

SAS/GRAPH Introduction

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Agenda

- Overview
- Components of SAS/GRAPH Software
- Device-Based vs. Template-Based Graphics
- Graph Types
- A Typical SAS/GRAPH Program
- Getting Started



Overview

SAS/GRAPH is the data visualization and presentation (graphics) component of the SAS System.



Overview

SAS/GRAPH

- Visually represents the relationship between data values
- Produces two- and three-dimensional graphs, including charts, plots, maps
- Can combine several graphs into one
- Supports creation of custom graphics



Overview

SAS/GRAPH

- Allows addition of titles, footnotes and notes
- Supports selection of text fonts, colours, patterns, line styles
- Provides control over size and position of many graphics elements



Overview

SAS/GRAPH

- Creates presentation graphics:
 - Text slides
 - Display of several graphs at one time
 - Combination of graphs and text
 - Automated presentations



Overview

SAS/GRAPH

- Generates a wide variety of graphics output:
 - Vector graphics, bitmap images, ActiveX, Java
 - For screen, web browsers, hardcopy devices
- Supports ODS destinations:
 - LISTING, HTML, RTF, PDF, PRINTER
- Graphs can be stored in SAS catalogs:
 - Replay, recombine, export, print



Overview

SAS/GRAPH

- Provides map data sets, fonts
- Provides utility procedures for:
 - Map import / map creation / map manipulation
 - Font creation
 - Device customization
 - Checking the SAS/GRAPH environment settings



Components of SAS/GRAPH

- Device-based SAS/GRAPH procedures
- Annotate Facility
- Data Step Graphics Interface
- Network Visualization (NV) Workshop



Components of SAS/GRAPH

- SAS/GRAPH statistical graphics suite
 - Part of ODS Statistical Graphics
 - Template-based

Provides these features:

- Statistical Graphics (SG) procedures
- Graph Template Language
- ODS Graphics Editor
- ODS Graphics Designer



Device-Based vs. Template-Based Graphics

SAS/GRAPH produces graphics using two very distinct systems:

- Device-Based
- or
- Template-Based

Note: Most users are familiar with the traditional device-based system for producing graphics



Device-Based Graphics

- SAS/GRAPH output generated by a default or user-specified device (DEVICE= option)
 - DEVICE= Examples:
WIN, GIF, PNG, JPEG, ACTIVEX, SVG, HPGL
 - Procedure Examples:
GCHART, GPLOT, GMAP, GBARLINE, G3D, GCONTOUR

Note: GOPTIONS control the graphical environment



Template-Based Graphics

- SAS/GRAPH output generated based on an ODS template of type STATGRAPH
 - Procedure Examples:
SGPLOT, SGPANEL, SGSCATTER, SGRENDER

Note: ODS GRAPHICS statement controls the graphical environment. GOPTIONS have no effect

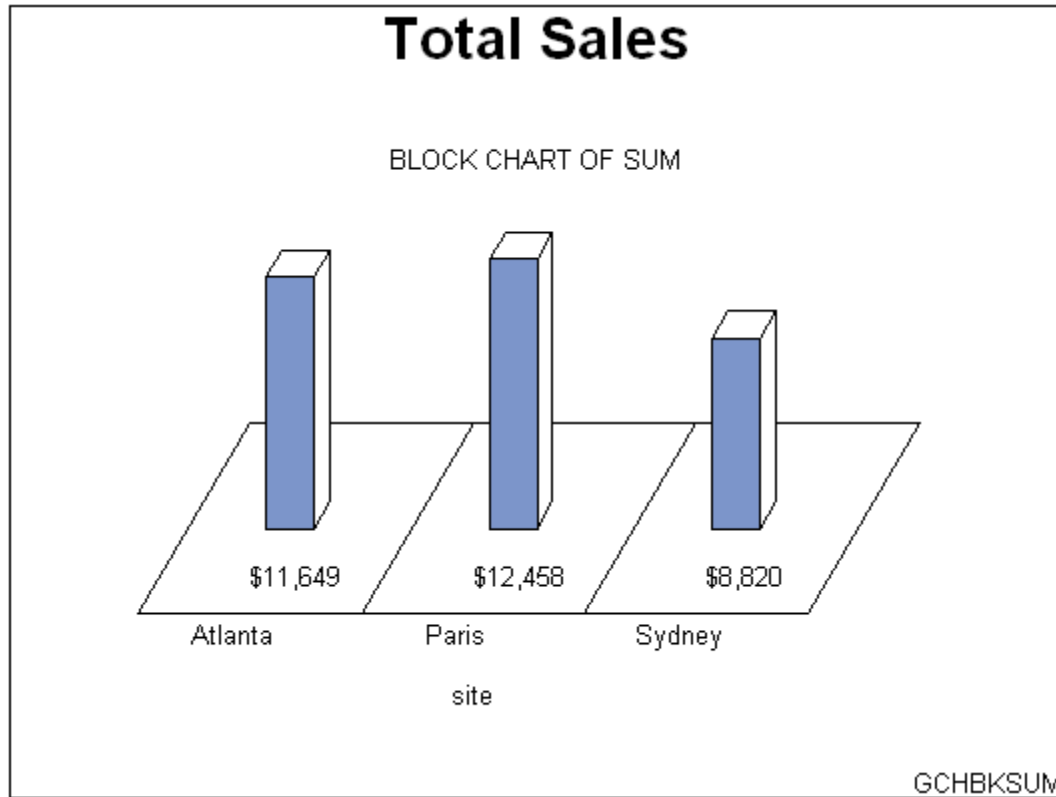


Graph Types: Overview

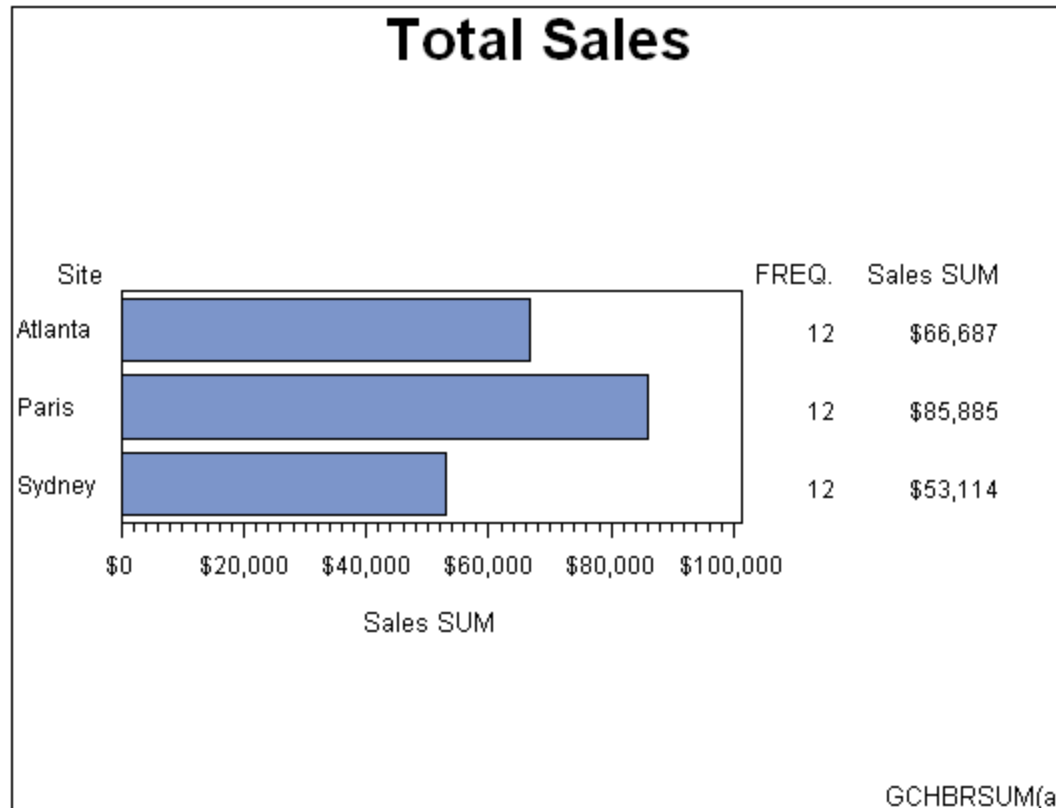
- Charts
- Two-Dimensional Plots
- Three-Dimensional Plots
- Maps
- KPI Charts (KPI = Key Performance Indicator)
- Text Slide and Presentation Graphics
- Custom Graphics



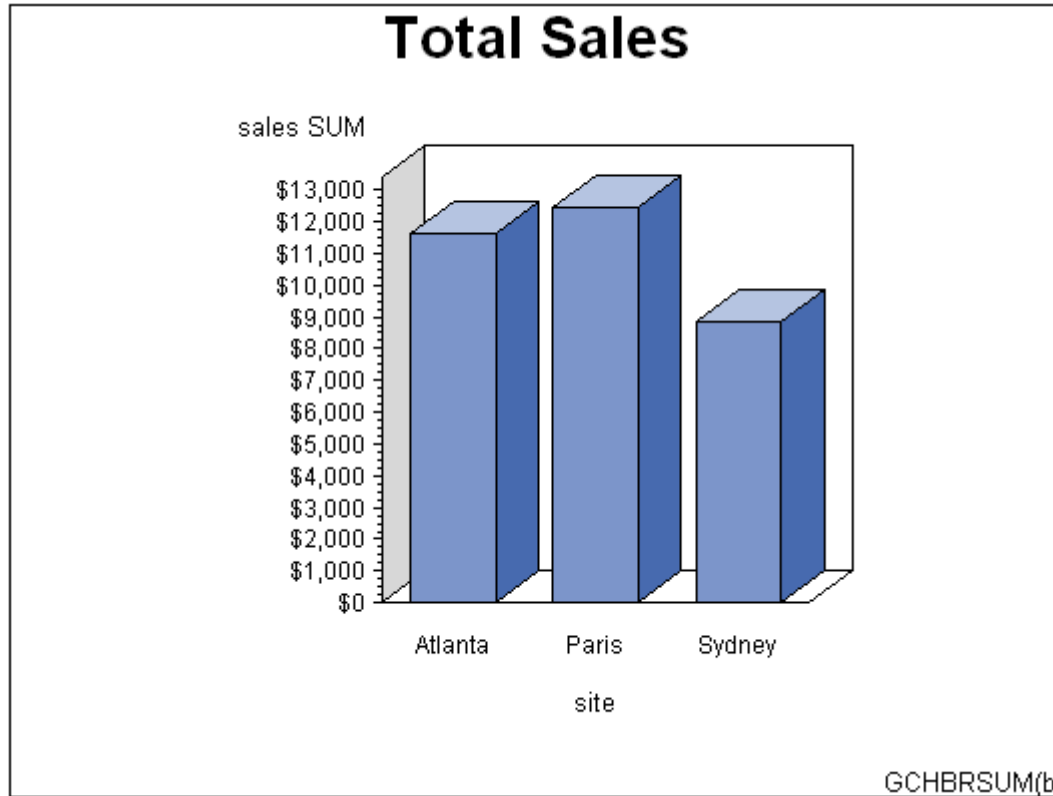
Graph Types: Block Charts



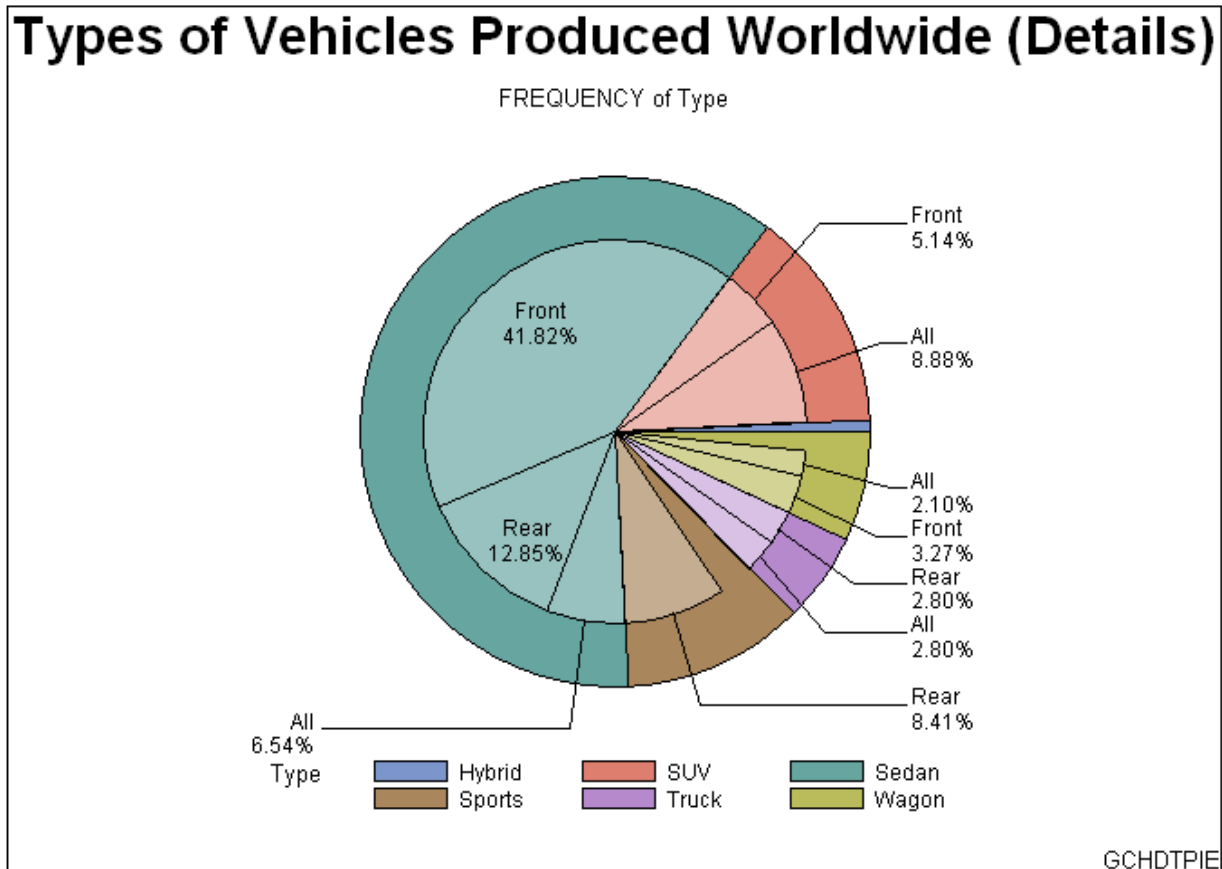
Graph Types: Horizontal Bar Charts



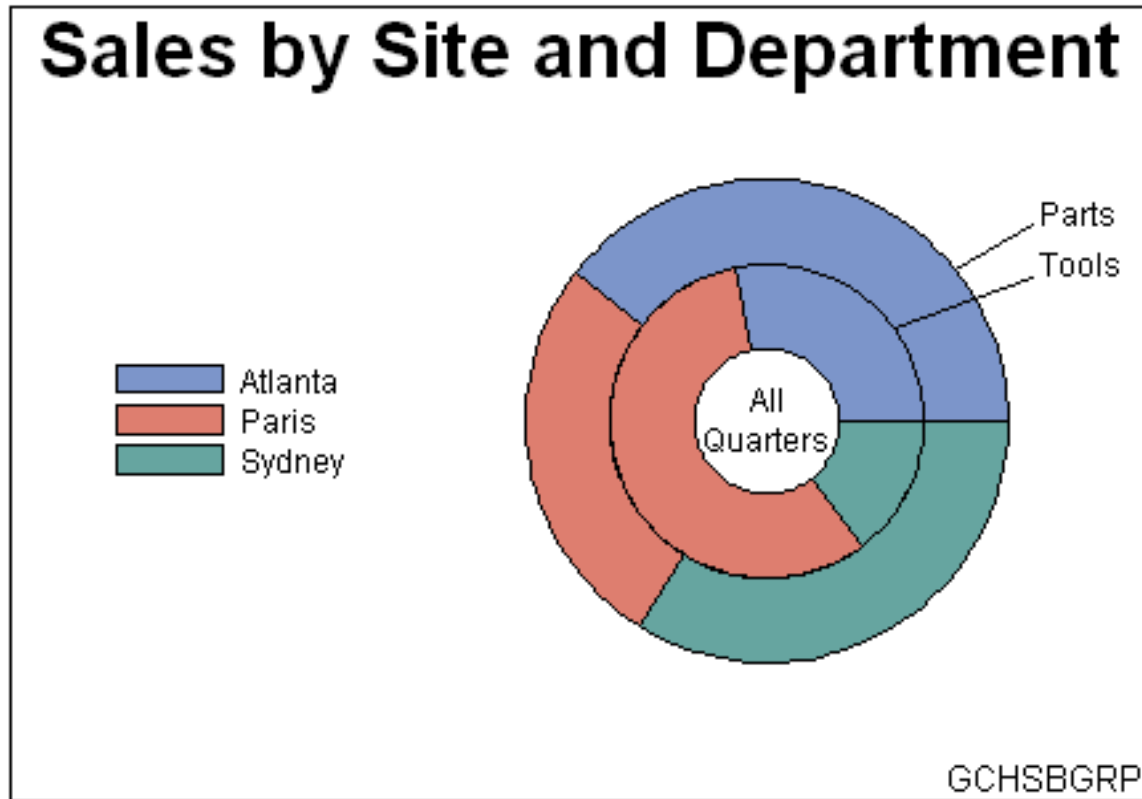
Graph Types: Vertical Bar Charts



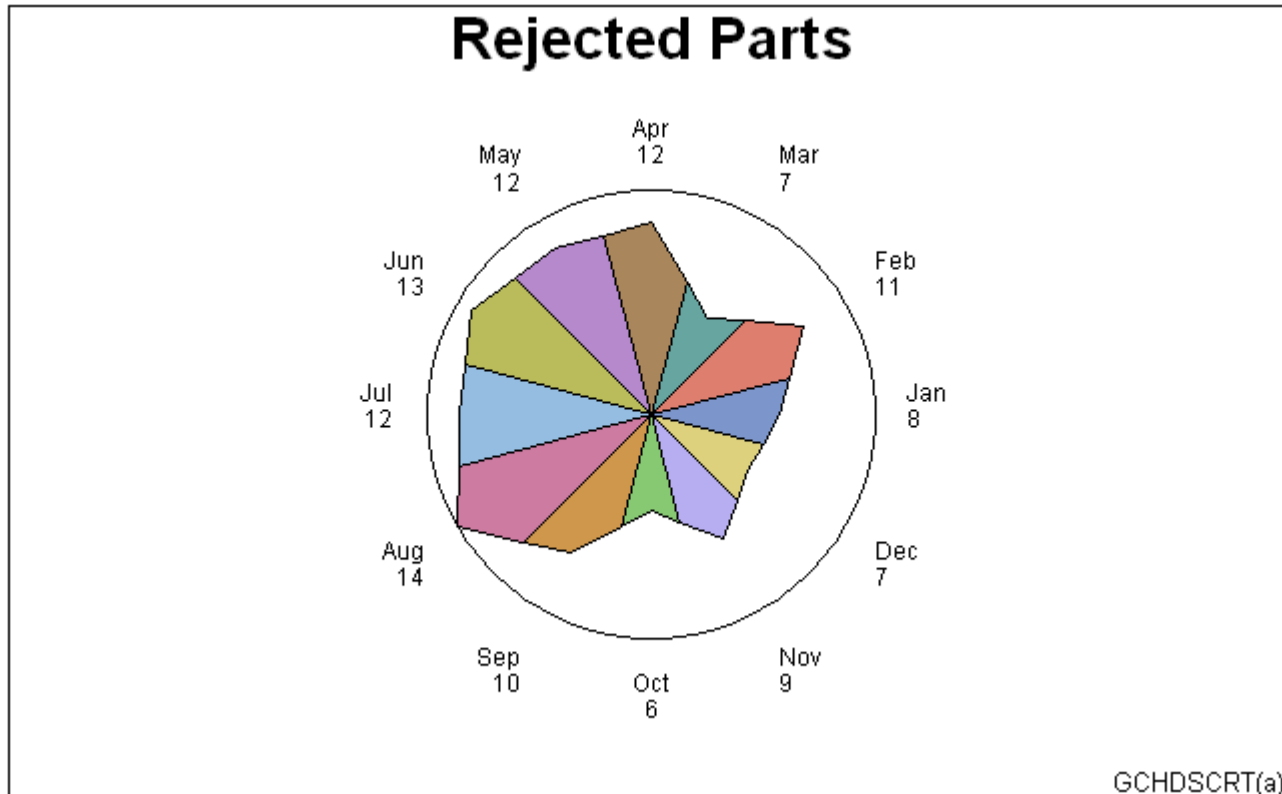
Graph Types: Pie Charts



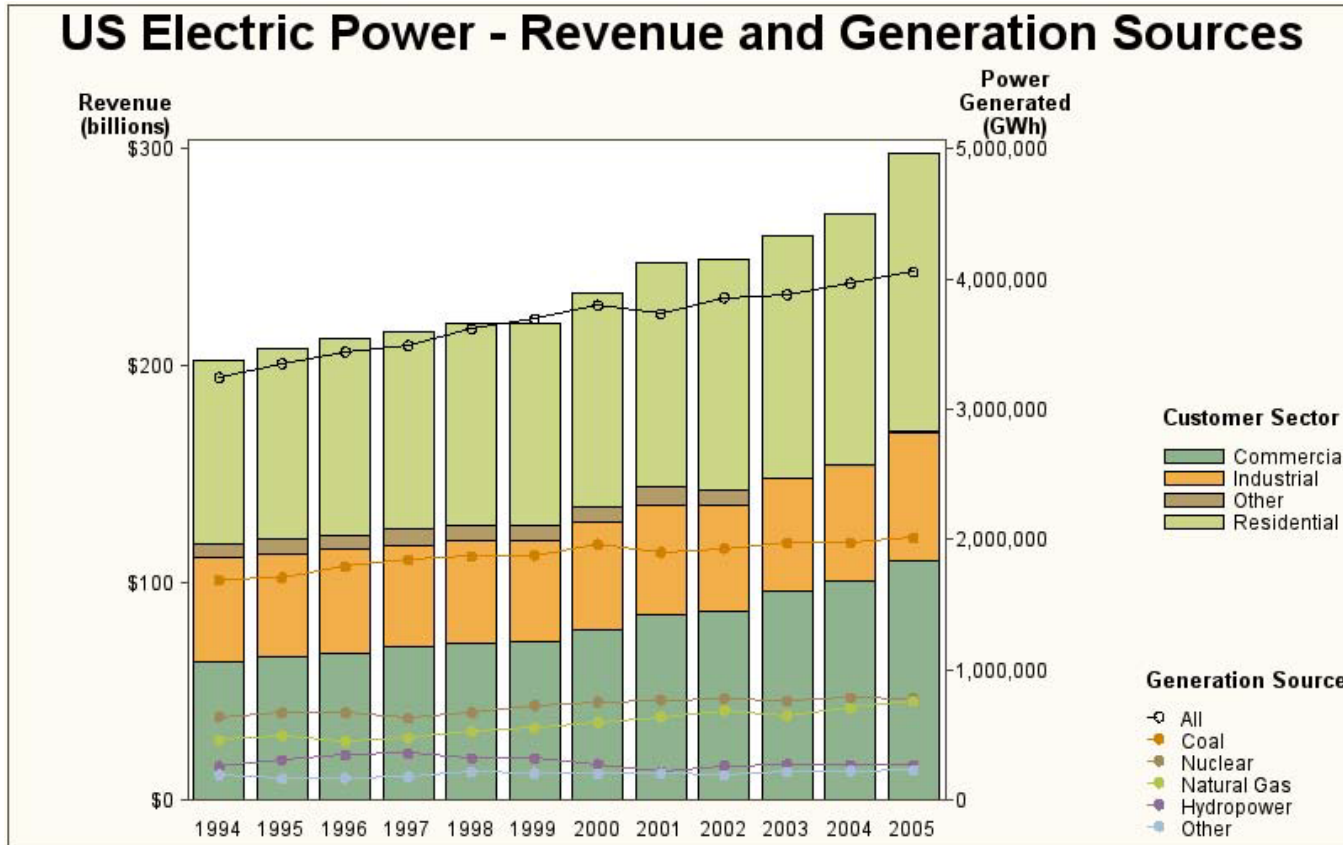
Graph Types: Donut Charts



Graph Types: Star Charts



Graph Types: Bar-Line Charts

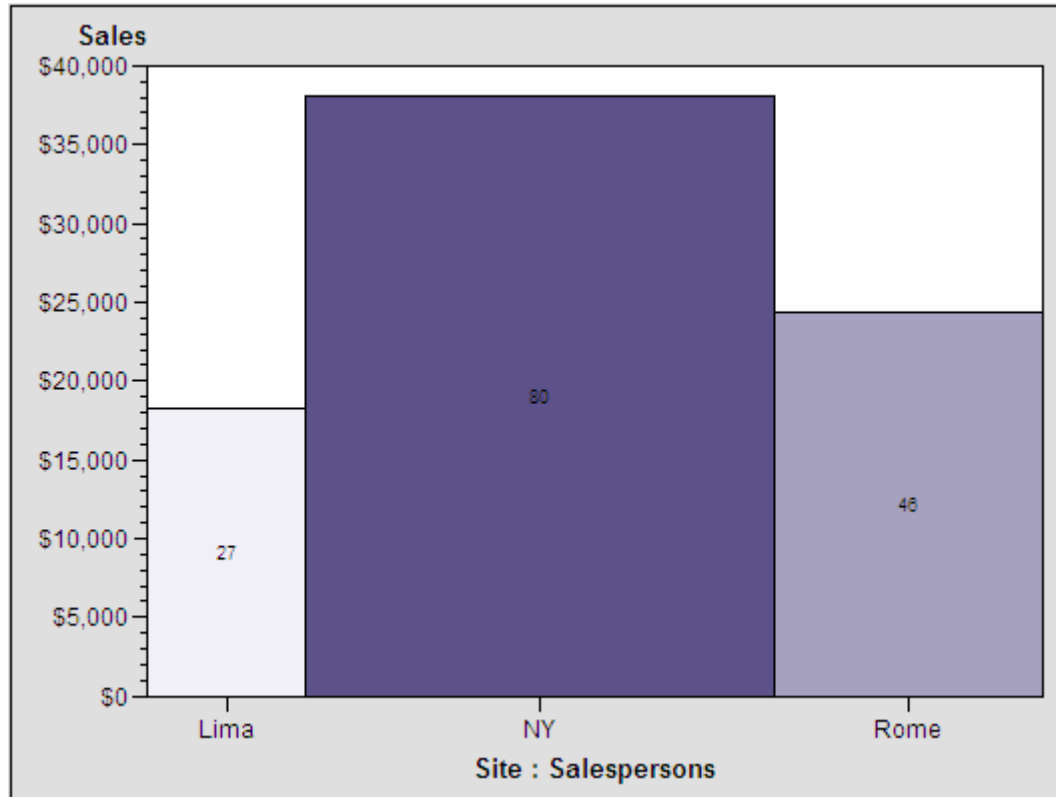


GBLPOWER

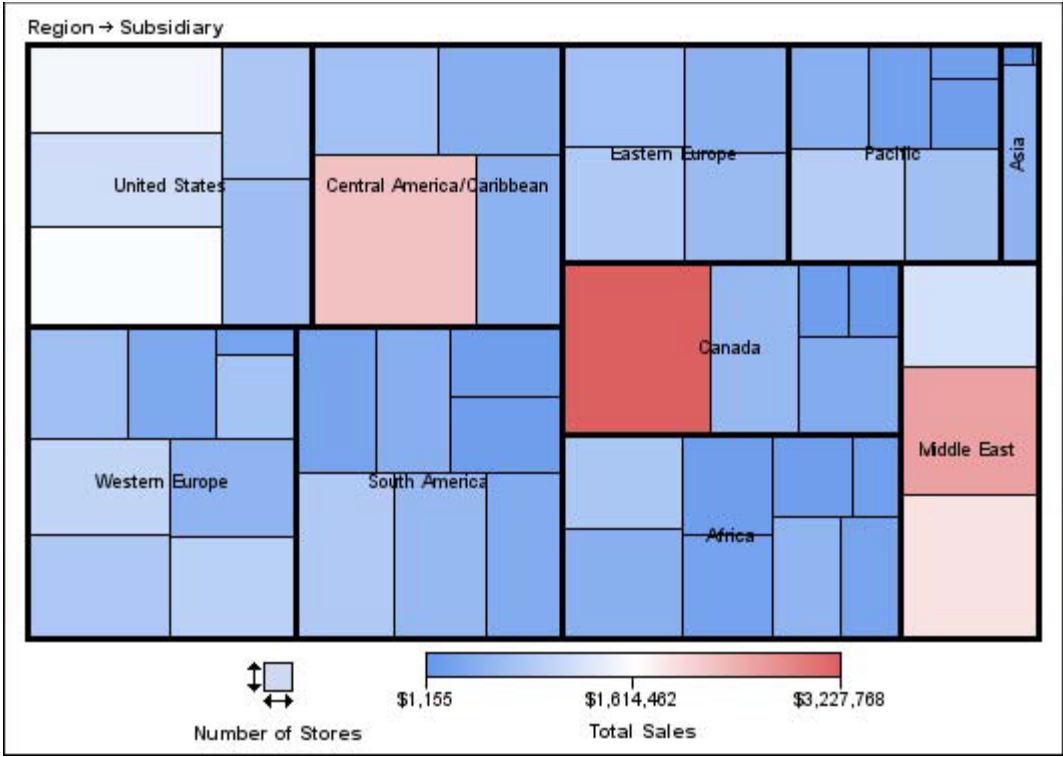
[Link to Bar Data: USEIA Energy Customer Sectors](#)
[Link to Line Data: USEIA Energy Generation Sources](#)



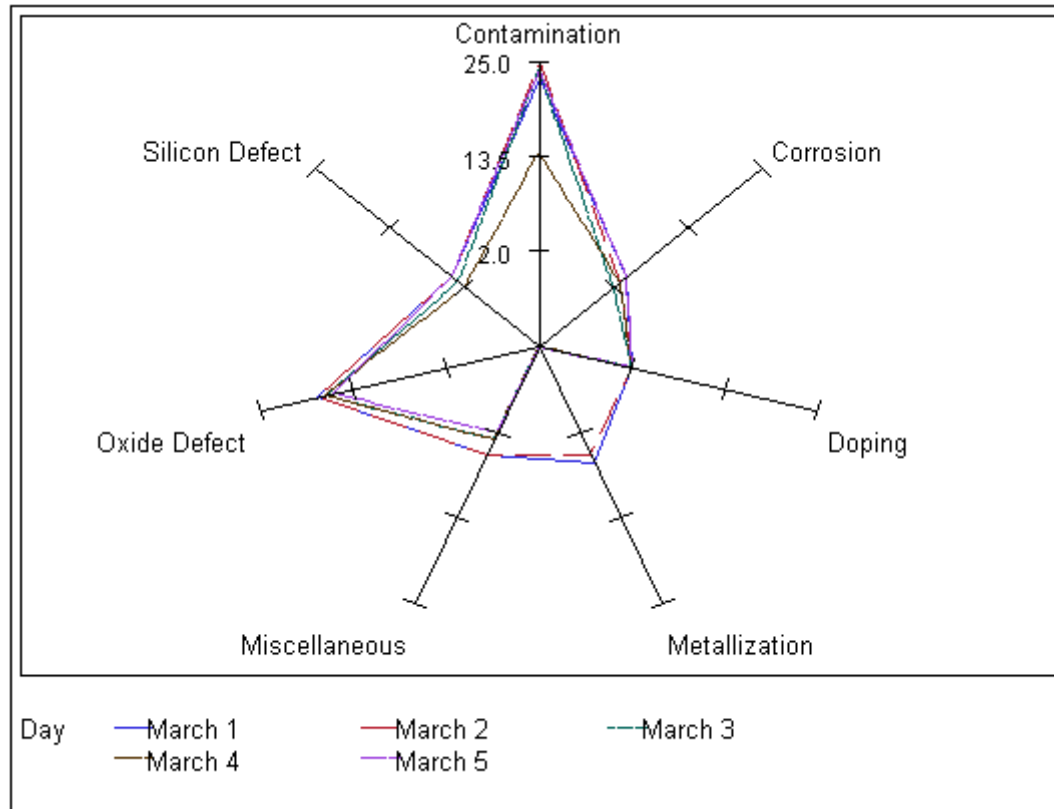
Graph Types: Area Bar Charts



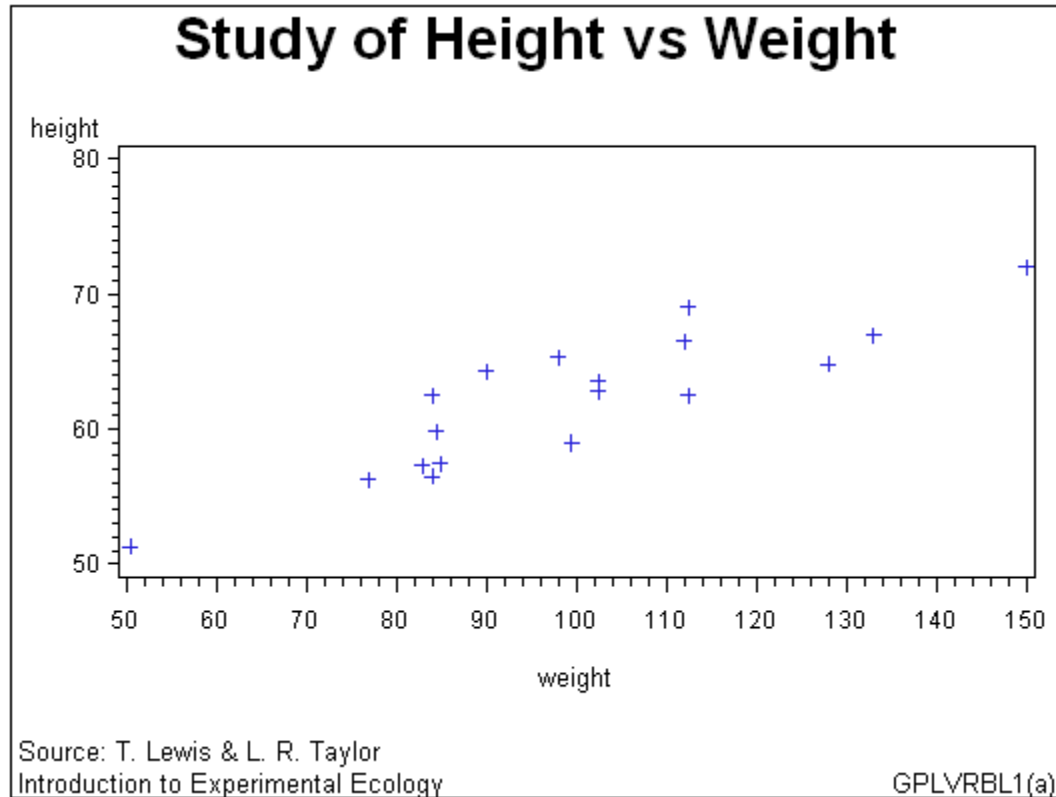
Graph Types: Tile Charts



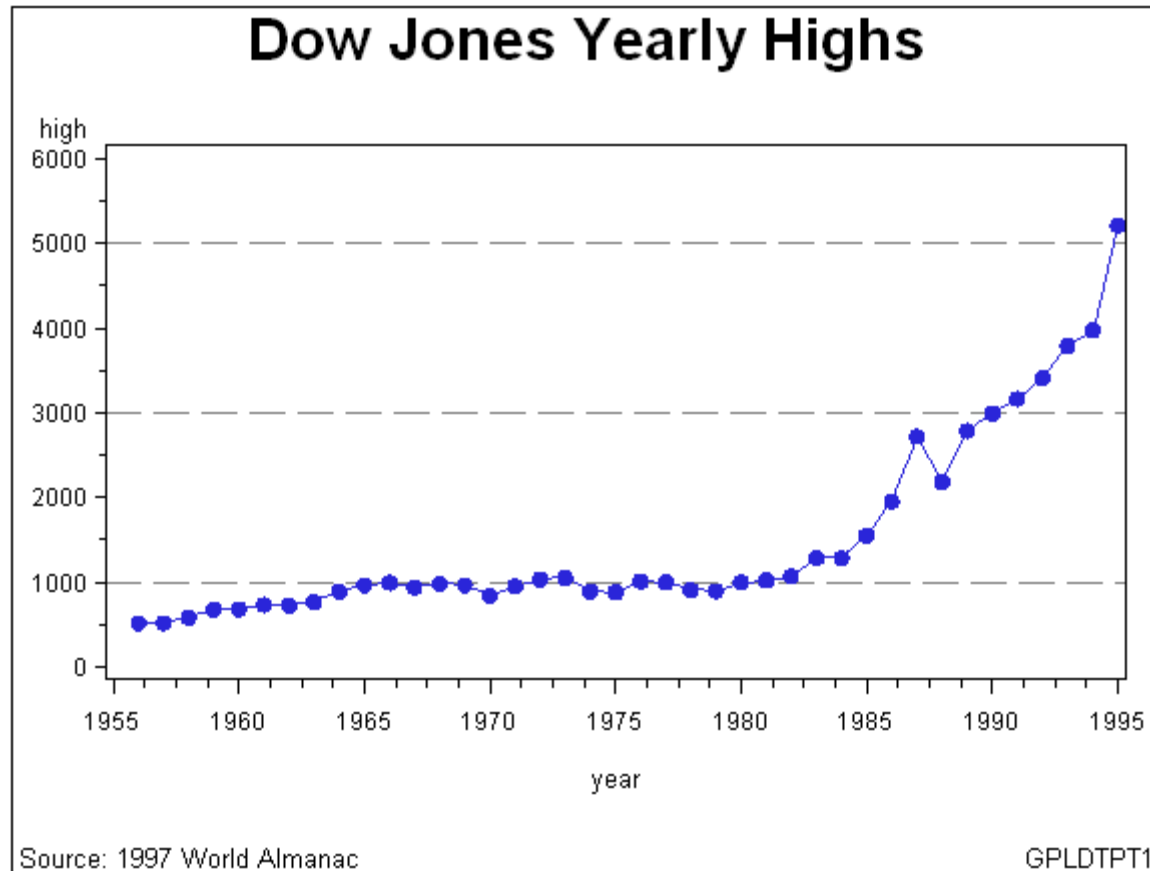
Graph Types: Radar Charts



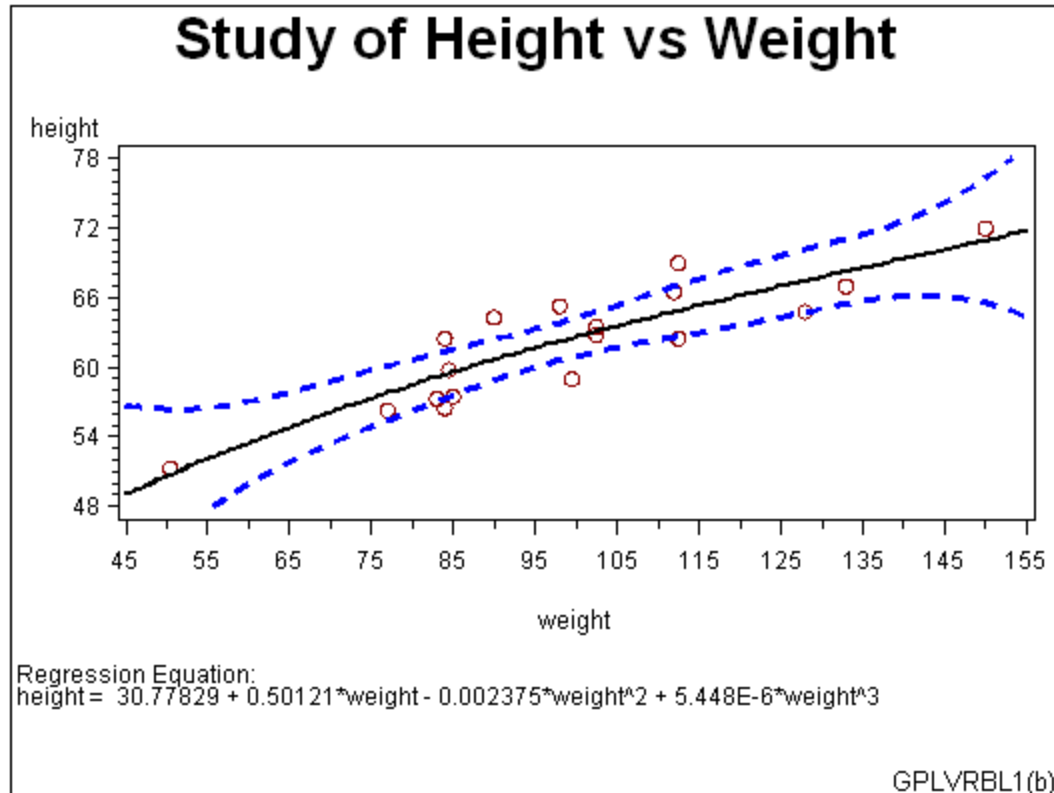
Types: Two-Dimensional Scatter Plots



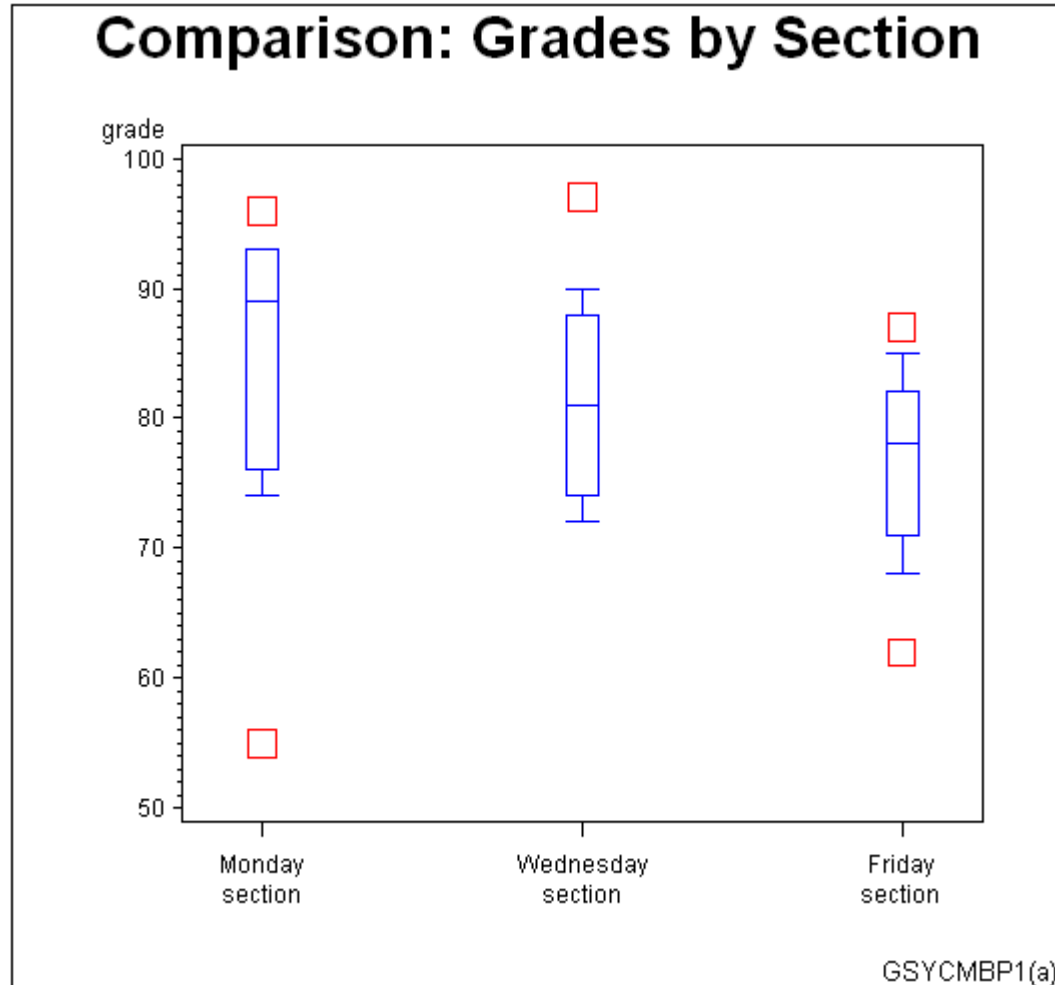
Graph Types: Simple Line Plots



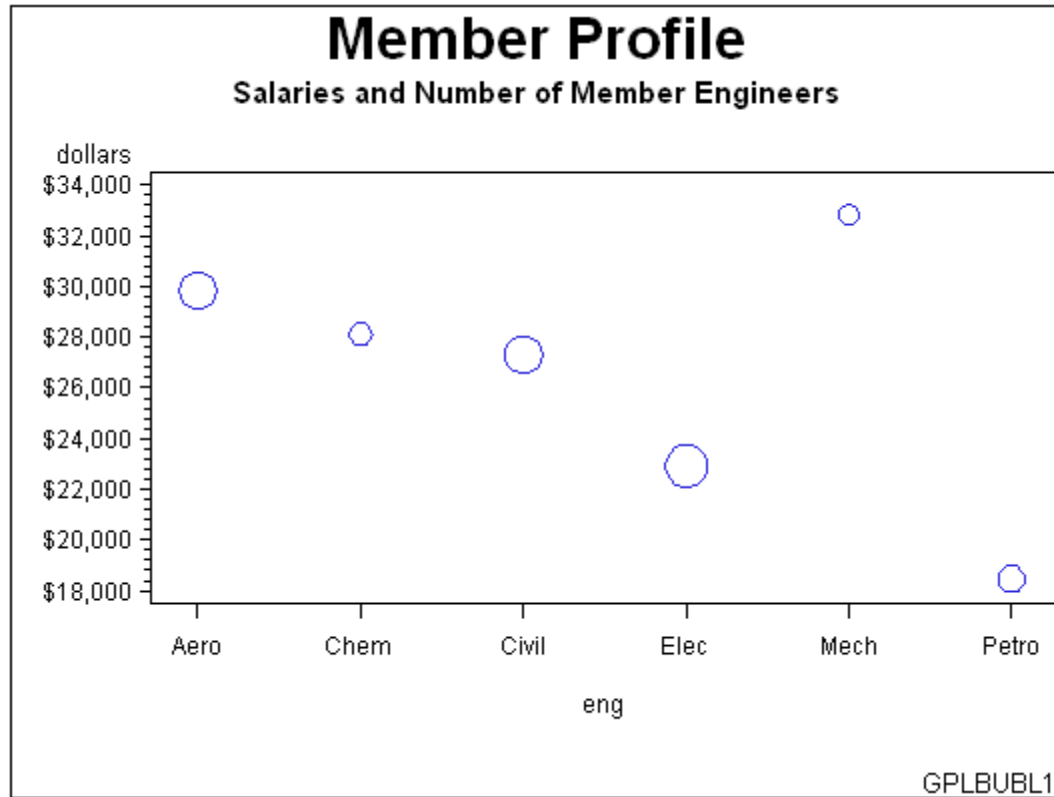
Graph Types: Regression Plots



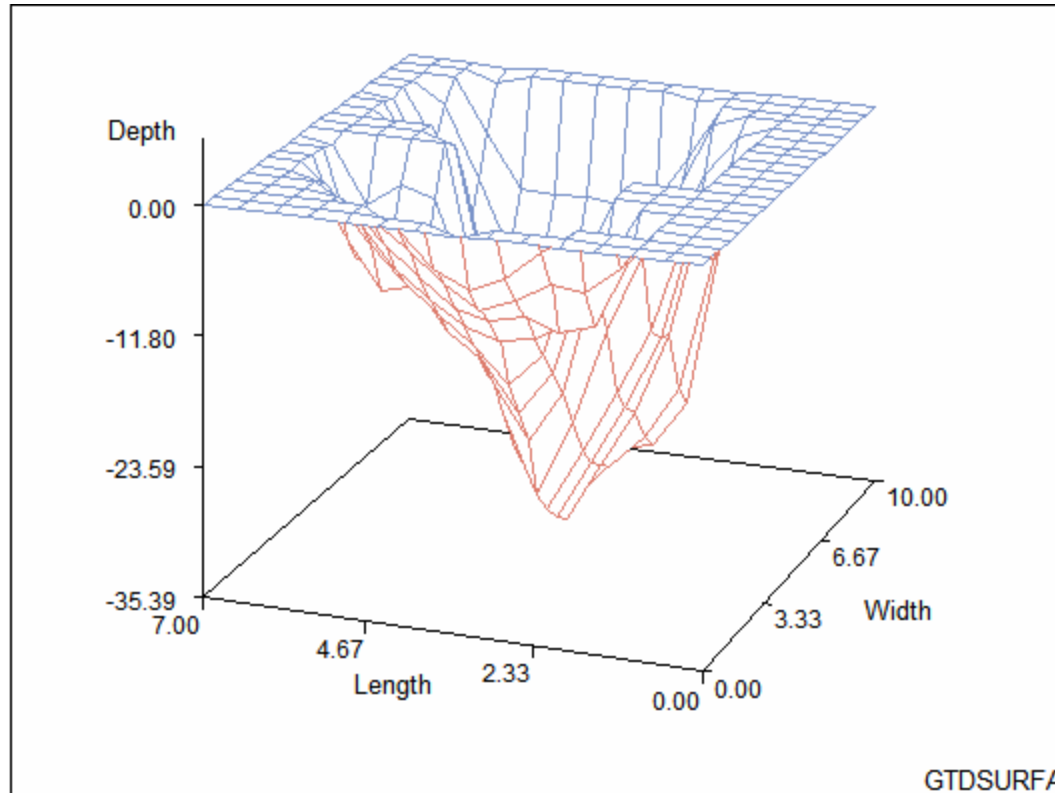
Graph Types: High-Low Plots



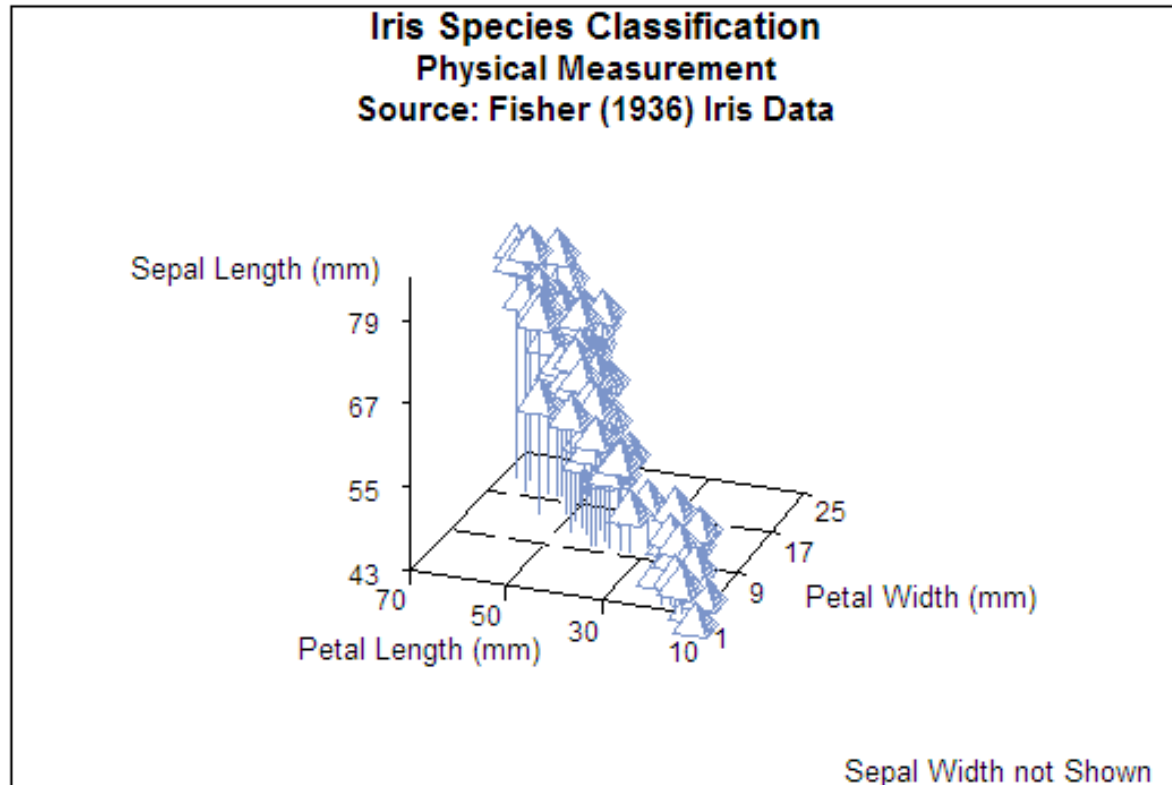
Graph Types: Bubble Plots



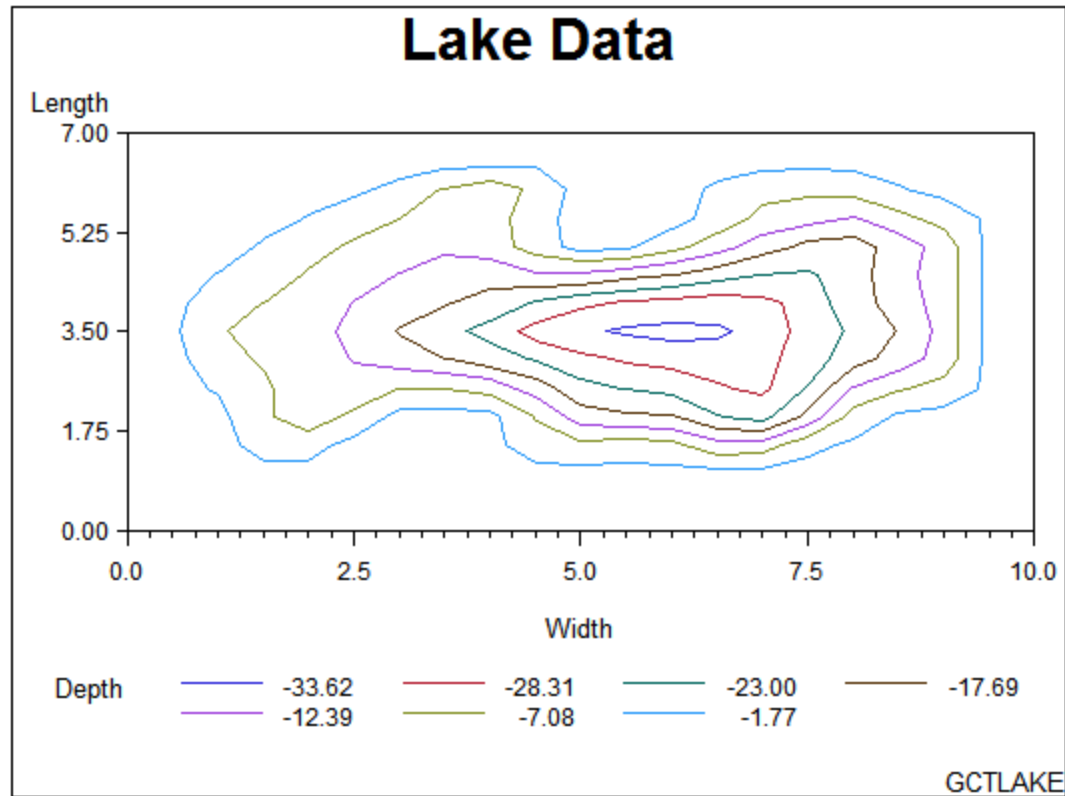
Graph Types: 3-D Surface Plots



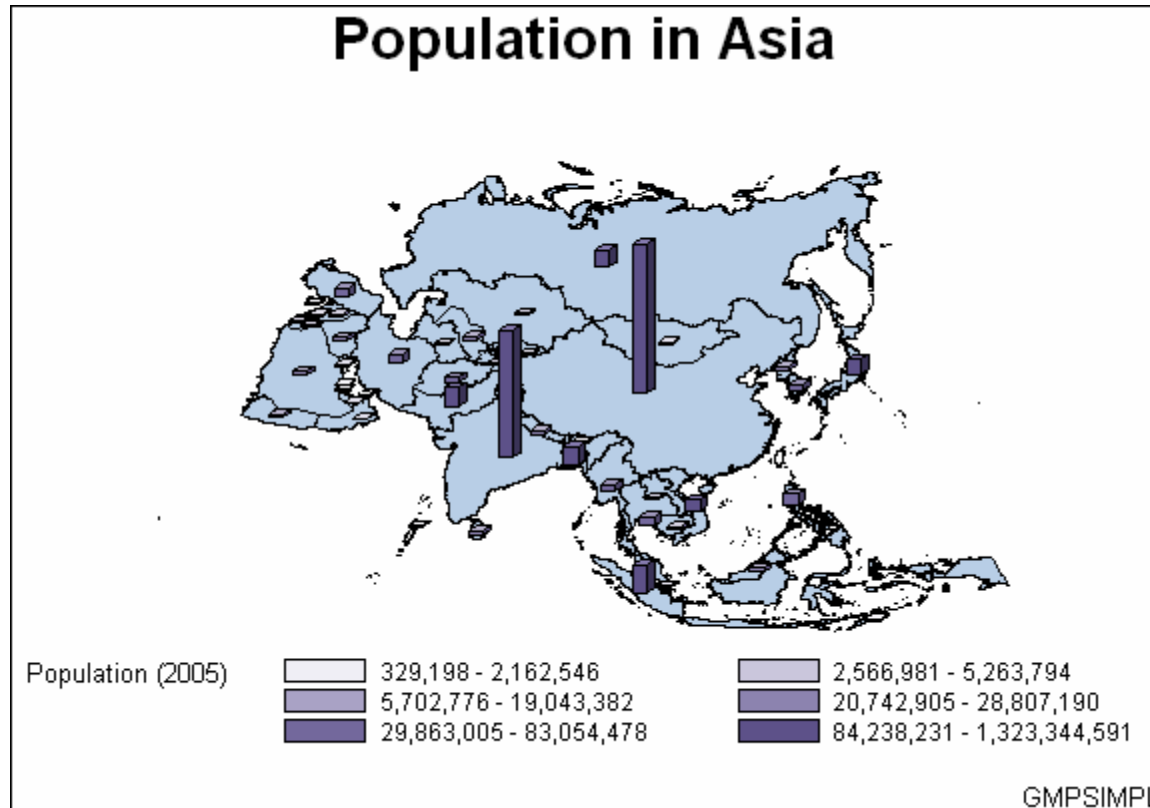
Graph Types: 3-D Scatter Plots



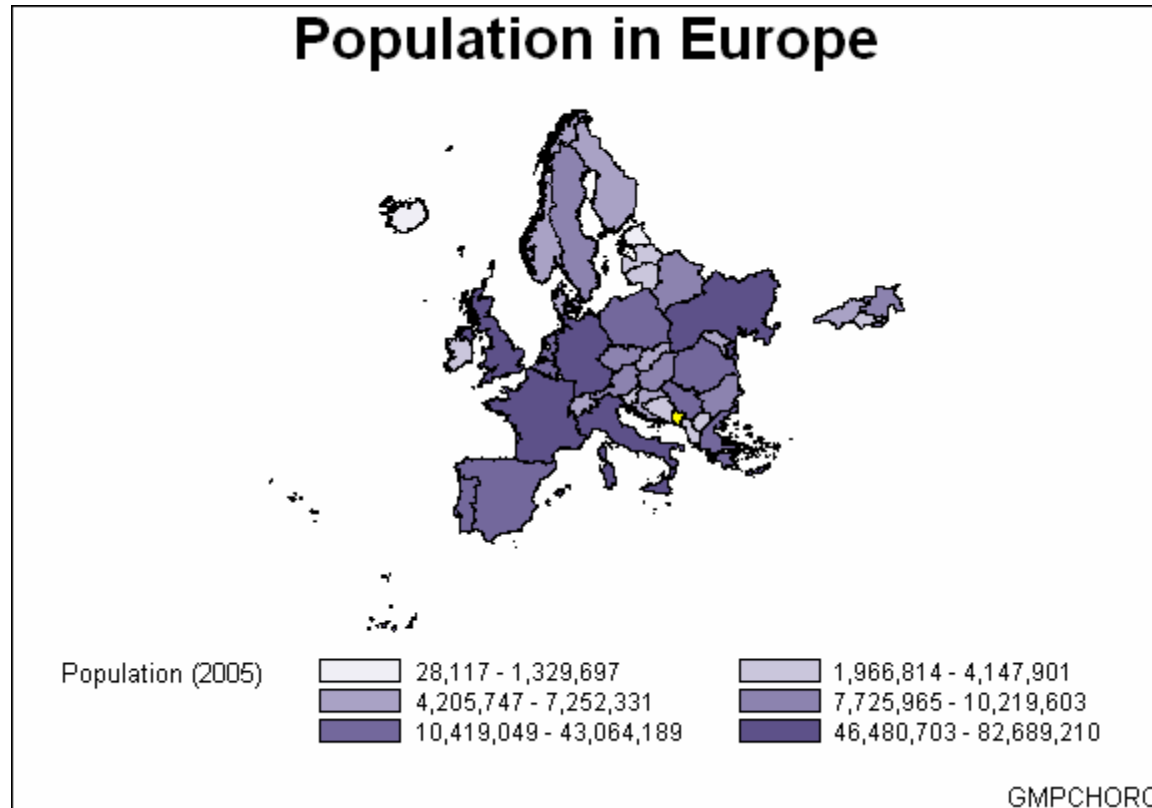
Graph Types: 3-D Contour Plots



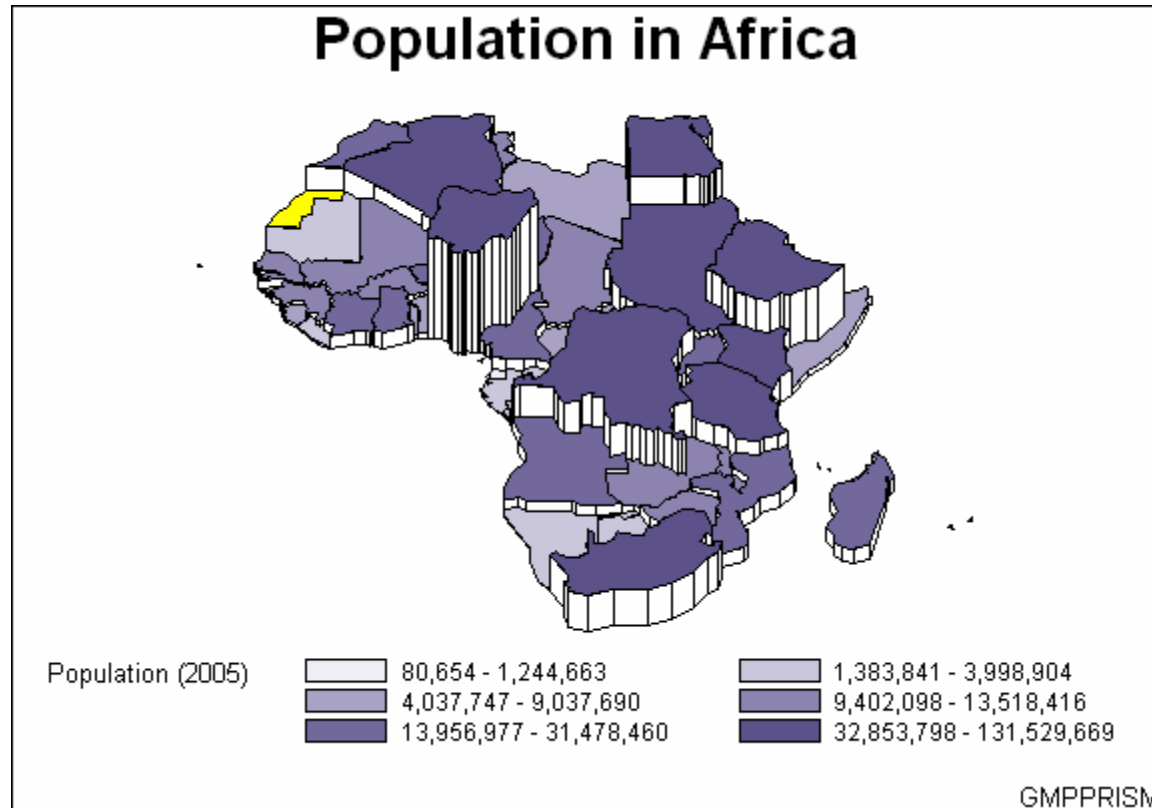
Graph Types: Block Maps



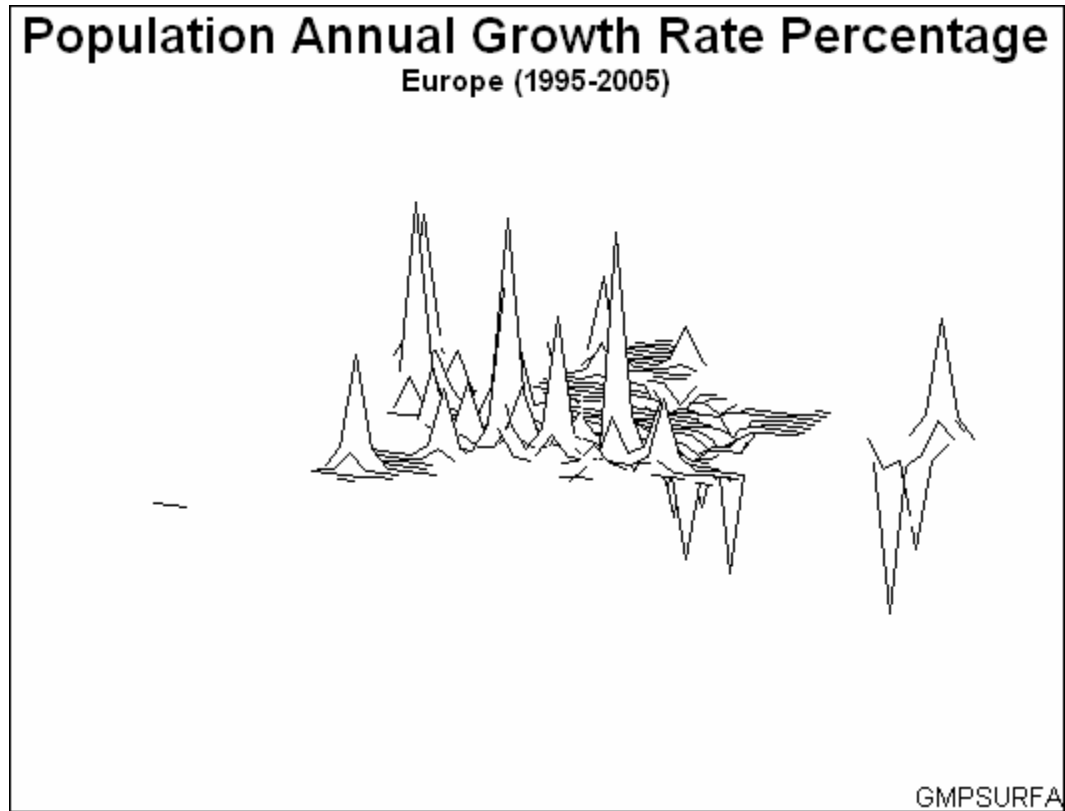
Graph Types: Choropleth Maps



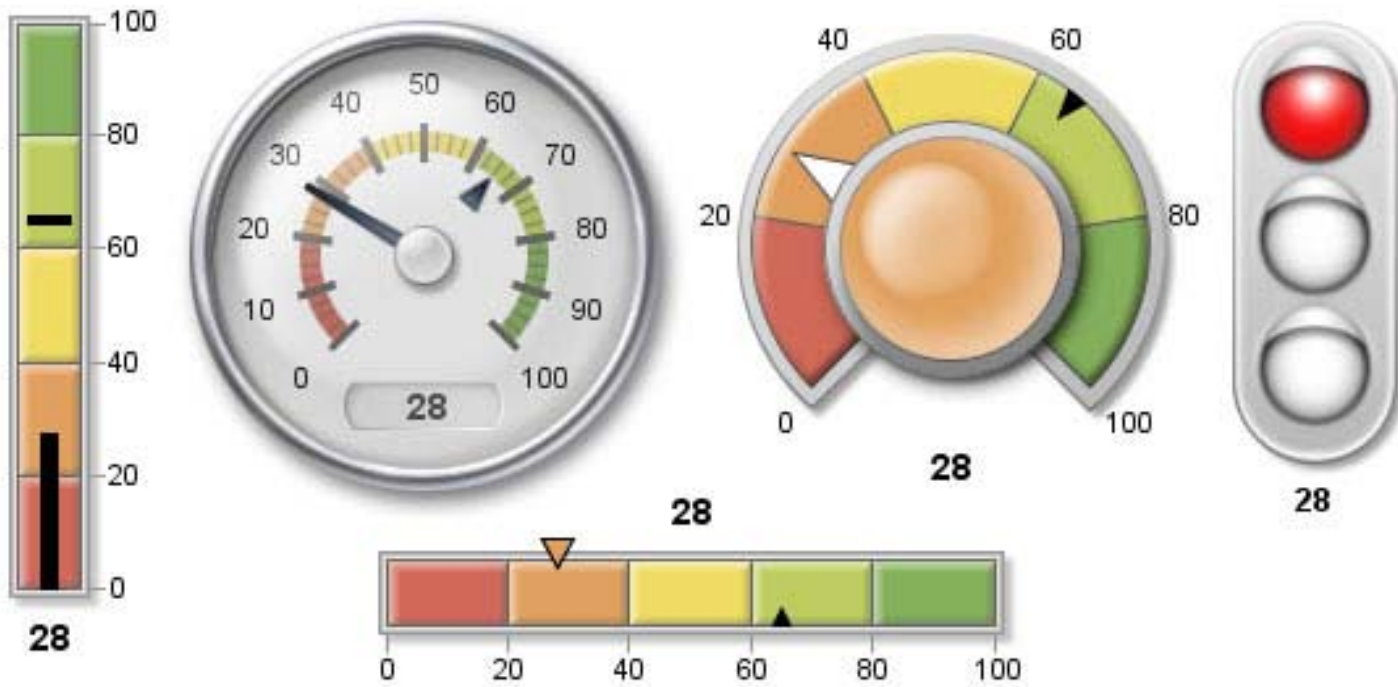
Graph Types: Prism Maps



Graph Types: Surface Maps



Graph Types: KPI Charts



Graph Types: Text Slides

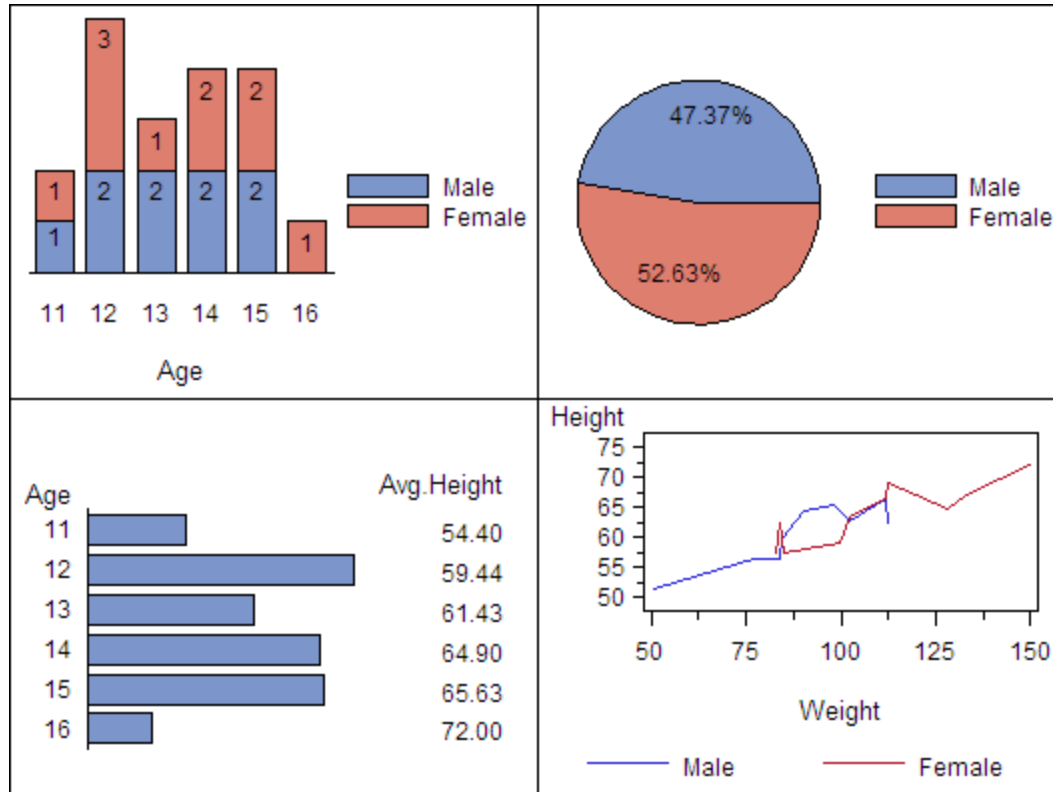
New Directions

**Goals and strategies
for the coming year**

ABC Engineering, Inc
January 1998



Graph Types: Combined Graphs



A Typical SAS/GRAPH Program

```
ods html file="c:\regression.htm" style=analysis;

goptions reset=all device=activex;

title c=magenta "Study of Height vs. Weight";
footnote justify=r height=2 "Data: SASHELP.CLASS";

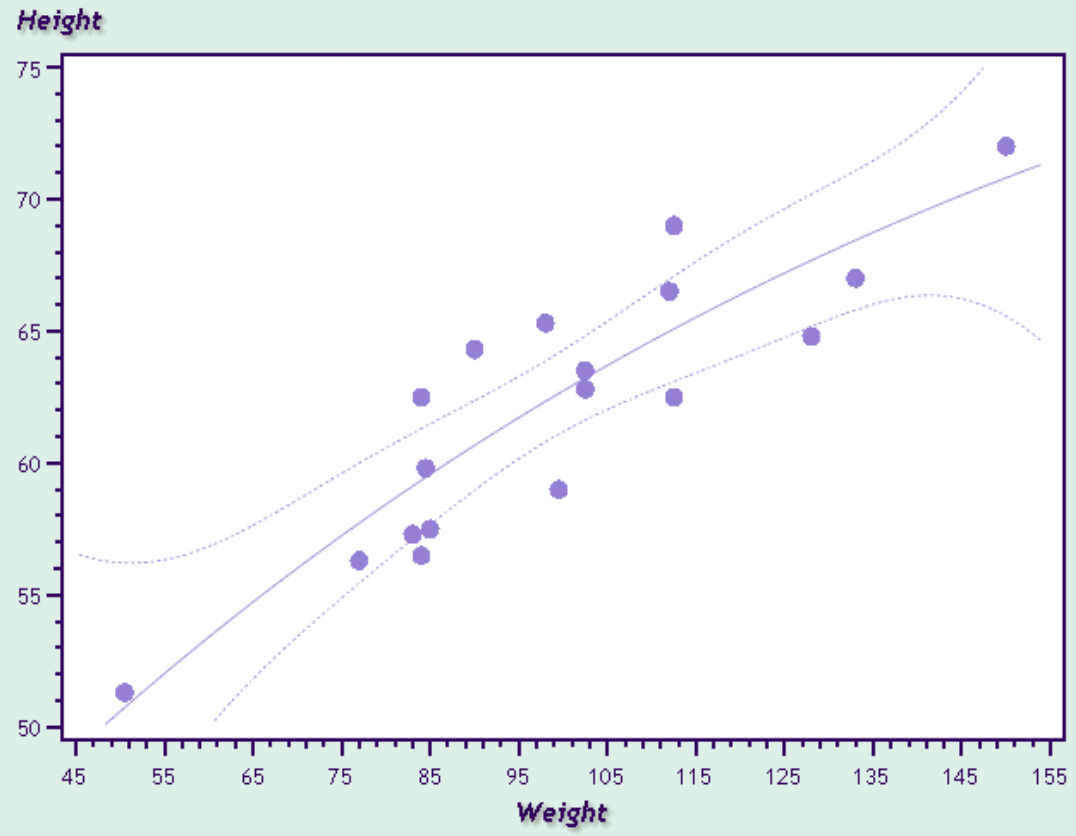
symbol interpol=rcclm95 value=circle;

proc gplot data=sashelp.class;
  plot height * weight /
    haxis = 45 to 155 by 10;
run;
quit;

ods html close;
```



Study of Height vs. Weight



Data: SASHELP.CLASS

Elements of a SAS/GRAPH Program

- Procedure Statement `proc gplot`
- Action Statement `plot x * y`
- Other Statements and Options `/ haxis =`
- Global Statements: **AXIS** **TITLE**
BY **NOTE**
GOPTIONS **FOOTNOTE**
LEGEND
PATTERN
SYMBOL



Getting Started

- *Get the reference documentation:
“**SAS/GRAPH 9.2 Reference**” – free on the Web in HTML or PDF (only 1500+ pages 😊)*
- *Most examples in the reference documentation are installed as part of SAS/GRAPH in folder:
`YourSASroot\graph\sample`*
- *Run examples of interest and read up on the procedure and the global statements.*



Getting Started

- Use **“Quick Results with SAS/GRAPH Software”** by Arthur L. Carpenter / Charles E. Shipp, *SAS Books by Users #55127* (from 1995 - still good for device-based graphics)
- *Learn by doing – experience is the best teacher*
- For ODS Statistical Graphics: **“Graphing Made Easy with SG Procedures”** by Susan J. Slaughter / Lora D. Delwiche, *SGF 2011 paper*



Final Message

IF you plan to be an avid user
THEN DO;

take a course;
read books and articles;
learn by doing;

END;

ELSE use Enterprise Guide;



SAS/GRAPH 9.2 Introduction

Main source for this presentation:

“SAS/GRAPH 9.2 Reference” (PDF Version)

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