Using Hyperlink to Organize SAS HTML Output

Connie Li, Constat Systems, Monmouth Junction, New Jersey
James Sun, Constat Systems, Monmouth Junction, New Jersey

ABSTRACT

Internet and intranet have quickly become important vehicles for information delivery. The versatile HTML’s hyperlink is one of the reasons behind widespread popularity of web technology. In this paper, authors explain different ways to take advantage of hyperlink to organize SAS outputs. Some techniques can also be applied to organize outputs generated with new Output Delivery System.

INTRODUCTION

The web, including internet and intranet, is a hypertext information system. The idea behind using hypertext is that instead of reading text in a rigid, linear structure, you can easily skip from one point to another, get more information, go back, jump to other topics, and navigate through the text based on what interests you are at the time.

Inherited from its mainframe roots, SAS output has been prepared for traditional fan-folder green paper. It typically uses fixed font and presented in monochrome. With web technology, SAS can reach a large audiences. Furthermore, we can use HTML’s hyperlink to gain better accessibility and derivability.

The first example covered demonstrates simple usage of hyperlink to organize outputs generated from the same multidimensional data. In the second example, we explain how to establish a simple navigation mechanism for related SAS outputs.

HTML FORMAT AND HYPERLINK

HTML is an acronym stands for HyperText Markup Language. It is based on SGML (the Standard Generalized Markup Language), which is used to describe the common structure of various kinds of documents. A HTML file describes the structure of documents, for example, titles, paragraphs, or lists. With SAS Institute’s web publish tools, we can translate a SAS output into a HTML document.

In HTML, hyperlink is a user-selectable hypertext or hypermedia jump point. When selected, it will “jump” to another text or multimedia object. A simple hypertext link can guide user from one HTML document to another document. Or simply “jump” to different section within the same document.

The HTML tags behind the glorious hyperlink is the pair: <A> and </A>. The syntax is shown below. The ‘file’ is the URL of linked HTML document. If the link intend associate to another HTML file, no need for ‘#anchor’. If want to navigate through one section to another section (could be belong to different documents), ‘anchor’ should be specified.

```html
define a hyperlink

<A HREF="file#anchor">highlight text” </A>
declare a target section,  (point to jump )

<A NAME ="anchor"> </A>
```

Hyperlink enable us to setup a navigation mechanism within a HTML formatted SAS document. You can also establish a hierarchy menu system to organize related outputs.

Currently you can translate a regular SAS output into a HTML file in many ways. The new SAS version 7 even make the conversion trivial with its Output Delivery Systems (ODS). To take advantage of hyperlink, you still need some creative thinking in organize SAS reports.

MULTIDIMENSIONAL DATA

As an example we use a fictitious stock performance data. It consists of seven variables. STOCK, represent the stock ticket symbol; QUATER, is a time point variable; PRICE, represent stock price; EPS, BETA, PE are other performance variables. Each stock has its
performance data collect at six time points. Next table shows the sample data for one stock ‘MRK’.

<table>
<thead>
<tr>
<th>STOCK</th>
<th>QUARTER</th>
<th>PRICE</th>
<th>EPS</th>
<th>BETA</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRK</td>
<td>97Q2</td>
<td>98.2</td>
<td>1.50</td>
<td>1.1</td>
<td>34.2</td>
</tr>
<tr>
<td>MRK</td>
<td>97Q1</td>
<td>88.5</td>
<td>1.09</td>
<td>1.1</td>
<td>33.6</td>
</tr>
<tr>
<td>MRK</td>
<td>96Q4</td>
<td>72.5</td>
<td>0.98</td>
<td>1.0</td>
<td>33.4</td>
</tr>
<tr>
<td>MRK</td>
<td>96Q3</td>
<td>75</td>
<td>1.02</td>
<td>1.1</td>
<td>31.2</td>
</tr>
<tr>
<td>MRK</td>
<td>96Q2</td>
<td>83</td>
<td>1.33</td>
<td>1.0</td>
<td>29.7</td>
</tr>
<tr>
<td>MRK</td>
<td>96Q1</td>
<td>79</td>
<td>1.16</td>
<td>1.2</td>
<td>38.2</td>
</tr>
<tr>
<td>PFE</td>
<td>....</td>
<td>....</td>
<td>....</td>
<td>....</td>
<td>....</td>
</tr>
</tbody>
</table>

Getting answers to business questions from such multidimensional data often requires viewing that data from various perspectives. Here are three tables created from different perspectives.

- Table of most recent stock performance comparison among stocks. It actually is a front slice of the cubic (see figure 1). This table is a main table.
- Trend for one individual stock table. It can be represented by a piece of horizontal plate cut through one individual stock symbol.
- Trend comparison among all stock for each performance variable (such as PRICE, PE). The data list contains all the slices cut parallel to QUARTER axis.

Figure 2 is the HTML generated main table. The first column lists all stock symbols. Each stock symbol has its own hyperlink. For example, stock ‘MRK’ links to a HTML table named ‘mrk.html’. To achieve this a translation is used.

```
MRK → <A HREF="mrk.html">MRK</A>
```

The ‘mrk.html’ is the one of tables presenting the trend for stock MRK.

The first row of the main table is for performance variables. They link to other tables. The hyperlinks for these variables are different from previous stock links. The translation is shown next:

```
PRICE→<A HREF="perform.html#price">PRICE</A>
```

It connects the section associated with individual performance variable. When ‘PRICE’ is clicked, the section of ‘Performance Variable: PRICE’ in the table (Figure 3) will be displayed.

Tables shown in Figure 3 are trend comparison for each performance variable. We should place the anchor in each performance variable section. It is accomplished within a title statement. While viewing the main table, users can quickly jump to this table to further study the trend within one performance variable.

Generating SAS outputs from those perspectives are trivial. The typical way in producing output yields one fundamental shortfall. There is no effective mechanism to reflect the hierarchy relationship existed among tables.
Figure 3 Trend Comparison for Individual Performance Variable

The SAS code for Figure 3 is shown next. The anchors are accomplished here with TITLE2.

```sas
%MACRO ADITAB(PERFORM);
PROC TRANSPOSE DATA=ONE OUT=OUT1 PREFIX=Q;
   VAR &PERFORM;
   ID QUARTER;
RUN;
TITLE1 ’<CENTER><H4><FONT COLOR= GREEN> Performance Variable: <A name=&PERFORM></A>’;
TITLE2 ’&PERFORM</FONT></H4></CENTER>’;
%DS2HTML(DATA=OUT1, 
   VAR= 09702 09701 09604 09603 09602 09601, 
   OPENMODE=APPEND, 
   ID = STOCK, 
   INDICLR= #BEEEEE, 
   SCOLOR= BLUE, 
   HTMLFILE=PERFORM.HTML, 
   c1bgcolr=#ffcccc, 
   TWIDTH=70, 
   TTAG=NO FORMATTING);
%MEND ADITAB;

FILENAME ADD 'D:\SAS012\PERFORM.html';
DATA_NULL;
FILE ADD NOTITLE;
PUT '<HTML><TITLE>Stock Performance Tables </TITLE>' / ' <BODY BGCOLOR= #FFFFFF BACKGROUND
=BKIMG1\_GIF >' / ' <CENTER><H2><FONT COLOR=RED> PERFORMANCE DATA AT DIFFERENT QUARTER </FONT></H2></CENTER>’;
RUN;
```

Although, the sample data has only three dimensions. The same method can be applied to the cases with more dimensions. We can build links in additional tables. It is an effective way to slice and dice the vast information.

**ORGANIZE RELATED OUTPUTS**

When working on a project, it helps a lot to get familiar with your data first. Together with meta data generated with PROC CONTENTS, print out some sample observations and retrieve facts about data formatting are essential.

Obviously, CONTENTS, PRINT and FORMAT could be generated with different procedures. The typical printouts provide the information in a flat fashion. When facing multiple datasets, the needs for a simple navigation mechanism are more demanding.

To present the information better, output from PROC CONTENTS, which provides most of meta data, serves as main page. Ordered by dataset, each section is belong to one dataset. This main page is organized by hyperlinks on the top which allow you to access different sections. Within each section, hyperlinks are included to connect to the associate output for PRINT and FORMAT. The following figure is the main page.
There are two major parts in the SAS code. A PROC CONTENTS is used to capture metadata for the project data. The option of _ALL_ takes all datasets within this SAS catalog. The NODUPKEY SORT of resulting CONTENTS output provides precise information about the project datasets.

```sas
PROC CONTENTS DATA=MYLIB._ALL_
OUT=ONE(KEEP=MEMNAME NAME TYPE FORMAT INFORMAT LABEL);
RUN;
PROC SORT DATA=ONE(KEEP=MEMNAME) OUT=OUT2 NODUPKEY;
   BY MEMNAME;
RUN;
```

Using this precise information, the next data step generates the navigation within the Meta Data Info page. The links offer a quick jump to the section you chose. A line break (<BR>) is inserted every six observations. Hence the links align in the center with 6 dataset names occupied one line. At the same time an anchor is planted on top of the page. It allows to go back after reviewing a specific section in details.

```
FILENAME ABC "M:\TEMP\META.HTML";
PROC PRINTTO PRINT=ABC NEW;
RUN;
DATA _NULL_; 
   SET OUT2 END=EOF;
   BY MEMNAME;
   FILE PRINT NOTITLE;
   TAG='<A
| ||COMPRESS('NAME="'||MEMNAME||'"' ||'>' ||' '</A'>
| TAG2='| <A
| ||COMPRESS('HREF="prt.html#'||MEMNAME)||'"' ||'PR
INT</A> |';
   TAG3='| <A
| ||COMPRESS('HREF="FMT.html#'||MEMNAME)||'"' ||'FOR
MAT</A> |';
   IF FIRST.MEMNAME THEN DO;
      PUT TAG1;
      PUT '<HTML><BODY
BACKGROUND=back.GIF><CENTER><A NAME="TOP">
</A>';
      PUT '<CH1><FONT COLOR=red>Meta Data Info</
</FONT></CH1><P>
';
      PUT '<P><B>ALL PROJECT DATA</B><P>'; 
      END;
      IF _N_ IN (7,13,19,25) THEN PUT '<BR>'; 
      IF EOF THEN PUT '</BODY></HTML>'; 
   RUN;
PROC PRINTTO;
RUN;
```

The second part of code is wrapped with another PROC PRINTTO in order to attach it with the first section. This time the dataset ‘OUT’ called provides full information about variables attribution. An invisible anchor is place in front of subtitle. So you can you jump to the point when you select the link on the top section. Two links connect to separate PRINT and FORMAT pages are placed beneath the dataset name. The link next to them is designed for go back to the top of the page.

```
FILENAME ABC "M:\TEMP\META.HTML";
PROC PRINTTO PRINT=ABC;
RUN;
DATA _NULL_; 
   SET OUT END=EOF;
   BY MEMNAME;
   FILE PRINT NOTITLE;
   IF FIRST.MEMNAME THEN DO;
      PUT TAG1;
      PUT '<HTML><BODY
BACKGROUND=back.GIF><CENTER><A NAME="TOP">
</A>';
      PUT '<CH1><FONT COLOR=red>Meta Data Info</
</FONT></CH1><P>
';
      PUT '<P><B>ALL PROJECT DATA</B><P>'; 
      END;
      IF _N_ IN (7,13,19,25) THEN PUT '<BR>'; 
      IF EOF THEN PUT '</BODY></HTML>'; 
   RUN;
PROC PRINTTO;
RUN;
```

The tabulate part for variable attributes is straightforward. After generated the line belong to column label, the put statement print out a row every observation. To avoid tedious HTML tags, authors actually define them with %let statement already. Inside the SAS code, those macro variable, such as &T1 &T2 and &TDS..., represent tags which used to built HTML table.

```
FILENAME ABC "M:\TEMP\META.HTML";
PROC PRINTTO PRINT=ABC NEW;
RUN;
DATA _NULL_; 
   SET OUT END=EOF;
   BY MEMNAME;
   FILE PRINT NOTITLE;
   IF FIRST.MEMNAME THEN DO;
      PUT TAG1;
      PUT '<HTML><BODY
BACKGROUND=back.GIF><CENTER><A NAME="TOP">
</A>';
      PUT '<CH1><FONT COLOR=red>Meta Data Info</
</FONT></CH1><P>
';
      PUT '<P><B>ALL PROJECT DATA</B><P>'; 
      END;
      IF _N_ IN (7,13,19,25) THEN PUT '<BR>'; 
      IF EOF THEN PUT '</BODY></HTML>'; 
   RUN;
PROC PRINTTO;
RUN;
```

Using the same approach, we can produce output for sample observations and format mapping. Different from meta data page. The table section presenting variable attributes are replaced with sample observations or format information. With these hyperlinks the three SAS outputs create a simple information system containing essential facts about your project datasets.
CONCLUSION

This paper briefly covers some techniques to enhance SAS HTML formatted outputs. As we have seen, a great deal can be accomplished in organizing SAS outputs with hyperlink. By utilizing resources already available in SAS, such as HTML format tools and ODS, we are able to translate previously disparate outputs into a simple information system.

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REFERENCES


