A SAS Journey from Tables in the Database to Graphics in your Inbox

Raghav Adimulam, Westat, Rockville, MD

ABSTRACT

The journeys that data takes from its origins in databases to its destination in the form of reports and graphics are diverse. This poster shows one such journey of data residing on the SQL Server to the form of meaningful graphics and reports. Along the path, complex Macros are used to loop through a SAS dataset using Call Execute routine in a data step. The macro calls are automatically generated with macro parameters coming from dataset variable values. The various intricacies present in the Procedures of Format, Report and SGPlot are used to generate fixed structure reports and plots wrapped in the ODS destination sandwiches of Excel and PDF. The convenience of emailing the reports to users is accomplished by the Task Scheduler running on a SAS server. In this way, a complex set of data is converted to expressive graphics with the help of SAS software.

INTRODUCTION

SAS provides us with a powerful call routine called Call Execute when trying to avoid a lot of repetitive code and thereby resulting in elegant code. In this paper, the various plots and charts generated have their Proc SGPlot code macrotized and the macro call compiled in a data step using the Call Execute routine. This way we can avoid having to display dozens of macro calls in the code. The datasets that for the input to the SGPlot procedure are extracted from the SQL Server database using the LIBNAME engine. The tables are fed into excel through SAS using ODS. The advent of ODS EXCEL has replaced the Excel XP tagsets in lots of SAS programs requiring generation of workbooks with multiple sheets in them.
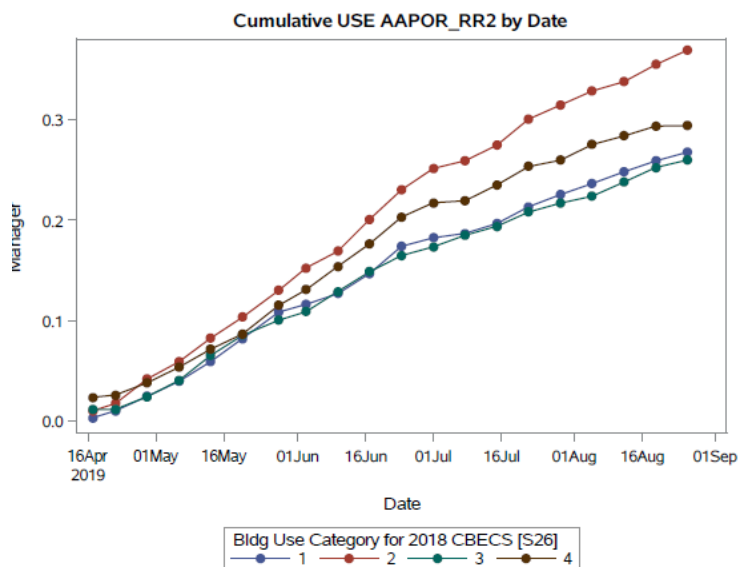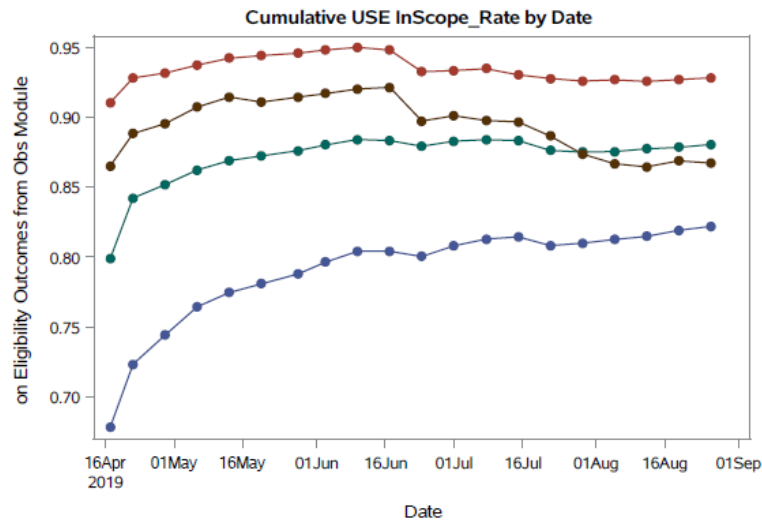
PLOTS 1 - LINE CHARTS USING SGPLOT CALL EXECUTE

This example creates Cumulative line charts for five different outcomes with the x-axis being the weekly date, usually a Monday. The versatile SGPlot procedure is employed here, with the series statement defining the chart's details such as colors, labels, font size, symbol, etc. The ODS PDF sandwiched around the data step that has the macro calls handled elegantly by a Call Execute routine. All the parameters for macro call are supplied in variables stored in a dataset called Rates.

```
%macro mplot (vRate=,var=,type=);
title "Cumulative &var. &vRate. by Date ";
proc sgplot data=output.rates_counts_&SYSDATE;
   series X = Date Y = &vRate. / group = &var. markers markerattrs=(symbol=CircleFilled  size=2pct);
   where _type_ = &type. ;
run;
%mend mplot;

ODS PDF FILE = "C:\Output\Outcome_Rates_&SYSDATE..pdf";
data _null_;
 set rates;
 call execute('%mplot(vRate='||var1||',type='||var2||',frames='||var3||')');
run;

ODS PDF CLOSE;
```

Cumulative USE InScope_Rate by Date
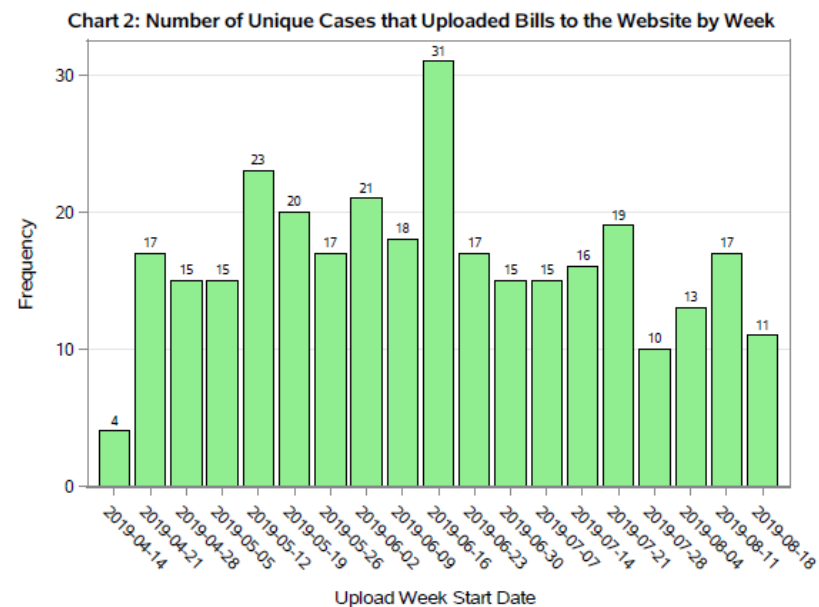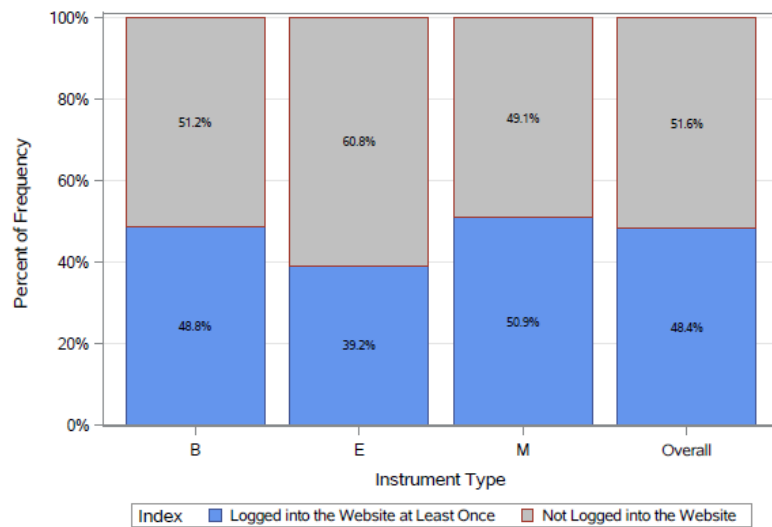

Cumulative USE AAPOR_RR2 by Date

PLOTS 2 - BAR GRAPHS USING CALL EXECUTE

The resourceful SGPlot procedure's VBAR statement allows the display of metrics in the form of stacked bar graphs. Again, just as in previous section, we macrotized the plot generation procedure because of the presence of dozens of resultant plots. As in the preceding section, the convenience of Call Execute routine inside a data step is again used for calling the *plotdisp* macro.

```
%macro plotdisp (ds=,lvl=);
%if &lvl = 1 %then %do;
proc sgplot data=&ds. pctlevel=GROUP;
 styleattrs datacolors=(CornFlowerBlue silver);
 vbar InstrumentType / group=Index groupdisplay=stack stat=percent statlabel seglabel;
%end;
%else %do;
proc sgplot data=&ds. ;
 vbar InstrumentType / stat=freq datalabel  fillattrs=(color=lightBlue);
%end;

 yaxis grid;
run;
```

```
quit;
%mend plotdisp;
```


Chart 2: Number of Unique Cases that Uploaded Bills to the Website by Week

EXCEL SPREADSHEET WITH MULTIPLE SHEETS

One of the advantages of the latest version of SAS 9.4 is the Excel ODS destination. Creation of an excel workbook with multiple sheets can be accomplished easily using the ODS EXCEL statement below with the options of sheet interval and embedded titles. Call Execute is again used to produce a macro call for each of the 25 sheets in the Excel workbook.

```
ODS Excel FILE="C:\Output\Instrument-Level-Dispositions_&SYSDATE..XLSX" STYLE=BarrettsBlue
   options(sheet_name="OVERALL TOTALS"
      sheet_interval='none'
      embedded_titles='yes');

%create_ds(overall,)

data _null_;
 set freqs;
 call execute('%create_ds('||var1||','||var2||','||var3||')');
run;
```

```
ODS Excel CLOSE;
```

EMAIL THE USERS USING SAS

SAS permits the usage of Filename statement to gather the parameters of all the email essentials as shown in the Filename code snippet below. The subsequent data step uses the file reference to send the email through SAS software. Underlying the code is a process to setup and update the SAS configuration (.cfg) file with the correct port and the name of the email exchange server. The references section has a link to an SGF paper that details the setup required for this process.

```
%LET EMAILFM  = "User@outlook.com" ;
%LET EMAILTO  = "User1@outlook.com" "User2@outlook.com" "User3@outlook.com" ;

filename mcrsend email
from   = &EMAILFM
to     = (&EMAILTO)
subject="Monitoring Outcome Rates Report for &Sysdate";

data _null_;
  file mcrsend;
  put "The Monitoring Outcome Rates Report for &Sysdate";
  put "<C:\Output\Outcome_Rates_&SYSDATE..pdf>";
run;
```

CONCLUSION

SAS offers many ways in which we can create reports and present them. The powerful Call Execute routine enables us to produce elegant code by reducing a lot of redundant code involving macro calls. Contained in the SGPlot procedure are numerous ways of producing graphs like Bar charts, line charts and boxplots. The ODS Excel destination helps us create multi-sheet workbooks. The SAS journey ends with the reports and graphics being delivered to your email inbox.

REFERENCES

SAS Institute Inc., 2017. Base SAS® 9.4 Procedures Guide, Sixth Edition.
SAS Institute Inc., 2017. SAS® 9.4 Language Reference: Concepts, Sixth Edition
Erik W. Tilanus, "Sending E-mail from the DATA step" SGF 2008.
https://support.sas.com/resources/papers/proceedings/pdfs/sgf2008/038-2008.pdf

CONTACT INFORMATION
Your comments and questions are valued and encouraged.

> Raghav Adimulam
> Westat
> 1600 Research Blvd
> Rockville, MD 20850
> RaghavAdimulam@westat.com