New SAS/GRAPH Features

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INTRODUCTION

The SAS/GRAPH® product is an evolving product. New features, as suggested by users or developed in-house, are constantly considered and added. This paper describes the new SAS/GRAPH features added in the past year. The paper also provides examples showing the use or effect of most of the new SAS/GRAPH features. All of these new features are available in release 4.0b of the SAS/GRAPH product for the Digital Equipment Corporation VAX® Series of minicomputers. They will also be available in the next major release of the SAS/GRAPH product for all supported machines.

There have been changes in most of the SAS/GRAPH procedures. The changes in GCHART, GPLOT, GMAP, G3GRID, GPROJECT, GSLIDE, GCONTOUR, and G3D will be presented as well as a list of new device drivers. The changes are grouped by procedure except for the ANNOTATE facility, which is introduced separately.

The code to reproduce the figures used in this paper can be found in the sample with the same number as the figure (that is, Sample 1 has the code for figure 1).

GPROJECT

Three small changes have been made to the GPROJECT procedure, which projects maps. The first change moves the origin of the projected (output) data to the approximate center. This reduces the small distortions of the projection techniques (formerly the origin was in the lower left corner of the projected data). The second change is the output of the two parallels (ALBERS or LAMBERT projections) or poles (GNOMON projection) as a note in the log. This can be useful when combining and checking data.

GMAP

To allow you more control over the scaling of choropleth maps, the XSIZE= and YSIZE= options have been added. The XSIZE= and/or YSIZE= option can be independently specified in character cells, percent of viewing area, inches, or centimeters. Two uses of the XSIZE= and YSIZE= options are (1) to create a special effect by squeezing or stretching a map, and (2) to remove the distortion of scale normally introduced by varying resolution of graphics devices. The two map examples (figures 1 and 2) show all four methods of specifying XSIZE= or YSIZE=. Note that the number of inches and centimeters are changed due to the reduction required for this paper. Also note that a space must appear between the number and "CM" to avoid confusion with base sixteen numbers.

GPLOT

Three new options are available in the GPLOT procedure. The SKIPMISS option causes a plot to be discontinuous when a missing value is found in the data. Refer to the tangent curve (figure 3) where the undefined values of the function at 90 and 270 degrees are missing values. Many types of data have inherent missing values, such as data from stores or other businesses that have no sales data from Sundays and holidays. The time axis for such data may include all days to emphasize the difference between sales (or other variables) on the days preceding and following the day with the missing value. The other two features, FRAME and CFRAME=, are related to each other. The FRAME option causes the area defined by the axis to be closed on all four sides (figure 3). The CFRAME= option causes the background of the axis area to be filled with the color specified. The FRAME option can be used to divide a plot from titles and labels and give a graph a more professional look. The CFRAME= option can introduce more color to a graph and emphasize the plot.

GCHART

HBAR, VBAR, and PIE charts all have new features. Formerly, the HBAR and VBAR reference line options, VREF= and HREF= respectively, accepted only a single number. Now a list of reference lines can be specified, following the normal syntax for specifying a numeric list. These reference lines can be used to represent critical points associated with a chart, such as projected company goals or points established by government regulation. The FRAME and CFRAME= options that are available in GPLOT are also available for HBAR and VBAR charts. The FRAME option causes the axis area to be closed on all four sides (figure 4) and the CFRAME= option causes the background of the axis area to be filled with the specified color.

To allow you to customize your PIE charts, new options have been provided to control the placement of values on PIE charts. The MATCHCOLOR option causes the values associated with a slice to appear in the same color as the slice. This overrides the CTEXT= option which affects only the heading and group labels when MATCHCOLOR is specified. The MATCHCOLOR option helps to tie values to the proper slice, especially in pies with small slices.

Three new options control the location on the values associated with each slice. The values associated with a slice are (1) the name which is the value of the PIE variable, (2) the value which is the frequency count, percent, sum, or mean depending on the TYPE= option, and (3) the percent which is the percent of the total pie.
the slice represents. The new options are NAME=, VALUE=, and PERCENT=. Each can specify one of four methods for positioning. The possible methods are OUTSIDE, INSIDE, ARROW, and NONE. The OUTSIDE method corresponds to the way values have previously been positioned on pie charts. Examples of all four methods are found in Figure 5, which also shows how it is possible for all three values (NAME=, VALUE=, and PERCENT=) to use the same method, different methods, or any other combination. This means there are 64 ways to place the values on a PIE chart. The default method for NAME= and VALUE= is OUTSIDE. The default method for PERCENT= is NONE. Changing the positioning method also affects the radius of the pie. The largest radius pie is obtained by specifying INSIDE or NONE for all methods. When any method is OUTSIDE, the radius of the pie must be reduced to allow room for the text. If the ARROW method is chosen, the radius is reduced even more. Remember that the length of the text for the names, values, and percents can also affect the radius of the pie.

Three more options are new to the PIE statement. These all concern the addition of a group variable to pies. The GROUP= option accepts a variable and uses the values of that variable to produce one pie for each group value. This is very similar to the way groups work in VBAR, HBAR, and BLOCK charts. Each PIE comes out on a separate page (or screen) by default, but by using the ACROSS= and DOWN= options more than one pie can be placed on a page. In the sample PIE chart (Figure 6), the two pies represent the fictional employee distribution of the two years, 1982 and 1983. The pies show that in 1982 the service department had the most employees, but that sales personnel grew to have the most employees in 1983. The pie chart shows this trend very concisely.

DEVICE DRIVERS

The new device drivers introduced last year include terminals from Data General (D450, D460, G300, and G500), Digital (VT125), Hewlett-Packard (HP2623 and HP2627), and Tektronix (TEK4105), as well as plotters from Hewlett-Packard (HP7470 and HP7475) and Nicolet Zeta (ZETA8).

MAP DATA SETS

Two new map data sets have been added to the SAS/GRAPH product. These are for use with the new ANNOTATE facility. The first one, USCENTER, gives the visual centers of the states in the US (projected) and STATES (unprojected) data sets. The other new data set, USCITY, gives the projected and unprojected coordinates of many major U.S. cities. The US data set has also been reprojected to reflect the changes in the GPROJECT procedure.

ANNOTATE

The ANNOTATE facility is the most exciting addition to the SAS/GRAPH product. This facility adds custom graphics capabilities to almost all graphics procedures. The ANNOTATE facility contains too much to fully explain here, but a brief introduction follows. A further description is available in the paper entitled THE SAS/GRAPH ANNOTATE FACILITY, also found in these Proceedings.

The ANNOTATE facility functions are mostly based on X and Y coordinates. These coordinates can be specified in several different systems. Some of the systems are relative to the data and others to the page or screen. The data relative systems free you from having to know exactly what a graph will look like to position important labels or other graphics. The GCHART, GPLOT, GMAP, GCONTOUR, GSLIDE, and G3D procedures all support the page- or screen-relative systems. In addition, the GPLOT, GMAP, and GCONTOUR procedures support the data-relative systems.

CONCLUSION

The SAS/GRAPH features described in this paper represent the latest SAS/GRAPH enhancements. For more information on the use of these new features, write or call:

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**GMAP XSIZE= and YSIZE= Options**

*Sample 1*

- TITLE1 C=B3 'GMAP XSIZE= and YSIZE= Options';
- TITLE2 C=B3 'XSIZE = 40 (Cells)';
- TITLE3 C=B3 'YSIZE = 3 IN';
- FOOTNOTE C=B3 'Figure 1';
- PROC GMAP DATA=FL MAP=FL;
  - ID STATE;
  - CHORO STATE / NOLEGEND XSIZE=40 YSIZE=3 IN;
- RUN;

*Sample 2*

- TITLE1 C=B3 'GMAP XSIZE= and YSIZE= Options';
- TITLE2 C=B3 'XSIZE = 50 PCT';
- TITLE3 C=B3 'YSIZE = 50 CM';
- FOOTNOTE C=B3 'Figure 2';
- PROC GMAP DATA=FL MAP=FL;
  - ID STATE;
  - CHORO STATE / NOLEGEND XSIZE=75 PCT YSIZE=50 CM;
- RUN;
Sample 3

DATA TANGENT;
IF _N_ = 1 THEN D2R = ATAN(1) / 45;
RETAIN D2R;
DO DEGREES = 0 TO 359;
   RADIANS = DEGREES * D2R;
   TANGENT = TAN (RADIANS);
   OUTPUT;
END;
RUN;

SYMBOL I=J;
TITLE 'Plot with SKIPMISS & FRAME Options';
FOOTNOTE 'Figure 3';
PROC GPLOT DATA=TANGENT;
  PLOT TANGENT * DEGREES / SKIPMISS FRAME 
    HAXIS=0 TO 360 BY 90 HMINOR=8;
RUN;

Sample 4

PATTERN1 V=X1 C=B7;
PATTERN2 V=X2 C=B7;
TITLE 'Chart with FRAME Option';
FOOTNOTE 'Figure 4';
PROC GCHART DATA=EMPLOYEE;
  VBAR DEPT GROUP=YEAR SUBGROUP=SEX 
  TYPE=PCT G100 FRAME;
RUN;
Sample 5

/* Figure 4 was produced by combining the four pies from the following statements. */
PROC GCHART DATA=EMPLOYEE;
  PIE DEPT / NAME=OUTSIDE
        VALUE=None;
  PIE DEPT / NAME=INSIDE
        VALUE=None;
  PIE DEPT / NAME=ARROW
        VALUE=None;
  PIE DEPT / NAME=None
        VALUE=None;
RUN;

Sample 6

TITLE 'Pie Chart with Groups';
FOOTNOTE 'Figure 6';
PROC GCHART DATA=EMPLOYEE;
  PIE DEPT / GROUP=YEAR
        ACROSS=2;
RUN;