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Dashing out a Quick Dashboard of Graphs in SAS®

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ABSTRACT

In a world overwhelmed with data, a challenge often facing a data analyst confronted with a new data set is to produce concise initial comparisons that provide information about data distributions as well as statistical comparisons on primary factors of interest. This paper illustrates how to combine summary analysis graphs that incorporate statistical results in a matrix/dashboard format on a single, concise page. SAS users familiar with basic SAS programming techniques will be able to produce these dashboards of graphic results.

INTRODUCTION

Today's explosion of data within any organization can easily overwhelm its leader's capability to understand what it means. Whether the goal is profits or knowledge, understanding the meaning behind your data is critical to any organization's future. SAS procedures have long been used to summarize data using sophisticated graphical and statistical techniques. This paper describes how to combine multiple statistical tests and graphs in a matrix/dashboard format on a single, concise page to create a quick dashboard of information that can summarize important information, including inferential comparisons. As an example, this paper illustrates a simple method to create quick graphic reports on the results for two-sample comparisons using both t-test and contingency table (chi-square) results. These results are reported visually in a matrix dashboard that combines both graphical and summarized statistical results. SAS users familiar with basic SAS programming techniques will be able to produce these dashboards of graphic results.

CREATING A STATISTICAL SUMMARY DASHBOARD

The following steps show how to use the %MAKEDASH macro to display a dashboard of results containing the graphical and statistical results from t-tests and 2xr chi-square tests. These steps are presented in tutorial fashion to illustrate the process in creating the display. All of the SAS files needed for this example are available on the web at the address indicated at the end of this paper. The macros needed for the example are in a file named DASH_MACRO.SAS and include the following SAS macros:

%CHIRESULTS – performs a chi square test on a 2xr table, and creates a bar chart.

%TTESTRESULTS – performs an independent group t-test and create comparative histograms or boxplots.

%MAKEDASH– creates a template needed to display the graphical results.

The primary file that is used to define the graphs and display the dashboard is named MAKEDASH_PROGRAM.SAS. The following steps are an example of how to customize the contents of the MAKEDASH_PROGRAM.SAS file to display your own dashboard.

STEP 1. Prepare the SAS work area for graphs

This step illustrates how to use the MAKEDASH_PROGRAM.SAS program to construct a graphical dashboard. The completed program is available for download at the web address mentioned at the end of this paper. The first few lines of code in the program are used to specify the location of the required macros.

```
* Specify the location of the include files;
%LET FOLDER=C:\SASDATA\;
* These are SAS (macro) routines required for the dashboard program;
%INCLUDE "&FOLDER.DASH_MACROS.SAS";
```

This code assumes that you are using a Windows operating system, and would need to be altered for other computer systems. The next two lines turn off ODS GRAPHICS (required beginning with SAS version 9.3) and erasing any current title or footnote;

```
ods graphics off;
title;footnote;
```

Several other lines of code are needed to prepare the Windows workspace for creating the graphical output. The plots created by this program are stored in a SAS library named WORK.GSEG. Before creating the plots, it is recommended that you clear the SAS WORK.GSEG area with the following code:

```
* DELETE any plots that might be in WORK.GSEG;
PROC GREPLAY NOFS IGOUT=WORK.GSEG;
  DELETE _ALL_;
RUN;
QUIT;
```

The code

```
GOPTIONS DISPLAY HSIZE=6IN VSIZE=6IN;
```

controls the size of the graphs as they are created.

STEP 2. Create a series of graphs using SAS.

Define which graphs and statistical tests you want to perform using the %CHIRESULTS and %TTESTRESULTS macros. The following examples illustrate how to call these two macros.

Example 1. Calling the %CHIRESULTS macro: This macro performs a chi-square test and combines the statistical results with a bar chart. Here is an example of calling this macro using information in the SASHELP.HEART data set.

```
%CHIRESULTS(ROWVAR=Chol_Status, COLVAR=SEX, BDATA=SASHELP.HEART, PLTNAME=PLOT3);
```

where

ROWVAR A numeric or text variable containing the variable name for the ROW variable in a chi-square analysis.

COLVAR A numeric or text variable containing the variable name for the COLUMN variable in a chi-square analysis. Important: for this program the COLVAR should have only 2 categories.

BDATA The SAS data set that contains the data for the analysis.

PLTNAME A name you provide for the graphical output. This should be PLOT1, PLOT2, and so on up to the number of plots you intend to place in the display.

The results in Figure 1 graphically show a difference in the pattern of Cholesterol Status (Chol_Status, a categorical variable) by Sex (a variable with only 2 categories), and the footnote on the graph reports the results of the chi-square test.

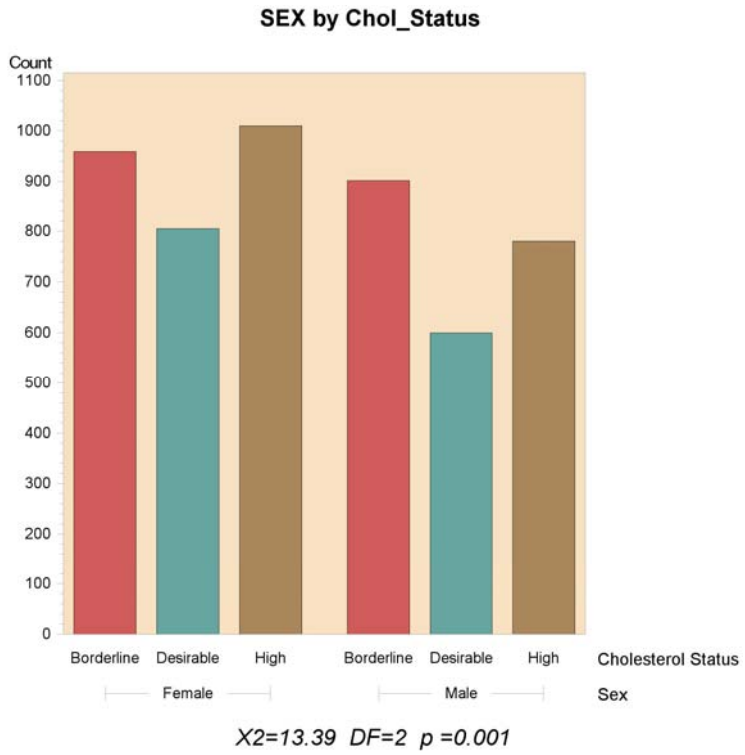

Figure 1. Results of CHIRESULTS call

Example 2. Calling the %TTESTRESULTS macro: This macro calculates a t-test and combines the statistical results with comparative box plots or histograms. Here is an example of calling this macro using information in the SASHELP.HEART data set.

```
%TTESTRESULTS(OBSVAR=Cholesterol,GPVAR=sex,BDATA=sashelp.heart,PLTNAME=plot2,TYPE=B);
```

where

OBSVAR A numeric variable containing the observed data for comparison.

GPVAR A numeric or text variable that contains two categories specifying the two groups for a t-test comparison.

BDATA The SAS data set that contains the data for the analysis.

TYPE Either H for horizontal comparative histograms, V for vertical comparative histograms, or B for Box and Whiskers comparison.

PLTNAME A name you provide for the graphical output. Typically this will be PLOT1, PLOT2, and so on.

The results in Figure 2 graphically show a marginal (p=0.05) separation in mean weight by sex, and the footnote on the graph reports the results of the t-test.

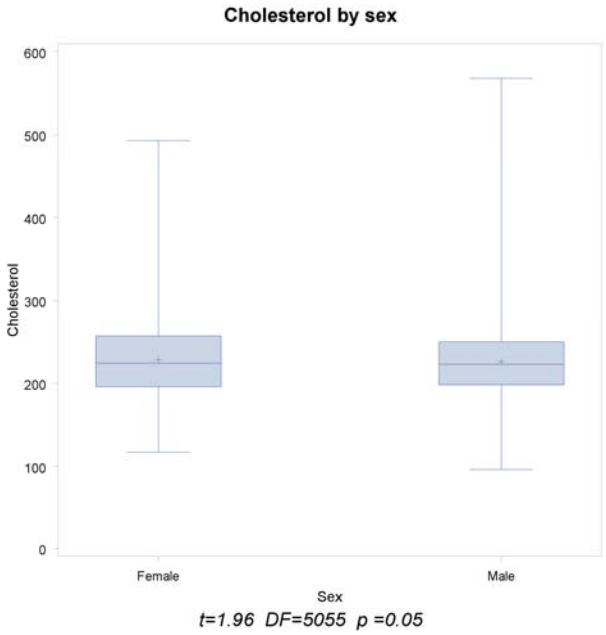

Figure 2: Box and Whiskers output from TTESTRESULTS named PLOT2

STEP 3: Create all of the plots desired for the dashboard

Using a series of macro calls, create all of the plots that will appear in the dashboard. Notice that each plot should have a unique plot name (PLTNAME). The following macro calls illustrate the creation of six graphs.

```
%TTESTRESULTS(OBSVAR=Cholesterol, GPVAR=sex, bdata=sashelp.heart, pltname=plot1, type=V);
%TTESTRESULTS(OBSVAR=Cholesterol, GPVAR=sex, bdata=sashelp.heart, pltname=plot2, type=B);
%CHIRESULTS(ROWVAR=Chol_Status, COLVAR=SEX, BDATA=SASHELP.HEART, PLTNAME=PLOT3);
%CHIRESULTS(ROWVAR=BP_Status, COLVAR=SEX, BDATA=SASHELP.HEART, PLTNAME=PLOT4);
%TTESTRESULTS(OBSVAR=AgeCHDdiag, GPVAR=sex, bdata=sashelp.heart, pltname=plot5, type=H);
%TTESTRESULTS(OBSVAR=Systolic, GPVAR=sex, bdata=sashelp.heart, pltname=plot6, type=H);
```

Combine all of the saved plots onto a single-page dashboard display using the %MAKEDASH macro as illustrated here:

```
* Combine the graphs into the dashboard;
%MAKEDASH()
RUN;
QUIT;
```

The results are displayed shown in Figure 3. Code in the %MAKEDASH macro is adapted from the SAS Knowledge Base[1].

CONCLUSION

The MAKEDASHSAS program allows analysts to combine a variety of graphs created in SAS PROCs or macros to create a matrix of plots in a SAS dashboard. This technique can be used by analysts who need to display the results of simple data comparisons in a concise format. The procedure can be easily expanded to include customized plots created from a number of SAS graphic procedures. Other options, such as color, patterns, and fonts could also be included as options in this program to provide added customization.

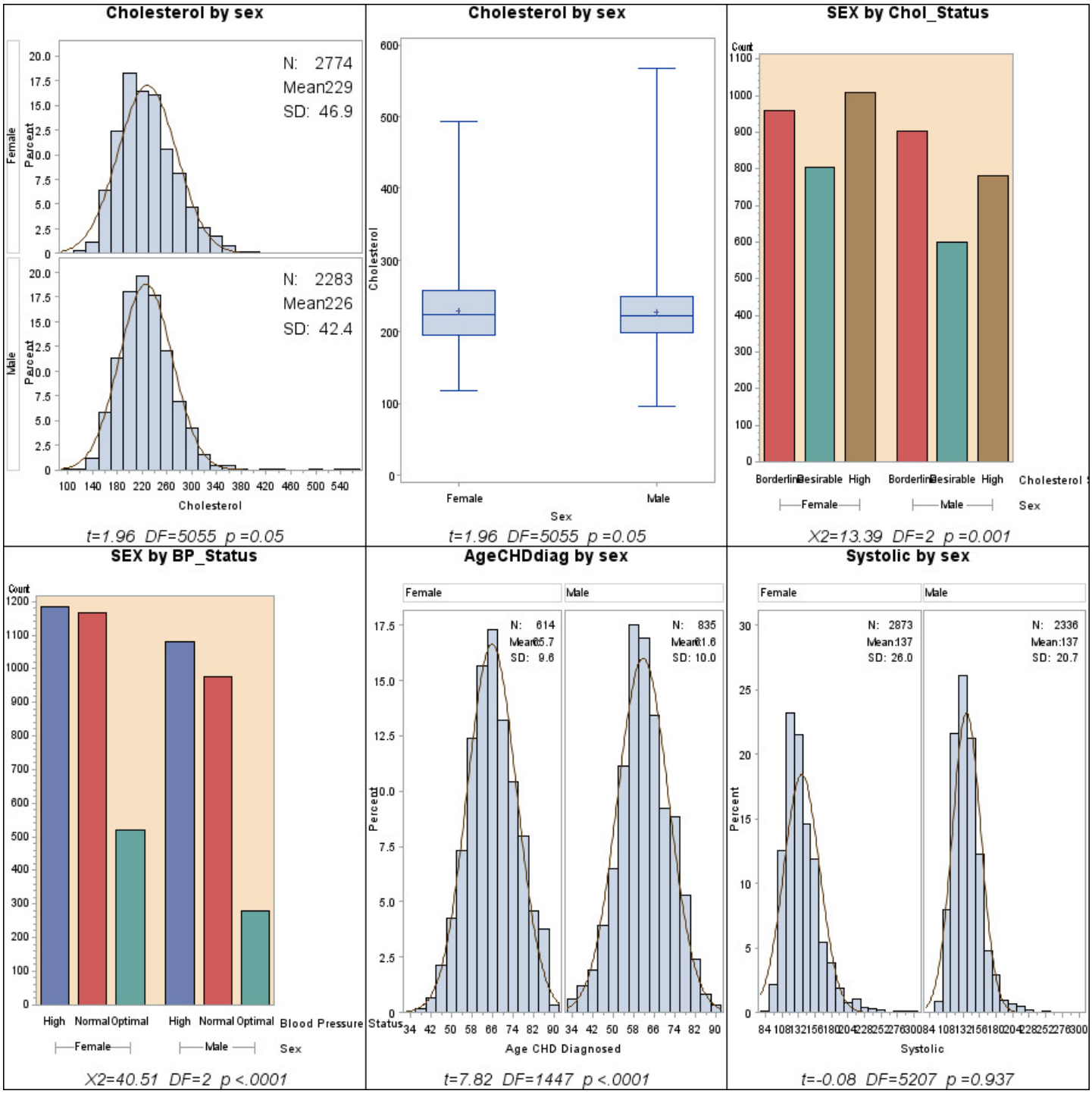

Figure 3: Graphical output from the MAKEDASH program example.

REFERENCES

[1] SAS Knowledge Base / Samples & SAS Notes, “Sample 24940: Dynamically replay all GSEG entries,” http://support.sas.com/kb/24/940.html.

RECOMMENDED READING

- *SAS Essentials: Mastering SAS for Research*

CONTACT INFORMATION

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The example files used for in these examples are available at the following web address

www.alanelliott.com/DASHBOARD (case matters in this address.)

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