Using Advanced RTF Language to Enhance ODS RTF Output

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ABSTRACT

ODS has given SAS great power to control its output appearance. By using ODS to create outputs in Rich Text Files (RTF) format, SAS is able to produce almost any appearance for tables or listings that the clients want. There are so many skills or techniques out there to achieve this goal that even one book can not hold all. This article gives an example for improving the appearance of AE or Concomitant Medication tables by combining the Advanced SAS programming skills and usage of RTF language.

INTRODUCTION

These days, stats and clinical staff have set up higher and higher standard for the appearance of tables and listings. Fortunately, we have Output Delivery System (ODS) and Proc Report in SAS which are so powerful to improve the quality of table or listing outputs greatly. But still, some times the clients are so rigid that they will stick to some small but detail requirements which are beyond the ability of proc report or any other SAS procedure (in the example of this paper, the clients insisted that every wrapped row should be indented for 2 letters). In this case, if the outputs are in RTF format, you are rescued. Incorporating advanced RTF language into the SAS will help to accomplish the task that SAS is not able to perform.

As mentioned, we were requested that if a line (e.g. AE or Meds term) is so long that it gets wrapped, then all wrapped rows (starting from the second one) must indent for 1 letters. Since the term is generally dynamic in data, it is impossible to realize this by coding with SAS. After deep research, we found that some Advanced RTF language can help to solve this issue and luckily, we are using RTF as our output format.

DESCRIPTION

In regular Concomitant Medication table, name or term of each medication is generally displayed in multi-level structure as shown in the below figure. Lower level class names or preferred term is required to be indented and aligned with its relevant label in column header accordingly to facilitate the reading. The general approach to achieve this indentation is to place blank space before each term according to its level in the output data.

```
Body System Class
   Additional Sub-Class 1                              Placebo
      Additional Sub-Class 2                          (N=xxx)
         WHO Preferred Term                            n (%)


   CALCIUM CHANNEL BLOCKERS                          41 (29.7)
      CALCIUM CHANNEL BLOCKERS AND DIURETICS             0
      CALCIUM CHANNEL BLOCKERS AND DIURETICS             0
      SELECTIVE CALC.CHANNEL BLOCK. W/DIRECT CARDIAC EFF 10 ( 7.2)
         DILTIAZEM                                     7 ( 5.1)
         VERAPAMIL                                     3 ( 2.2)
      SELECTIVE CALC.CHANNEL BLOCK. W/MAINLY VASC. EFF. 31 (22.5)
         AMLODIPINE                                   25 (18.1)
         FELODIPINE                                    1 ( 0.7)
         LERCANIDIPINE                                 3 ( 2.2)
         NIFEDIPINE                                    4 ( 2.9)
         NISOLDIPINE                                   1 ( 0.7)
```

Figure 1. Desired Concomitant Medication Table

But since the term is random and dynamic, it is impossible to ensure that each term will be displayed in one line. If there comes a long worded term or the table can not give enough space for the term column, it will cause the problem of word wrapping, as shown in below figure

```
Body System Class
   Additional Sub-Class 1                            Placebo
      Additional Sub-Class 2                        (N=xxx)
         WHO Preferred Term                          n (%)


   CALCIUM CHANNEL BLOCKERS                         41 (29.7)
      CALCIUM CHANNEL BLOCKERS AND DIURETICS            0
      CALCIUM CHANNEL BLOCKERS AND DIURETICS            0
      SELECTIVE CALC.CHANNEL BLOCK. W/DIRECT       10 ( 7.2)
CARDIAC EFF
         DILTIAZEM                                   7 ( 5.1)
         VERAPAMIL                                   3 ( 2.2)
      SELECTIVE CALC.CHANNEL BLOCK. W/MAINLY VASC.  31 (22.5)
EFF.
         AMLODIPINE                                 25 (18.1)
         FELODIPINE                                  1 ( 0.7)
         LERCANIDIPINE                               3 ( 2.2)
         NIFEDIPINE                                  4 ( 2.9)
         NISOLDIPINE                                 1 ( 0.7)
```

Figure 2. Actual Concomitant Tables with Wrapping

The term in red is wrapped due to its over-length and the allowed width in the "Term" column can not hold that length. The current proc report in SAS is unable to handle this case and will still regard the term as in one row, thus the wrapped rows will be displayed from the very beginning without any indentation. Here comes the immediate consequence: it becomes so hard to tell by a glimpse whether a term displayed is a "Body System Class" or is a wrapped line from a sub-class or preferred term (e.g. "CARDIAC EFF" in the example). The above will usually not pass the stat review.

SOLUTION

Here comes the solution-RTF language. By inserting special RTF keywords ('\fixxx' or '\lixxx')into the medication term column, it will solve this problem in perfect way.

\lixxx means the paragraph in the cell (including the wrapped rows) will be indented from left-most by xxx

(width of indentation);

\fixxx means the first line will be indented xxx (width of indentation) from defined margin of the paragraph in the cell. Be noted that xxx here can be negative if used with '\lixxx' which indicates that the first line will be protruded against the rest of wrapped rows by |xxx|.

Below is the algorithm that needs to be applied into the production program:
Assume we have acquired the dataset with counts for each class/sub-class/term, and some of its variables are explained as below:

      CMACLAS —variable name of Anatomical Class;
      CMS1CLAS—variable name of Pharmacologic Class (level 1sub-class);
      CMS2CLAS—variable name of Pharmacologic Sub-Class (level 2sub-class);
      CMDECOD —variable name of WHO Drug Term;
      ROWTEXT —variable name of in output dataset for the Medication Term column;
      PRTSEQ —sequence number indicating the class level of each record.

The goal is:
1. Each Anatomical Class Term starts from left-most and be indented with 1 letter if wrapped to another line;
2. Each Pharmacologic Class Term is indented with 2 letters and indented with 1 more letter if wrapped to another line;
3. Each Pharmacologic Sub-Class Term is indented with 4 letters and indented with 1 more letter if wrapped to another line;
4. Each WHO Drug Term is indented with 6 letters and indented with 1 more letter if wrapped to another line;

To achieve the goal, we can define the medication term column ROWTEXT when producing the final dataset for output, as in the following way: (note: `ods escapechar="@";`)

```
if       PRTSEQ=1  then ROWTEXT="@R/RTF'\fi-100\li100 "||CMACLAS; *(ATC);
else if PRTSEQ=2  then ROWTEXT="@R/RTF'\fi-100\li300 "||CMS2CLAS; *Pharma Class;
else if PRTSEQ=3  then ROWTEXT="@R/RTF'\fi-100\li500 "||CMS1CLAS; *Pharma Sub;
else if PRTSEQ=4  then ROWTEXT="@R/RTF'\fi-100\li700 "||CMDECOD; *Who Drug;
```


Figure 3. Actual CM Tables after Applying RTF Modification

After updating the medication term column from above method, the final data for output can be input to regular Proc Report procedures or any output-generating macros that will produce a RTF output and the final output will appear as in above figure.

As one can see for the red part, now the wrapped rows will be indented at any desired spaces in order to be distinguished from the regular sub-classes rows or term rows. Regardless the actual length for any term, the program will indent the wrapped rows automatically which will satisfy the client a lot.

CONCLUSION

This paper has tried to give the reader a glimpse at the power of SAS ODS to resolve real problem. There have been tons of papers showing the basic concept of RTF application in SAS. In this paper, we hope to start from a practical perspective and to show that by applying the technique in SAS ODS RTF, we can greatly improve the accuracy and quality of outputs.

REFERENCES

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