

New PROC REPORT Procedure - An Enhanced PROC REPORT

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ABSTRACT

This paper is intended to present an enhanced proc report procedure. With traditional report procedure, statistics MEDIAN can not be calculated, BOX option can draw grills on the report table, but it can not draw lines separating different headers, also it can not be used with text FLOW option which is used to wrap long texts. When FLOW option is used to wrap a long text, it puts every wrapped part of the text in a separate line, it's hard even impossible to tell which line is wrapped down from its previous line. With the enhanced procedure, statistics MEDIAN can be calculated, BOX option and text FLOW option have been improved. Now, BOX option can draw vertical and horizontal lines to separate headers and it can also be used with FLOW option. When FLOW option is used to wrap long texts, it groups the wrapped parts by the original texts, it's easy to tell which line is wrapped down from its previous line.

INTRODUCTION

Proc report procedure is widely used in report writing which includes data listing, summary statistics, etc. Often, clients/users want to calculate not only N, MEAN, STD, MIN, MAX, ... but also MEDIAN, they also want to put grills on the report table to clearly separate each cell from the other and separate headers from each other, however the traditional report procedure has some limits:

1. MEDIAN can not be calculated using the procedure.
2. With SAS 6.11® and late version, BOX option was added to draw grills on the report table. However the option is very limited, it can not meet user's requirements.
 - a) It can not draw vertical lines separating column headers from each other (see table 3).
 - b) It can not draw horizontal lines separating different level headers when ACROSS variables are used (see table 3).
 - c) Wrapping text is required frequently when there is not enough space; When there is a long text to be listed and wrapped, traditional report procedure puts every wrapped part of the text in a separate line, there is no difference between lines, it's hard even impossible to tell whether each line is a complete item or just a wrapped part of a long text, that makes the table/listing confusing. Besides, the BOX option can not be used with text FLOW option which wraps the long text (see table 1).

With the enhanced report procedure, those issues have been resolved:

1. MEDIAN can be calculated (see table 4).
2. BOX option has been improved.
 - a) It draws vertical and horizontal lines to separate column headers from each other (see table 4).
 - b) In the case that a long text is listed and wrapped, by

indentation it groups all the wrapped parts of the same long text and makes it easy to review the wrapped text (see table 2).

EXAMPLES

Example 1.

The following is the layout of a SAS data set AE containing medical center (TRIAL), patient id (PTNO) and adverse event text (AETX) columns.

SAS Data of Patient Adverse Events

OBS	TRIAL	PTNO	AETX
1	004	023	ELEVATED GAMMA GT
2	004	023	INCREASED ALK PHOS. ELEVATED LIVER FUNCTION ENZYMES
3	004	023	HEARTBURN
4	004	203	HEARTBURN
5	004	203	PATIENT FALL-KNEE PAIN. HURT BILAT KNEES (R) >(L)

Using traditional proc report procedure to report the adverse events(see appendix for the program):

Table 1: List of Adverse Events

Medical Center	Patient	Adverse Event
4	023	ELEVATED GAMMA GT INCREASED ALK PHOS. ELEVATED LIVER FUNCTION ENZYMES HEARTBURN
	203	HEARTBURN PATIENT FALL-KNEE PAIN. HURT BILAT KNEES (R) >(L)

In order to fit in the limited space in table 1, adverse event texts are wrapped by using FLOW option, however BOX option can not be used and it's hard to review the table, adverse event 'INCREASED ALK PHOS. ELEVATED LIVER FUNCTION ENZYMES' for patient 023 is wrapped into three lines 'INCREASED ALK PHOS.', 'ELEVATED LIVER FUNCTION' and 'ENZYMES', each of them could be considered as a separate item, without looking at the original data it's impossible to know that these three lines refer to the same adverse event.

Using enhanced report procedure to report the adverse events(see appendix for the program):

Table 2: List of Adverse Events

Medical Center	Patient	Adverse Event
4	023	ELEVATED GAMMA GT INCREASED ALK PHOS. ELEVATED LIVER FUNCTION ENZYMES HEARTBURN
	203	HEARTBURN PATIENT FALL-KNEE PAIN. HURT BILAT KNEES (R) > (L)

In order to fit in the limited space in table 2, adverse event texts are wrapped by using FLOW option, BOX option is used to make it easy to review the table. For instance, adverse event 'INCREASED ALK PHOS. ELEVATED LIVER FUNCTION ENZYMES' for patient 023 is wrapped into three lines 'INCREASED ALK PHOS.', 'ELEVATED LIVER FUNCTION' and 'ENZYMES'. By indentation it's very easy to know that they refer to the same adverse event.

Example 2.

SAS data set DEMO contains patient's demographic information : age group (AGEGRP), gender (SEX), heart rate (HRSIT). The following example is to create summary table(mean, median, min, max) about heart rate by age group and gender.

Using traditional proc report procedure to generate report table(see appendix for the program):

Table 3: Summary of patient's heart rate information

Age Group	Female			Male		
	Mean	Min	Max	Mean	Min	Max
18 - 40	78	60	100	67	56	88
41 -50	75	56	96	72	56	92
51 -60	76	56	104	72	60	88
> 60	75	36	110	74	57	88

In table 3, traditional proc report can not calculate MEDIAN, it can not draw vertical or horizontal lines to separate headers, gender group is not well organized.

Using enhanced report procedure to generate report table(see appendix for the program):

Table 4: Summary of patient's heart rate information

Age Group	Female				Male			
	Mean	Median	Min	Max	Mean	Median	Min	Max
18 - 40	78	80	60	100	67	64	56	88
41 -50	75	76	56	96	72	68	56	92
51 -60	76	76	56	104	72	70	60	88
> 60	75	73	36	110	74	74	57	88

In table 4, enhanced report procedure can calculate MEDIAN, it can also draw vertical and horizontal lines to separate headers, now gender group is well organized.

USAGE COMPARISON BETWEEN TRADITIONAL PROC REPORT AND THE ENHANCED REPORT PROCEDURE

The enhanced report procedure is very easy to use, Using the enhanced procedure is similar to using the traditional report procedure(see appendix for program examples). The following is the comparison between traditional procedure and enhanced procedure.

The syntax for traditional report procedure :

```
PROC REPORT <DATA=SAS-data-set>
    <OUT=SAS-data-set>
    <WINDOWS|NOWINDOWS> <VARDEF=divisor>
    <layout-options(s)> <column-header-option(s)>
    <storage-and-retrieval-option(s)>
    <window-options(s)>;
COLUMN column-specification(s);
DEFINE report-item </ <usage> <attributes(s)>
    <option(s)> <justification>
    <COLOR=color>
    <'column-header-1' <... 'column-header-n'>>;
BY <DESCENDING> variable-1 <...
    <DESCENDING> variable-n <NOTSORTED>;
... ..
```

RUN;

The syntax for enhanced report procedure :

```
NEWPROC REPORT <DATA=SAS-data-set>
    <VARDEF=divisor>
    <layout-options(s)><column-header-option(s)>
    <storage-option(s)> ;
%_COLUMN_ ( column-specification(s) ) ;
%_BY_ (<DESCENDING> variable-1 <...
    <DESCENDING> variable-n ) ;
%_DEFINE_ ( report-item </ <usage> <attributes(s)>
    <option(s)> <justification>
    <COLOR=color>
    <'column-header-1' <... 'column-header-n'>>;
    ... ..
```

ENHANCE ;

Layout - options for traditional procedure

BOX
CENTER|NOCENTER
COLWIDTH=column-width
MISSING
LS=line-size
PS=page-size
PANELS=number-of-panels
PSPACE=space-between-panels
SHOWALL
SPACING=space-between-columns
WRAP

Layout - options for enhanced procedure

BOX=YES|NO
CENTER=YES|NO
COLWIDTH=column-width
MISSING=YES|NO
LS=line-size
PS=page-size
PANELS=number-of-panels
PSPACE=space-between-panels
SHOWALL=YES|NO
SPACING=space-between-columns
WRAP=YES|NO

Column- header - options for traditional procedure

HEADLINE
HEADSKIP
NAMED
NOHEADER
SPLIT='character'

Column- header - options for enhanced procedure

HEADLINE=YES|NO
HEADSKIP=YES|NO
NAMED=YES|NO
HEADER=YES|NO
SPLIT='character'

Storage - and - retrieval - options are simplified to storage - option in the enhanced procedure:

FILE= filename(whole file name including path , if no path specified, a temporary file will be created)

Statistics - options for traditional procedure

Median can not be calculated

Statistics - options for enhanced procedure

Median can be calculated with
key word MEDIAN specified

Beside the above listed different usage of options and statements, all the other statements and usage are the same for both traditional report procedure and enhanced report procedure, they include BREAK, COMPUTE ... ENDCOMP, RBREAK , FREQ, WEIGHT, ... etc.

PROCEDURE SHIPMENT

The enhanced report procedure can be shipped as a separate module, it can be installed into your SAS System, once installed there is no need to run any programs before using the procedure.

CONCLUSIONS

The new PROC REPORT procedure improved the traditional PROC REPORT procedure, it includes more features. The syntax for new procedure is similar to the one for traditional procedure, except that the %_BY_ statement must appear before %_DEFINE_ statement and NOTSORTED option for %_BY_ statement is not supported.

TRADEMARKS

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REFERENCES

SAS Institute Inc. (1990), *SAS Guide to the REPORT Procedure, Usage and Reference: Version 6, First Edition*, Cary, NC: SAS Institute Inc.

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APPENDIX

Program used to generate table 1 :

TITLE 'Table 1: List of Adverse Events';

PROC REPORT DATA=AE SPLIT='/' PS=60 HEADLINE
NOWINDOWS ;

COLUMN TRIAL PTNO AETX;
DEFINE TRIAL/ORDER F=5.0 WIDTH=8 CENTER
'MEDICAL/CENTER' ;
DEFINE PTNO/ORDER F=5.0 WIDTH=8 CENTER
'PATIENT' ;
DEFINE AETX/ WIDTH=25 FLOW CENTER
'ADVERSE/EVENT' ;

RUN;

Program used to generate table 2 :

```
TITLE 'Table 2: List of Adverse Events';

NEWPROC REPORT DATA=AE SPLIT='/'
                BOX=YES PS=60 ;
%_COLUMN_ (TRIAL PTNO AETX);
%_DEFINE_ (TRIAL/ORDER F=5.0 WIDTH=8 CENTER
           'MEDICAL/CENTER' );
%_DEFINE_ (PTNO/ORDER F=5.0 WIDTH=8 CENTER
           'PATIENT' );
%_DEFINE_ (AETX/ WIDTH=30 FLOW CENTER
           'ADVERSE/EVENT' );
ENHANCE;
```

Program used to generate table 3 :

```
DATA DEMO;
SET DEMO;
MHSIT=HRSIT ;
MIHSIT=HRSIT ;
MXHSIT=HRSIT ;
KEEP PTNO AGEGRP SEX HRSIT MHSIT MIHSIT
      MXHSIT ;
RUN;

TITLE "Table 3: Summary of patient's heart rate information";

PROC REPORT DATA=DEMO SPLIT='/' PS=60 BOX
            SPACING=0 NOWINDOWS ;
COLUMN AGEGRP SEX, (HRSIT MIHSIT MXHSIT) ;
  DEFINE AGEGRP/GROUP F=AGE. WIDTH=10
        CENTER 'AGE GROUP' ;
  DEFINE SEX/ACROSS F=SEX.  '' ;
  DEFINE HRSIT/ANALYSIS MEAN F=8.0 WIDTH=8
        CENTER 'MEAN' ;
  DEFINE MIHSIT/ANALYSIS MIN F=8.0 WIDTH=8
        CENTER 'MIN' ;
  DEFINE MXHSIT/ANALYSIS MAX F=8.0
        WIDTH=8 CENTER 'MAX' ;
RUN;
```

Program used to generate table 4 :

```
DATA DEMO;
SET DEMO;
MHSIT=HRSIT ;
MIHSIT=HRSIT ;
MXHSIT=HRSIT ;
KEEP PTNO AGEGRP SEX HRSIT MHSIT MIHSIT
      MXHSIT ;
RUN;
```

TITLE "Table 4: Summary of patient's heart rate information";

```
NEWPROC REPORT DATA=DEMO SPLIT='/' PS=60
                BOX=YES SPACING=0 ;
%_COLUMN_ (AGEGRP SEX,
           (HRSITM HRSITMI HRSIT MXHSIT) );
%_DEFINE_ (AGEGRP/GROUP F=AGE. WIDTH=10
           CENTER 'AGE/GROUP' );
%_DEFINE_ (SEX/ACROSS F=SEX.  '' );
%_DEFINE_ (HRSIT/ANALYSIS MEAN F=4.0
           WIDTH=6 CENTER 'MEAN' );
%_DEFINE_ (MHSIT/ANALYSIS MEDIAN F=6.0
           WIDTH=6 CENTER 'MEDIAN' );
%_DEFINE_ (MIHSIT/ANALYSIS MIN F=4.0
           WIDTH=6 CENTER 'MIN' );
%_DEFINE_ (MXHSIT/ANALYSIS MAX F=4.0
           WIDTH=6 CENTER 'MAX' );
ENHANCE ;
```