Donut Charts: Poking Holes in Pie Charts
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ABSTRACT

Two popular graphs used throughout Asian business and print media are the donut chart and subgrouped pies. Donut charts are pie charts with a hole in the middle where text or graphics can be placed for added emphasis. Subgrouped pie charts have two or more concentric circles with the slices arranged for easy comparison of slice variables. Donut charts can also be subgrouped. Using the SUBGROUP= option produces a legend with the PIE and DONUT statements.

INTRODUCTION

In Release 6.09 of the SAS® System, donut charts and subgrouped pies and donuts are available using PROC JCHART, an experimental procedure. In Release 6.10, these new features have been added to the GCHART procedure.

DONUT CHARTS

Donut charts have been widely used in Asian, mostly Japanese, business and technical publications for many years. Recently we have seen an increase in the use of such graphs in the United States in such publications as the New York Times and the Wall Street Journal.

The following is an example of a simple donut chart, starting at 3 o'clock, drawing the pie slices in a counterclockwise direction.

**Output 1** Simple Donut Chart

The DONUT statement uses all of the same options as the PIE statement, with the additions of DONUTPCT= and LABEL=.

The value of DONUTPCT= is the size of the donut hole. Valid values for DONUTPCT= are between 0 and 99. The value is a percentage of the whole pie. The default value for DONUTPCT= is 25.

The LABEL= option is used to place text inside the donut hole. Values for the LABEL= option are text description parameters and text strings. Each text string must be enclosed in quotes and separated by blanks.

A DONUT statement for the variable DEPT, in the input SAS data set TOTALS uses the following code and created the Donut chart in Output 1:

```sas
title j=c h=3 'Department Store Sales';
proc gchart data=totals;
donut dept /
  sumvar=sales
  fill=solid;
run;
```

JSTYLE is an option for PROC GCHART that has been available since Release 6.07. JSTYLE implements Japanese-style pie charts where the graph starts at 12 o'clock, drawing the pie slices in clockwise, descending order. The other category is always the last slice.

**Output 2** Donut Chart Using DONUTPCT=, LABEL=, and JSTYLE Options

Using the following code to implement the JSTYLE option and create a donut hole of 40 percent, and the swiss font to label the donut hole with a "%" would look like Output 2:

```sas
proc gchart data=totals;
donut dept /
  sumvar=sales
  fill=solid
  jstyle
donutpct=40
  label=(font='swiss b=5 ' '%');
run;
```
Using the previous example and adding the EXPLODE= option uses the following code and creates Output 3:

```sas
proc gchart data=totals;
donut dept /
  sumvar=sales
  fill=solid
  jstyle
donutpct=40
  explode='clothing'
  label=(font=swiss h=5 '%');
run;
```

Output 3  Donut Chart Using the EXPLODE= Option

**SUBGROUPING**

The SUBGROUP= option places the subgroups in concentric pie or donut charts. The concentric chart sizes are evenly divided between the donut hole (if one is used) and the outside chart radius.

A simple pie chart using the variable CITY for subgroupsing uses the following code and creates Output 4:

```sas
title1 j=c h=3 'Department Store Sales By City';
proc gchart data=totals;
pie dept /
  sumvar=sales
  fill=solid
  jstyle
  coutline=black
  subgroup=city;
run;
```

Output 4  Subgrouped Pie Chart

The subgroup rings are ordered from outer to inner alphabetically if the subgroup variable is character, and from lowest to highest if the variable is numeric.

The order of the slices for subgroups is determined by the outermost subgroup. Any of the inner subgroups that have a variable that is not in the outer subgroup is placed last. That then sets the order for any remaining subgroups.

Subgroup labels are placed on the right side of the chart. If you use the GROUP= option to generate multiple subgrouped pie charts on one page, only the upper left chart has the subgroups labeled.

The slice labeling options, INSIDE, OUTSIDE, ARROW and NONE, are all available with subgrouped pies and donuts. However OUTSIDE and ARROW are not recommended as they cause the graph to appear cluttered.

In previous releases of PROC GCHART, when text labels overlapped, a note was written to the log, and the text was suppressed. With Release 6.10, labeled text is not suppressed if the text overlaps. Now that the Graphics Editor is available in SAS/GRAPH software, you may separate the overlapped text and reposition it for pie, donut, and subgrouped charts.

The default FILl= option for subgrouped pies and donuts is empty as it is for regular pie charts. Using FILL=SOLID or PATTERN statements generally makes the subgrouped pie chart easier to read. Using COUTLINE= outlines each of the subgroups. This enhances the appearance of the graph.

Note: The EXPLODE option is not supported with SUBGROUP=.

SUBGROUP= produces a legend for the slices. You may enhance the legend by using LEGEND=LEGENDn with the LEGEND statement. In Release 6.10 of PROC GCHART, the LEGEND statement is also available for standard pie charts without subgrouping.

A simple pie chart using the LEGEND= option uses the following
code and creates Output 6:

```sql
title j=c h=3 'Department Store Sales';
legend2 value=(f=swiss b=2);
proc gchart data=totals;
  pie dept / sumvar=sales fill=solid jstyle
  legend=legend2;
run;
```

Output 5  Pie Chart with a Legend

Suppressing the legend with subgrouping and adding slice labeling inside with a text color of cyan uses the following code and creates Output 6:

```sql
title j=c h=3 'Department Store Sales By City';
proc gchart data=totals;
  pie dept / sumvar=sales fill=solid jstyle subgroup=city ctext=cyan slice=inside nolegend;
run;
```

Grouping the charts by YEAR in addition to subgrouping by CITY uses the following code and creates Output 7:

```sql
title j=c h=3 'Department Store Sales';
title2 j=c h=3 'By City, By Year';
proc gchart data=totals;
  donut dept / sumvar=sales fill=solid jstyle subgroup=city ctext=cyan slice=inside nolegend group=year across=2;
run;
```

Output 7  Subgrouping with Grouping

Finally, graphics drawn with the Graphics Editor or images imported using the Graphics Editor, can enhance a donut chart with the graphics placed inside the donut hole rather than using a label. Output 8 and Output 9 show two donut charts with images placed inside the donut hole.
Output 8  Graphics Used inside the Donut Hole

Output 9  Graphics Used inside the Donut Hole

CONCLUSION

The donut and subgrouped pie charts bring a new dimension and interesting possibilities to pie charts. While these charts are mainly used in Asia, we hope that this is an innovation in PROC GCHART that you will find useful in any country.

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