;
    TotForPct = (&Total. * &MaxPct.) / 100;
  END;
  OUTPUT;
  TotToRpt = TotToRpt + Measure;
  IF TotToRpt GE TotForPct THEN DO;
    CALL SYMPUT('Pct_TotToRptForDisplay',
      TRIM(LEFT(PUT(TotToRpt, COMMA13.))));
    CALL SYMPUT('Pct_CountToRptForDisplay',
      TRIM(LEFT(PUT(_N_, 3.))));
    STOP;
  END;
END;
RUN;
```

```

TITLE1 FONT = "&Font."
COLOR = CX000000 /* RGB black */
HEIGHT = 3PCT ' ' /* Insert space at top. */
HEIGHT = &FontSize.
JUSTIFY = CENTER /* Force a new line. */
"Top &Pct_CountToRptForDisplay. of
&CountForDisplay. EU Countries
by Population"
JUSTIFY = CENTER /* Force a new line. */
"Are Enough To Account for"
JUSTIFY = CENTER /* Force a new line. */
"At Least &MaxPct.%
of the Total (&TotalForDisplay.)";
FOOTNOTE3 FONT = "&Font."
COLOR = CX000000 /* RGB black */
HEIGHT = &FontSize.
JUSTIFY = RIGHT
"Subtotal for these
countries = &Pct_TotToRptForDisplay. ";
FILENAME anyname "C:\TopPct.GIF";

PROC GCHART DATA = work.TopPct;
HBAR BarVar / SUMVAR=Measure DISCRETE SUM
SUMLABEL=NONE DESCENDING
MAXIS=axis1 RAXIS=axis2;
FORMAT Measure COMMA13.;
RUN;
QUIT;

```

LeRoy Bessler, Assurant Health

PRX 5: Matches and replays

[SAS 9] The PRXNEXT function can be called repeatedly to find successive matches for a regular expression within a source string. In this example we look for all occurrences of “cat” or “mog”.

```

DATA test1;
LENGTH instr $60;
INPUT instr $ 1-60;
rx = PRXPARSE("/cat|mog/");
start = 1;
stop = LENGTH(TRIM(instr));
DO UNTIL (p = 0);
CALL PRXNEXT(rx, start, stop, TRIM(instr),
p, 1);
IF p > 0 THEN DO;
sub = SUBSTR(instr, p, 1);
PUT "Matching "" sub +(-1)
"" found at position " p;
END;
ELSE PUT "No more matches found";
END;
DATALINES;
Transmogrification of cattle demographics
;

```

We initialise our START and STOP variables with the positions of the beginning and end of the string, and call PRXNEXT repeatedly until no more matches are found. The results are:

```

Matching "mog" found at position 6
Matching "cat" found at position 13
Matching "cat" found at position 23
Matching "mog" found at position 32
No more matches found

```

Now here is a program that does something slightly different. We look for the first occurrence of either “cat” or “mog”, and then for the first recurrence of that, whichever it was.

```

DATA test2;
LENGTH instr $60 p1 p2 $20;
INPUT instr $ 1-60;
rx = PRXPARSE("/(cat|mog).*(\1)/");
CALL PRXSUBSTR(rx, instr, p, 1);
IF p > 0 THEN DO;
sub = SUBSTR(instr, p, 1);
p1 = PRXPOSN(rx, 1, instr);
p2 = PRXPOSN(rx, 2, instr);
PUT "Matching substring is: " sub;
PUT p1 = p2 =;
END;
DATALINES;
Transmogrification of cattle demographics
Location of smog-scattering equipment
;

```

The new syntax here is “\1” which means “the text that matched sub-expression 1”. Here we display the entire matching sub-string, and also the matches for the two sub-expressions. The output from our program is:

```

Matching substring is: mogrification of cattle
demog
p1=mog p2=mog
Matching substring is: cation of smog-scat
p1=cat p2=cat

```

This syntax greatly extends the range of patterns we can look for e.g. the regular expression “/([A-Za-z])\1/” matches the first doubled letter in a string, though note that in “Llanelli” it would match the 2nd pair of “l”s, since the first pair differ in case.

Amadeus Software Consultancy Team

PRX 6: Altering strings

[SAS 9] The PRXCHANGE call routine enables us to modify text strings, at times in quite clever ways. It uses a different form of regular expression from those we have seen before. Whereas PRXMATCH and the others use expressions of the form:

```
"/pattern/"
```

PRXCHANGE regular expressions are of the form:

```
"s/old/new/"
```

Actually, in both cases, a character other than “/” can be used as delimiter if you prefer.

Here is a simple example, in which we change **cats** and **mogs** to **felines**:

```

DATA test1;
LENGTH instr outstr $60;
INPUT instr $ 1-60;
rx = PRXPARSE("s/cat|mog/feline/");
CALL PRXCHANGE(rx, 1, instr, outstr);
PUT "Changed "" instr +(-1) "" to ""
outstr +(-1) """";
DATALINES;
magnificat
seismograph
;

```

The second parameter, which here we have set to 1, is the number of times the change is to be applied. A value of -1 means “as many times as possible”. The output from our program is:

```
Changed "magnificat" to "magnififeline"
Changed "seismograph" to "seisfelinograph"
```

What makes matters more interesting is the ability to substitute into a target string the values that matched sub-expressions. Here, for example, is a program that switches between British and American date formats:

```
DATA test2;
  LENGTH instr outstr $60;
  INPUT instr $ 1-60;
  rx = PRXPARSE("s!(\d{2})[/-](\d{2})" ||
               "[/-(\d{2}|\d{4})!$2/$1/$3!");
  CALL PRXCHANGE(rx, 1, instr, outstr);
  PUT "Changed "" instr +(-1) "" to ""
      outstr +(-1) """";

  DATALINES;
25/12/08
04-07-2009
;
```

The output is:

```
Changed "25/12/08" to "12/25/08"
Changed "04-07-2009" to "07/04/2009"
```

Notice first that we have chosen to use “!” as delimiter, since we want to use “/” elsewhere in our expression. Our first two sub-expressions, the parts in parentheses, are two-digit numbers; the third is the year, which can be either two or four digits. These sub-expressions are separated by either slashes or hyphens. In the part of our regular expression that builds the new string, we can substitute in the matching sub-strings as \$1, \$2 and \$3 respectively.-

Recall that in a PRXMATCH regular expression, the syntax for referring to “the text that matched sub-expression 1” was “\1”. When building a new string in a PRXCHANGE regular expression, the syntax for the same thing is “\$1”. So, if we wanted to ensure that the separator within the date string, either “/” or “-”, was the same in both places, and reproduce it in the output, we could use the slightly fiercer-looking expression:

```
"s!(\d{2})[/-](\d{2})\2(\d{2}|\d{4})" ||
"!$3$2$1$2$4!"
```

Here, both “\2” and “\$2” appear, in the appropriate parts of the expression.

Amadeus Software Consultancy Team

Ask The Consultant

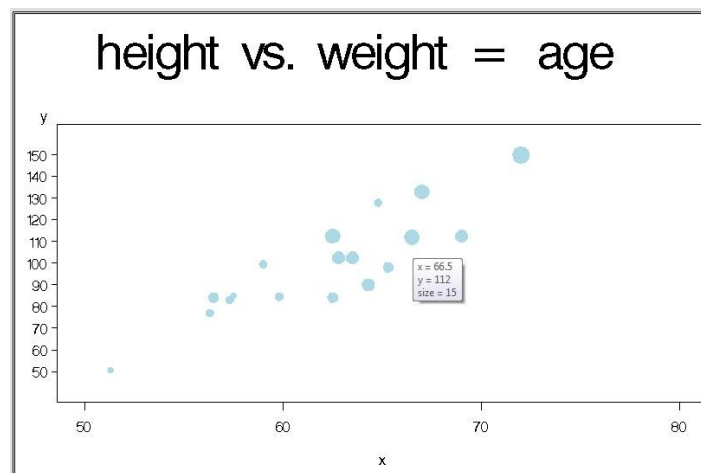
This part of VIEWS News is where you can get your technical questions answered. Send your questions to the Editor.

QuickTip - Bubble Plot that has drill down

Q: Is it possible to produce bubble plots with consistent sizes and with drill-down?

A: [SAS 9] This macro will make bubble plots with consistent sizes across BY groups and to allow drill down (it was based on a

SAS sample). The graph below was produced by the macro, followed by the macro code and another sample of its use:



```
%MACRO bubblePlot(data, x, y, size,
  href=about:blank,
  font=SWISSB,
  color=lightblue,
  labels=0, by=, textSize=4,
  minSize=, maxSize=);
  /* data - dataset to use for plot;
  /* x - x-axis variable;
  /* y - y-axis variable;
  /* size - variable to use for size of bubbles;
  /* href - drill down link;
  /* font - font for labels on bubbles ;
  /* color - colour of bubbles ;
  /* labels - 1=on each bubble, 0=none;
  /* by - by variable for plot;
  /* textSize - size of labels;
  /* minSize - if specified then sets minimum
    size of bubbles;
  /* maxSize - if specified then sets maximum
    size of bubbles;
  %IF &minSize. > AND &maxSize. > %THEN %DO;
  PROC SQL NOPRINT;
    SELECT MIN(&size.), MAX(&size.),
           RANGE(&size.)
    INTO   :realMin, :realMax, :realRange
    FROM   &data.;
  QUIT;
  %PUT _LOCAL_;
  %END;
  * Create Annotate data set, Anno:
  HSYS='1' specifies annotate to use a
  SIZE unit of percent of plot area;
  DATA _anno;
    LENGTH function text $8 style $32 html $128;
    RETAIN xsys ysys '2' hsys '1' when 'A'
           color "&color.";
    SET &data. (RENAME = (&x. = x &y. = y));
  %IF &by. > %THEN
    BY &by.;
  ;
  function = 'PIE';
  style = 'PSOLID';
```

```

%IF &minSize. > & &maxSize. > %THEN %DO;
  pct = (&size. - &realMin.) / &realRange.;
  range = &maxSize. - &minSize.;
  size = &minSize. + pct * range;
%END;
%ELSE %DO;
  size = &size.;
%END;
angle = 0;
rotate = 360;
text = '';
html = "title=""" || STRIP(VLABEL(x)) ||
" = " || STRIP(PUTN(x, VFORMAT(x))) ||
'0D'x || STRIP(VLABEL(y)) || " = " ||
STRIP(PUTN(y, VFORMAT(y))) || '0D'x ||
STRIP(VLABEL(size)) || " = " ||
STRIP(PUTN(&size., VFORMAT(&size.))) ||
"" href="""&href.""";
OUTPUT;
%IF &labels. %THEN %DO;
  function = 'LABEL';
  position = '1';
  line = 0;
  style = "&font.";
  text = STRIP(&size.);
  size = &textSize.;
OUTPUT;
%END;
RUN;
SYMBOL I = NONE V = NONE C = WHITE R = 10;
AXIS1 MINOR = NONE OFFSET = (2, 2);
AXIS2 MINOR = NONE OFFSET = (3, 3);
* Produce the plot;
PROC GGPLOT DATA = _anno;
%IF &by. > %THEN
  BY &by.;
;
* use GGPLOT to get axes and graph area setup
so we can annotate on the bubbles and labels
- including links on bubbles;
PLOT y * x / VAXIS = axis1 HAXIS = axis2
      ANNO = _anno;
RUN;
QUIT;
%MEND bubblePlot;

* Setup the graphics environment;
GOPTIONS RESET = ALL DEVICE = SASMF
            /* sasemf/activex/java */
            FTEXT = SWISS FTITLE = SWISS
            HTEXT = 3PCT HTITLE = 10PCT BORDER;

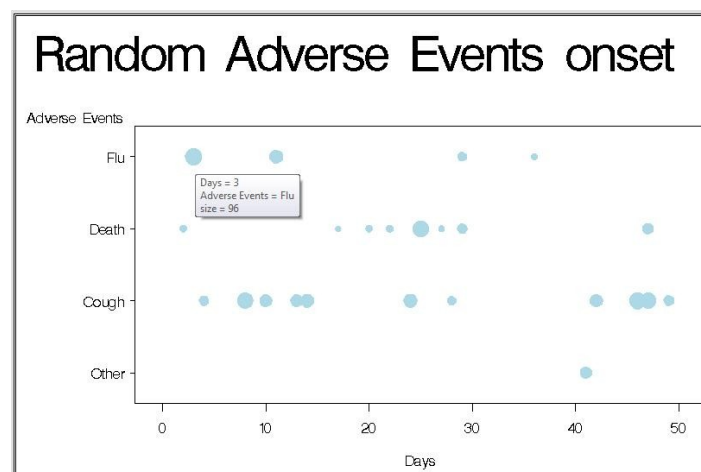
ODS _ALL_ CLOSE;
ODS HTML;

TITLE 'height vs. weight = age';

%bubblePlot(sashelp.class, height, weight, age,
            minsize = 1, maxsize = 3);

```

Here is another graph and sample program which uses the macro:



```

PROC FORMAT;
  VALUE ae
    1='Cough' 2='Death' 3='Flu' other='Other';
RUN;

DATA aeonset (KEEP = ae days count);
  LABEL ae = 'Adverse Events' days = 'Days'
        count = 'Count';
  FORMAT ae ae.;
  DO I = 1 TO 25;
    ae = ROUND(RANUNI(1) * 3);
    days = ROUND(RANUNI(1) * 50);
    count = ROUND(RANUNI(1) * 100);
    OUTPUT;
  END;
RUN;

TITLE 'Random Adverse Events onset';

%bubblePlot(aeonset, days, ae, count,
            minsize = 1, maxsize = 3);

ODS _ALL_ CLOSE;

```

Phil Mason, Wood Street Consultants Ltd

Taken from Phil Mason's SAS Tips.

Formats, Options, and Functions

This section is devoted to the description of useful, or unusual, SAS Formats, Options, and Functions.

[SAS 9.2] The **BESTDw.p** format displays numeric values, lining up decimal places for values of similar magnitude, and displays integers without decimal places. The “p” in the syntax optionally specifies the precision, defaulting to 3 if omitted.

[SAS 9.2] It is now possible to set a default record length for external files written or read by SAS using the system option **LRECL=**. The default value is 256.

[SAS 9.2] The **CALL SORTC()** and **CALL SORTN()** routines can be used to sort character and numeric variables, respectively.

PhUSE News

2008 PhUSE Conference

The 2008 PhUSE conference was held in Manchester from 12-15 October. With more than 300 participants from 16 countries and 100 companies, PhUSE is now the biggest event for statistical programmers in Europe. There were more than 100 papers and posters presented including the usual technical ones but more than 15 papers around this year's theme "Working in a Global Environment". All papers are now available on the PhUSE website, www.phuse.eu, and on Lex Jansen's website, www.lexjansen.com.

Next year's conference will be held in Basel, Switzerland on 19-21 October and will be chaired by Benjamin Szilagyi (Roche). We are currently planning the event, including pre-conference training courses on Sunday 18 October. More information will be available early in 2009.

Thanks for having contributed to the success of PhUSE. See you next year in Basel.

Olivier Leconte, 2008 PhUSE Conference Chair

News

SAS Forum UK 2008: Business Analytics - The Bridge to Innovation

On 21-22 October 2008 over 400 SAS users from over 120 organisations gathered in Telford for this year's SAS Forum. The two day event featured key note presentations from futurologist Dr Ian Pearson, Anne Milley from SAS, Zoe and Sky from Wildtrack, CTO Steve Brobst from Teradata and Jon Tickle of Big Brother and Brainiac fame. Delegates also had the chance to choose from technology and industry themed break-out sessions as well as look around the exhibition.

Of course, SAS Forum is also renowned for its evening party, and this year's theme was "The Wild West". Feedback from attendees has been good, but we're always looking for ways to improve, so if you have any ideas or feedback please email Phil Male at philip.male@suk.sas.com.

Phil Male, SAS UK

In Brief

- Back issues of *IEWS News* are available from the *IEWS* web site, and also from the *IEWS News* page at:
www.sasCommunity.org/wiki/IEWS_News
- Phil Mason now has a SAS tips newsletter, which can be requested by going to www.woodstreet.org.uk and then clicking on Tips. Previous tips can also be found on the web site.
- More SAS hints and tips can be found on the SAS FAQ pages www.hollandnumerics.com/sasfaq and also on the Amadeus Software Tips pages at www.amadeus.co.uk/TipsList.aspx?ST=1.
- Looking for a SAS-related job? Try the following web pages: www.hollandnumerics.com/careers and www.amadeus.co.uk/Careers.aspx.
- You are invited to join the SAS Professionals social networking group, described as the "365 Day SIG" for SAS Users in the UK, at:
sasprofessionals.ning.com
- Phil Holland has also started a group page on Squidoo for other pages related to SAS, and would like to make it a central resource for SAS hints, tips, links and books, at:
www.squidoo.com/groups/SAS_users

Stop Press!

New SAS-related book by Philip R Holland

Phil Holland has just published his 2nd SAS-related book, called "Power User's Guide to SAS Programming". This book brings together a wealth of ideas about strategic and tactical solutions to everyday situations experienced when transferring, extracting, processing and reporting data. Most of the solutions can be achieved using the SAS components you already license, so you won't need to throw money at the problems.

The book is available now as a print-on-demand book, or as a download, from stores.lulu.com/hollandnumerics. However, it is hoped it will also be available through Amazon in the New Year.

Philip R Holland

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.

December 2008

11 SAS9 Business Intelligence-Delivered, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

February 2009

10 SAS Programming Tips and Tricks, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

25 New and Enhanced Features of SAS 9.2, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

March 2009

12 From Data to Knowledge: A Journey into SAS9, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

22-25 SAS Global Forum, National Harbor, MD, USA

The SAS Global Forum (SGF, formerly called SUGI) is held each year and focuses on the technical aspects of SAS software. See www.sasglobalforum.org for more details.

26-27 Best Practices in SAS Statistical Programming in Regulatory Submission, New Brunswick, NJ, USA

These courses are intended for anyone directly or indirectly responsible for the creation, content or validation of summary tables, data lists and graphs used to support research, drug or medical device efficacy and safety in a regulatory submission. See tinyurl.com/5ayrmq for more details of the courses from Sunil Gupta.

June 2009

1 SAS Programming Tips and Tricks, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

25 New and Enhanced Features of SAS 9.2, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

July 2009

22 From Data to Knowledge: A Journey into SAS9, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

September 2009

24 SAS Programming Tips and Tricks, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

October 2009

19-21 PhUSE Conference, Basel, Switzerland

The Pharmaceutical Users Software Exchange (PhUSE) conference is the premier programming event for the pharmaceutical industry in Europe. See www.phuse.eu for more details.

28 New and Enhanced Features of SAS 9.2, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

November 2009

19 From Data to Knowledge: A Journey into SAS9, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

December 2009

1 SAS Programming Tips and Tricks, Oxfordshire

See the Amadeus Software web site www.amadeus.co.uk for further details.

All VIEWS event information will be posted and/or emailed to registered members of VIEWS, and will include an event application form. Please send your queries about any VIEWS events to event@views-uk.org, and don't forget to look at the web site for the latest news.

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