

SAS[®] SOFTWARE G3D ANIMATION AND GRAPHIC VIEWER SYSTEM

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ABSTRACT

This paper presents an illustration of SAS[®] G3D graphic animation and the SAS macros to generate HTML-based files for viewing SAS graphics on Web pages. The macros create a SAS graphic viewer system for review and manage of data outputs and 3-D animated web pages. The discussion includes but is not limited to:

- * Preparing SAS G3D graphics output,
- * Converting SAS graphics into HTML code,
- * Providing a SAS macro to generate a viewer system,
- * Illustrating a sample viewer system.

The SAS products used in this paper are: SAS BASE[®], and SAS/GRAPH[®] with no limitation of operating systems.

INTRODUCTION

The G3D procedure in SAS/GRAPH produces three-dimensional graphs of scatter plots. The illustration in this paper uses "The Cowboy Hat" data [5] to produce a three-dimensional surface graph. The parameters of TILT or ROTATE are modified in the same SAS G3D PLOT statement to create multiple still 3-D graphs. The animation process is to create moving graphs by rapidly advancing from one still graph to the next and to give the illusion of movement.

Multiple graphic files demand a system of organization which can be provided using a viewer. A viewer is a Web pages viewing system that can storage, archive and display HTML pages. It can serve as a central depository for all of the documents as well as simplify output management.

A viewer system provides the following features:

- * central location,
- * review SAS output documents including 3-D animation
- * document version control,
- * faster document delivery,
- * elimination of reprocess or retype the document.

To create SAS output viewer system, some background knowledge about HTML will be supplied. This paper is organized as a step by step demonstration for each of the subject discussed. Two SAS macros are provided for SAS output to HTML file conversion and a viewer macro to create a graphic viewer system.

PREPARATION OF SAS 3-D GRAPHS

The following SAS G3D program uses generated data to produce a three-dimensional surface graph.

```

data nums;
  keep x y z;
  do i = 1 to 60;
    x = 10 * ranuni(33)-5;
    y = 10 * ranuni(35)-5;
    z = sin(sqrt(x*x+y*y));
  output;
end;
run;
proc g3grid data=nums out=gridnums;
  grid y*x=z
  / axis1 = -5 to 5 by .08
    axis2 = -5 to 5 by .08;
run;
goptions reset=global cback = lilg
colors = ( black black blue black red
blue green black)
device = dib gsfname = gsf
gsfmode=replace ftext=swissb
hsize = 7 vsize = 4.5;
filename gsf 'c:\sugi23\g06.dib';
title h=2.5 c=rose f=swissb 'Surface Plot
of NUMS Data Set';
proc g3d data=gridnums;
  plot y*x=z/ noaxes
  tilt = 45
  rotate = 55;

```

```
run;
quit;
filename gsf clear;
run;
```

The plot produced by these statement is shown in Figure 1.

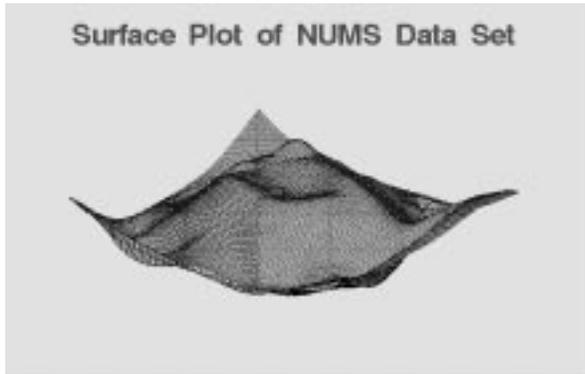


Figure 1. G3D Plot

Twelve graphs are produced by modifying slightly different parameter values of TILT or ROTATE. These graphs are the series of images to be animated. This is called self-animation. In self-animation, a single graph is generated and maintained as an image and is modified in a variety of ways to produce multiple images. SAS software runs under the UNIX operating system, can produce GIF file for graphic output directly. If you run SAS under other operating systems, you need to convert your graph as GIF file. Each SAS graph represents an individual image in a frame-based animation. These images are then displayed in sequence to create animation. A software called "GIF Construction Set for Windows" from Alchemy Mindworks Inc., [5] is used to create an animated GIF file.

GIF Construction Set for Windows offers two methods to creating animated GIF files. The users can either use the Animation Wizard feature of the File menu, or create animated GIF files by hand. The latter method is used in this presentation. This approach is more time consuming, but it will give you more control over how your animated GIF files look and behave.

Two factors, loop and delay, control the behavior of animation.

A loop value is to define the number of times the segment of animation will repeat. You can set your animation to loop once, multiple times, or continuously. An animation set-up for looping once will have the last frame as final image that stay on screen. A browser

with Loop Counter feature will repeat the animation multiple times specified by the users.

A Delay Value is the time delays of browser to remove the current image and display the next image. It is measured by 1/100ths of a second.

This presentation implement a fade in and fade out effect. The last frame of the animated file is selected and sprayed random dots of background color. Save it as a frame. Spray some more. Save it as a frame again. Continue the process until there is nothing left of the image. When sequenced in the animated file, this will look this image is disintegrating or, if in reverse, materializing.

GRAPHIC VIEWER SYSTEM

A graphic viewer is a system to browse, link, refer and display graphic images. The system consists of three components: 1) a ticker or banner with text of 'GRAPHIC VIEWER SYSTEM', 2) Frame Catalog, and 3) animation display. The following sections will discuss each component in detail.

TICKER

Tickers are GIF files which contain text. It can be simple text with words painted on it or it can be an animated GIF file with text which scrolls from right to left across the specified area. It displaying a scrolling string of characters, is similar to that of a scrolling electronic display. GIF Construction Set for Windows is used to create the following ticker.

FRAME CATALOG

Frame Catalog is an viewer subsystem which organizes and displays individual frames. Each frame is a reduced image, called thumbnail, of the actual graph on the catalog page. From catalog page, the user can click any thumbnail of animation frame, the graph of that frame will expand to its original size on display area. (See Figure 2).

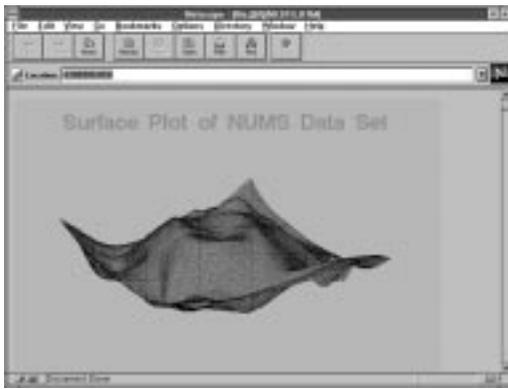


Figure 2. G3D Frame display on Web Page

SAS MACRO TO GENERATE FRAME CATALOG

The arguments for this macro are:

ifile: SAS output list name and its location ,
ofile: HTML file and where to store it.

```
%macro htmfm(ifile= , ofile= );

%LET H1
='<HTML><HEAD><TITLE></TITLE></HEAD>';
%LET G2 = %str('<BODY><IMG SRC=');
%LET G3 = %str('>');
%LET HEND ='</BODY></HTML>';
data _null_;
  infile " &ifile" END=EOF;
  file " &ofile:";
  input;
  if _n_ = 1 then
  put
  @1 &H1 @35 &G2;
  if not EOF then do;
    put _infile_;
  end;
  else put &G3 &HEND;
run;
%mend;
```

The following example shows how to invoke this macro.

```
%htmfm( ifile=g02.gif, ofile=g02.htm)
```

The resulting HTML file, G02.HTM, can be opened as a local file from the user's browser or placed on the

Web server and referenced by its URL (uniform resource locator).

SAS MACRO FOR VIEWER SYSTEM

A macro VIEWER is developed for graphic viewer system. For the macro VIEWER, the number of macro parameters to be passed depends on the number of list and graphs files to be stored in the system. This macro contains the following macro parameters to pass to the macro:

- 1) **hl** for HTML file name to be referred by the VIEWER system,
- 2) **rtitle** for title .

The macro VIEWER is flexible and can be modified easily for any number of files. The following viewer system and SAS macro code consists of three HTML files: Ticker, Catalog, and Animation.

```
%macro viewer(noflist=,
              hl1=,
              rtitle1=,
              hl2=,
              rtitle2=,
              hfile =);
%let r1
='<HTML><HEAD><TITLE></TITLE></HEAD><BODY
BGCOLOR="#effecb"><BR><IMG SRC=scroll.gif>;
  %let sr ='<OL><LI><H2>';
  %let lstart =%str('<A HREF=');
  %let llabel ='>';
  %let lend ='</A></H2>';
  %let er ='</OL><HR></BODY></HTML>';
data _null_;
  infile " &ilist1" end=eof;
  file " &hfile";
  input;
  if _n_ = 1 then put
  @1 &r1 &sr;
  %do i = 1 %to &noflist;
    %let j = %eval( &i + 1);
    if _n_ = &j then do;
      put &lstart &&hl&i &llabel
      &&rt&i &lend;
    end;
  %end;
  if eof then
  put
  @1 &er;
run;
%mend viewer;
```

The following example illustrates the invocation of the VIEWER macro.

```
%viewer(noflist = 2,
        hl1="catalog.htm",
        rtitle1="FRAME CATALOG",
        hl2="animat.htm",
        rtitle2="SAS G3D ANIMATION",
        hfile= RSYSTEM.HTM);
```

This example creates a VIEWER system HTML file with file name of RSYSTEM.HTM. The resulting RSYSTEM.HTM file can be opened as a local file from the user's browser. The following figure shows the illustrated VIEWER system home page. When user points and selects Frame Catalog or SAS G3D ANIMATION, the corresponding output will be displayed.



Figure 3 VIEWER system Home Page

CONCLUSION

This paper explored several findings:

- * A centralized SAS graphic output viewing depository is a key environment for SAS output document management ; using Web pages for the SAS graphic output viewing and management is instant and efficient to a broad audience.
- * Evolution of the Web page application and publishing is unlimited, with the future holding multimedia SAS outputs.

REFERENCES

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- [3] Edmond Williams and Shi-Tao Yeh: *Importing and Exporting SAS Output with Microsoft Word for Windows*, NESUG 8th Annual Conference Proceedings, pp. 728-734, October 1995
- [4] SAS Institute Inc., *SAS/GRAPH Software*. Version 5. 1985 SAS Institute Inc., Cary, NC, USA
- [5] <http://www.mindworkshop.com/alchemy/alchemy.html> (check out the downloadable "GIF Construction Set")

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