More on SAS functions

As I demonstrated in my SAS online course ‘SAS programming for beginners’ , SAS functions are pre-written routines that provide programming shortcuts for many calculations and manipulations of data. SAS functions can be used in DATA step programming statements. Starting from this session, I will introduce you to more SAS functions.

In this video, I will focus on functions that convert data:

- convert character data to numeric data
- convert numeric data to character data

Introduction to Converting Data

- The INPUT function (not the Data step INPUT statement to read the data) converts character data values to numeric values.
- The PUT function converts numeric data values to character values.

Potential Problems of Omitting INPUT or PUT

What happens if you skip the INPUT function or the PUT function when converting data?

SAS will detect the mismatched variables and will try an automatic character-to-numeric or numeric-to-character conversion. However, this process doesn't always work. Suppose each value of PayRate begins with a dollar sign ($). When SAS tries to automatically convert the values of PayRate to numeric values, the dollar sign blocks the process. The values cannot be converted to numeric values. Similar problems can occur with automatic numeric-to-character conversion.

Therefore, it is always best to include INPUT and PUT functions in your programs to avoid data type mismatches and automatic conversion.

Automatic Conversion

Character-to-Numeric: By default, if you reference a character variable in a numeric context (such as an arithmetic operation, comparing to a numeric value using a comparison operator, specified in a function that requires numeric arguments, etc), SAS tries to convert the variable values to numeric.

The automatic conversion

- uses the w. informat, where w is the width of the character value that is being converted
- produces a numeric missing value from any character value that does not conform to standard numeric notation

Numeric-to-Character: The automatic conversion of numeric data to character data is very similar to character-to-numeric conversion. Numeric data values are converted to character values whenever they are used in a character context (such as assign the numeric value to a previously defined character variable, use the numeric value with an operator that requires a character value, specify the numeric value in a function that requires character arguments, etc)

Specifically, SAS writes the numeric value with the BEST12. format, and the resulting character value is right-aligned.

Whenever data is automatically converted, a message is written to the SAS log stating that the conversion has occurred.

SAS Log

```
4       data hrd.newtemp;
5          set hrd.temp;
6          Salary=payrate*hours;
7       run;

NOTE: Character values have been converted
      to numeric values at the places given
      by: (Line):(Column).

      6:11

NOTE: The data set HRD.NEWTEMP has 40 observations
      and 19 variables.
NOTE: The data statement used 0.78 seconds.
```

SAS Log

```
9     data hrd.newtemp;
10       set hrd.temp;
11       SiteCode=site;
12    run;

NOTE: Numeric values have been converted
      to character values at the
      places given by: (Line):(Column).

      11:13

NOTE: The data set HRD.NEWTEMP has 40 observations
      and 19 variables.
NOTE: The data statement used 1.06 seconds.
```

Explicit Character-to-Numeric Conversion

You can explicitly convert the character values of a character variable to numeric values by using the INPUT function.

General form, INPUT function:

INPUT (source, informat) Example: input (raw_score, 7.)

where

- source indicates the character variable, constant, or expression to be converted to a numeric value
- a numeric informat must also be specified

When choosing the informat, be sure to select a numeric informat that can read the form of the values of the character variable.

For example:

Character Value	Informat
2115233	7.
2,115,233	COMMA9.

Explicit Numeric-to-Character Conversion

You can use the PUT function to explicitly convert numeric data values to character data values.

General form, PUT function:

PUT(source, format) Example: put (gender_code, 1.)

where

- source indicates the numeric variable, constant, or expression to be converted to a character value
- a format matching the data type of the source must also be specified

Additional Note

- The PUT function always returns a character string.
- The PUT function returns the source written with a format. The format must agree with the source in type.
- Numeric formats right-align the result; character formats left-align the result.
- If you use the PUT function to create a variable that has not been previously identified, it creates a character variable whose length is equal to the format width.

Reminder: SAS formats control the written appearance of data values. SAS informats read data into SAS.