The Lost Art of Annotate

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ABSTRACT

The ANNOTATE facility is a useful tool that adds to the capabilities of SAS/GRAPH and related procedures. We will briefly examine some of the common uses and expound on some of the more advanced uses of annotate. We will also discuss how ANNOTATE works in versions 7 and 8.

KEY WORDS

ANNOTATE, macro, annomac, SAS/GRAPH.

INTRODUCTION

The ANNOTATE facility is a tool within SAS/GRAPH that extends its power to create customized modifications of graphical output. It can be used with the following SAS/GRAPH procedures: GANNO, GCHART, GCONTOUR, GMAP, GPLOT, GPRINT, GSLIDE, and G3D. We will refer of the ANNOTATE facility in the following text simply as ANNOTATE.

This poster presentation does not attempt to explain the details needed to program with ANNOTATE, but simply show examples of its use and possibly expand the reader's view of the power of ANNOTATE. We have listed a selection of references at the end that will give the reader more details about how to program with ANNOTATE. Additionally, look for modules on the subject in the upcoming series of monographs edited by Art Carpenter.

ANNOTATE is most commonly used to add labels or values to points on a graph, to add labels and values to the histogram bar charts, or place a special symbol or text at specific locations. These modifications were used by the authors many years ago when they first began using ANNOTATE. As experience grew, the capabilities of ANNOTATE became more apparent.

More advanced uses include 1.) the creation of a second horizontal axis or a customized axis on graphs or charts; 2.) creation of complex graphical representations such as current vector plots or compass roses; 3.) creation of libraries of ANNOTATE features, symbols, or polygons which can be quickly added to maps; and 4.) the creation of complex figures that can be placed at multiple locations on an ANNOTATE map which display information specific to that location. Another advanced feature is the ANNOTATE macro which allows creation of ANNOTATE features with little code.

ANNOTATE was a necessary feature for SAS/GRAPH in earlier versions, where it added greatly to the capabilities of the programmer. How does the ANNOTATE facility work in versions 7 and 8, and is it still needed?

Common Uses of ANNOTATE

ANNOTATE is most commonly used to add text or values on graphs. Below is an example of such use. Text labels were added to identify grouped bars in the chart, and the actual values from the y-axis variable were added above each column. Commands to add such annotation are fairly simple.

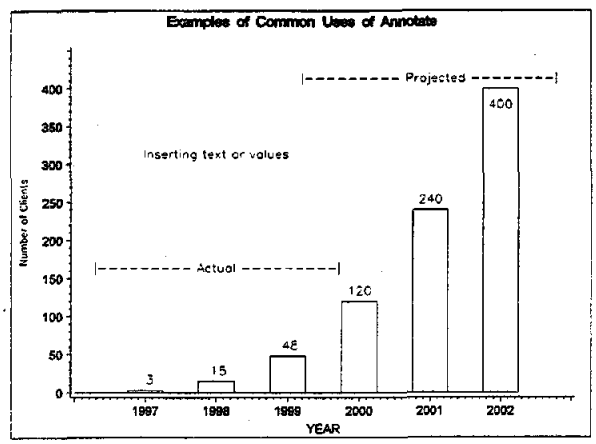

Figure 1. Annotate is used to add text delineating Actual and Projected increase in clients, and automatic insertion of values for each vertical bar.

Advanced Uses of ANNOTATE

The next step in difficulty is adding a second horizontal axis, replacing the main horizontal axis with a customized horizontal axis, or replacing both axes with an unusual axis or scale. This allows the programmer to get the desired look for special cases where the axis commands in SAS/GRAPH are limited.

Figure 2 below shows a complicated current vector map plotted over a 2-week period. Multiple hourly direction vectors were placed on the same axis and the original horizontal axis was replaced with a special axis where the axis line and time values were drawn using coordinates transformed from east current vectors.

This was a special use of ANNOTATE to replace the horizontal axis. In most cases, the authors have used this feature to add a second horizontal axis on the top of the figure or make small changes to the original horizontal axis.

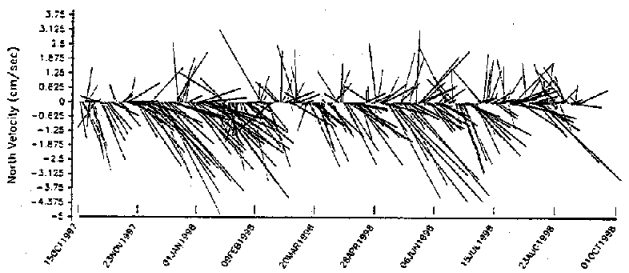

Figure 2. Current direction vectors vs time. Shows use of Annotate to replace a horizontal axis with a customized axis.

Figure 3 shown below is a current direction frequency map complete with annotated direction axis and legend scale. Macros were used extensively in the code for both figures 2 and 3 to allow dynamic building of the graphs based on the data set selected. These are the types of graphs where the use of ANNOTATE makes SAS/GRAPH fun.

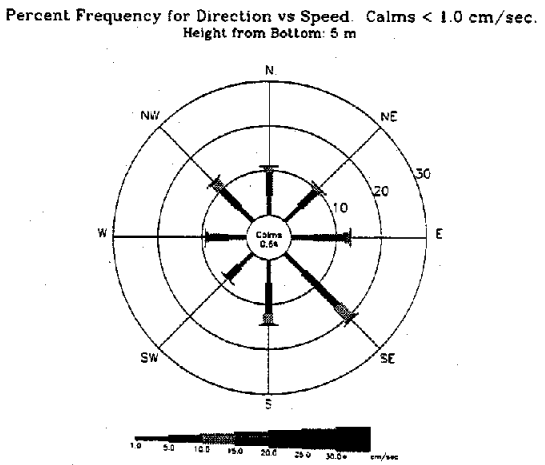

Figure 3. Example showing use of Annotate to create a direction axis, legend, text labels and values.

ANNOTATE Data Set and ANNOTATE Macros

The power of the ANNOTATE facility is accessed through the use of a specialized data set. When using this data set, ANNOTATE looks for variables with specific names and attributes, and the values taken on by these variables in turn instruct ANNOTATE as to the your intentions. The data set itself is fairly rigidly defined in terms of the names of the variables that it is to contain and the attributes that these variables must have.

ANNOTATE macros can provide a shortcut when creating an ANNOTATE data set using assignment statements. To be used properly you need to understand how they work and what they will do for you. They will not abrogate your need to understand how the process of creating the data set works. Indeed you need to have a good understanding of how the ANNOTATE data set is constructed before you should attempt to use these macros.

The ANNOTATE macro environment is prepared using the %ANNOMAC, %DCLANNO, and %SYSTEM macros. Macros used to replace assignment statements associated with functions include:

%BAR	Creates a fillable rectangle.
%CIRCLE	Draws an empty circle.
%DRAW	Draws a line to a specific point.
%LABEL	Write text at the specified location.
%MOVE	Moves to a specific point without drawing.
%POLY	Begins drawing a polygon.
%POLYCONT	Continues drawing a polygon.

Since the macros are resolved into a series of data step assignment statements, the size of the annotate data set is not reduced. However, the code needed to create the data set is reduced.

The following example shows how multiple statements can be reduced to a single macro statement.

```
*COLOR='BLUE';
*STYLE='SCRIPT';
*SIZE=4;
*TEXT='Home Wanted                ';
*Y=75;
*OUTPUT;
%label(50,75,'Home Wanted                ',
       blue,0,0,4,script);
```

More details on ANNOTATE macros can be found in Carpenter's SUGI24 paper, 'Using ANNOTATE MACROS as Shortcuts'.

Figure 4. shows a current direction frequency histogram generated almost completely with ANNOTATE macro commands. It was generated using the ANNOTATE %LABEL, %MOVE, %DRAW, and %SLICE macros. The titles were created using title statements.

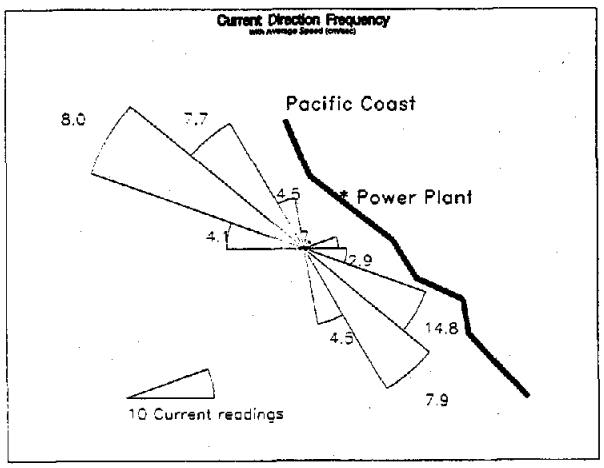

Figure 4. Current direction frequency histogram showing graphics created with ANNOTATE macros.

ANNOTATE Libraries

Libraries of ANNOTATE data sets containing symbols, maps, and special figures can be created and reused as needed.

Throughout the 1980's the authors used ANNOTATE extensively to create libraries of substrate and kelp forest maps along the southern California coast. Quarterly surveys were performed and the substrate or kelp forest boundaries were saved as x-y coordinates in ANNOTATE data sets, which were overlaid as needed onto maps of the study areas created with GPLOT. Symbols created with ANNOTATE were also reused extensively, as were ANNOTATE maps of the coastline and riverbeds.

Complex ANNOTATE Figures within Figures

With the use of ANNOTATE, complex figures or histograms can be used at multiple locations within another figure. This is impossible to accomplish using SAS/GRAPH alone.

In the studies discussed above, a map of the study area was created. Substrate or kelp maps were overlaid and the sampling sites were marked on the maps and labeled with ANNOTATE. Using ANNOTATE, we were also able to create small complex histograms at each site on the map, such as small time-series bar charts or current vector plots. These maps were very popular and they showed the extensive use of ANNOTATE to create plots within plots.

ANNOTATE in Versions 7 and 8

The ANNOTATE facility is completely supported in versions 7 and 8, however very little is new. Two new variables have been added to the LABEL function. The CBOX variable allows the background to have a defined color (e.g., CBOX='white'). The CBORDER variable allows color definition for the border of the label box.

More Information about ANNOTATE

We've included a list of references below that will point you in the right direction in your search for knowledge about ANNOTATE. Additionally, SAS Institute's Books by Authors will publish a series of monographs in the near future that will contain modules on ANNOTATE. The series is edited by Art Carpenter and is now in progress.

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