Add SGSCATTER, SGPLOT, SGPANEL and SGRENDER Procedures to Your SAS Toolbelt

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Overview

- Proc SGSCATTER, SGPLOT, SGPANEL and SGRENDER are part of the SAS ODS graphics procedures also called Statistical Graphics procedures
- SGSCATTER – creates scatter plots
- SGPLOT – creates single cell plots with a variety of plot and chart types and overlays
- SGPANEL – creates classification panels for one or more panel variables
- SGRENDER – produces graphs from graph templates that are written in Graph Template Language (GTL)
- For a full list of SAS ODS graphics procedures please see the reference section at the end of the presentation

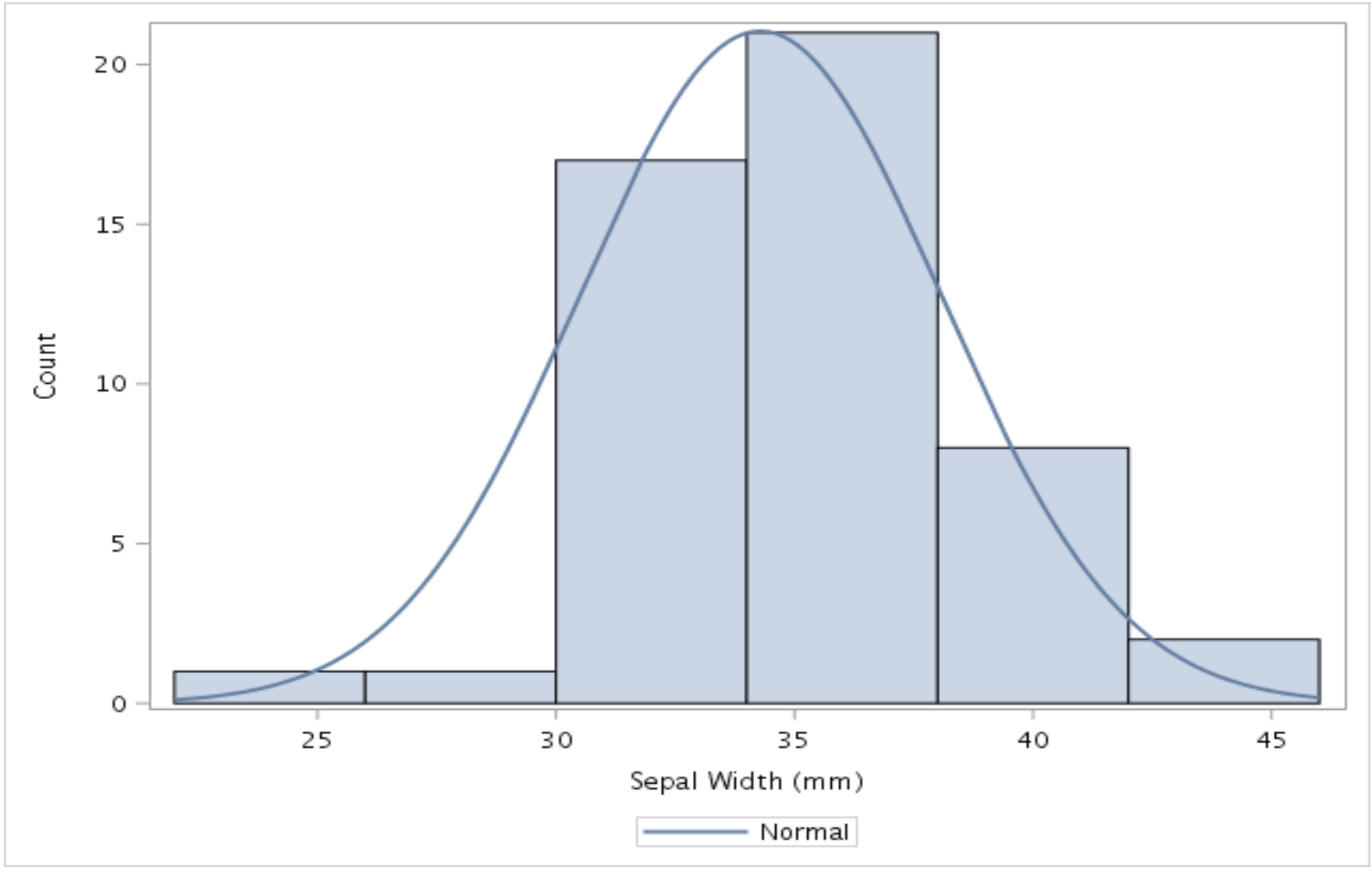
Demo 1: Can we predict iris sepal length based on iris sepal width?

- Sepals cover buds and are found immediately below the flower after blooming
- SASHELP.IRIS – Ronald Fisher's and Edgar Anderson's sample of 50 of each of 3 iris species to create a linear discriminant analysis model to distinguish species from each other

Let's look at the data for the iris Setosa species

- Is sepal width normally distributed?

```
%let species=Setosa;
proc sgplot
data=sashelp.iris(where=(species="&species."));
  title "Sepal Width Frequency Distribution for
&species.";
  histogram sepalwidth / scale=count;
  density sepalwidth / scale=count;
run;
title;
```

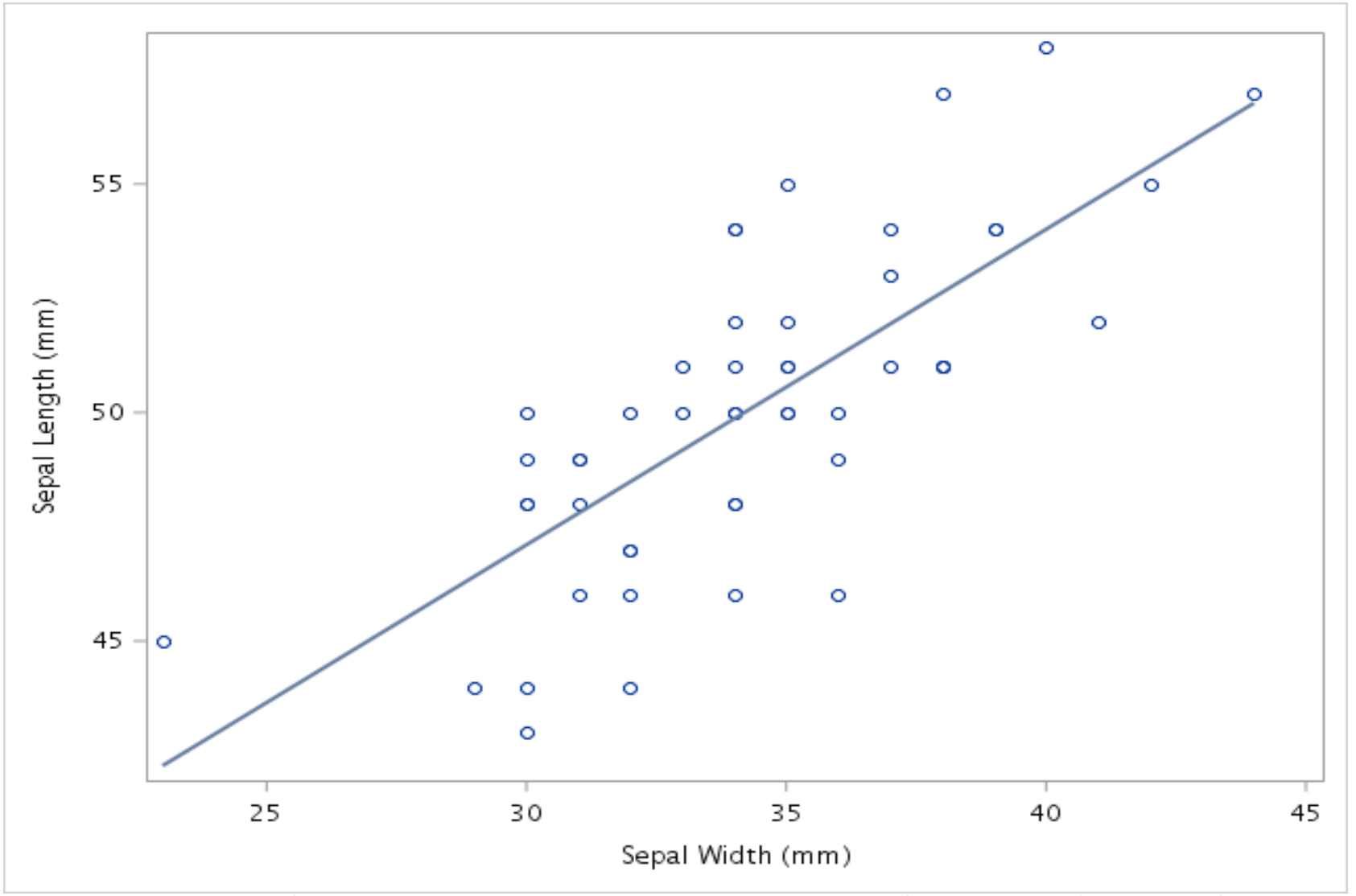


Distribution looks normal

Let's look at the data for the iris Setosa species

- Does sepal width have a linear relationship with sepal length?
- Do we see homoskedasticity? i.e. do variances look consistent across all pairs of sepal width and sepal length

```
%let species=Setosa;
proc sgscatter
data=sashelp.iris(where=(species="&species."));
    plot sepallength*sepalwidth / reg;
    title "Sgscatter scatter plot of Sepal Width
(x) against Sepal Length (y) for &species.";
run;
```



- Regression line and data points suggests linear relationship
- Homoskedastic - variance is consistent. No cone at either end

If assumptions are met, we can perform simple linear regression to predict sepal length from sepal width

```
%let species=Setosa;
proc reg
data=sashelp.iris(where=(species="&species."))
outest=est1;
   eq1: model  sepallength=sepalwidth;
run;
```

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	335.68848	335.68848	58.99	**<.0001**
Error	48	273.13152	5.69024		
Corrected Total	49	608.82000			

Root MSE	**2.38542**	**R-Square**	**0.5514**
Dependent Mean	50.06000	**Adj R-Sq**	**0.5420**
Coeff Var	4.76513		

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	26.39001	3.10014	8.51	**<.0001**
SepalWidth	Sepal Width (mm)	1	0.69049	0.08990	7.68	**<.0001**

Create scatterplot using sgplot instead of sgscatter

- Add confidence limits for the mean CLM and individual predicted values CLI

```
%let species=Setosa;
proc sgplot
data=sashelp.iris(where=(species="&species."));
 scatter x=sepalwidth y=sepallength;
 title "Sgplot scatter plot of Sepal Width (x)
against Sepal Length (y)";
 reg x=sepalwidth y=sepallength /clm cli;
run;
```

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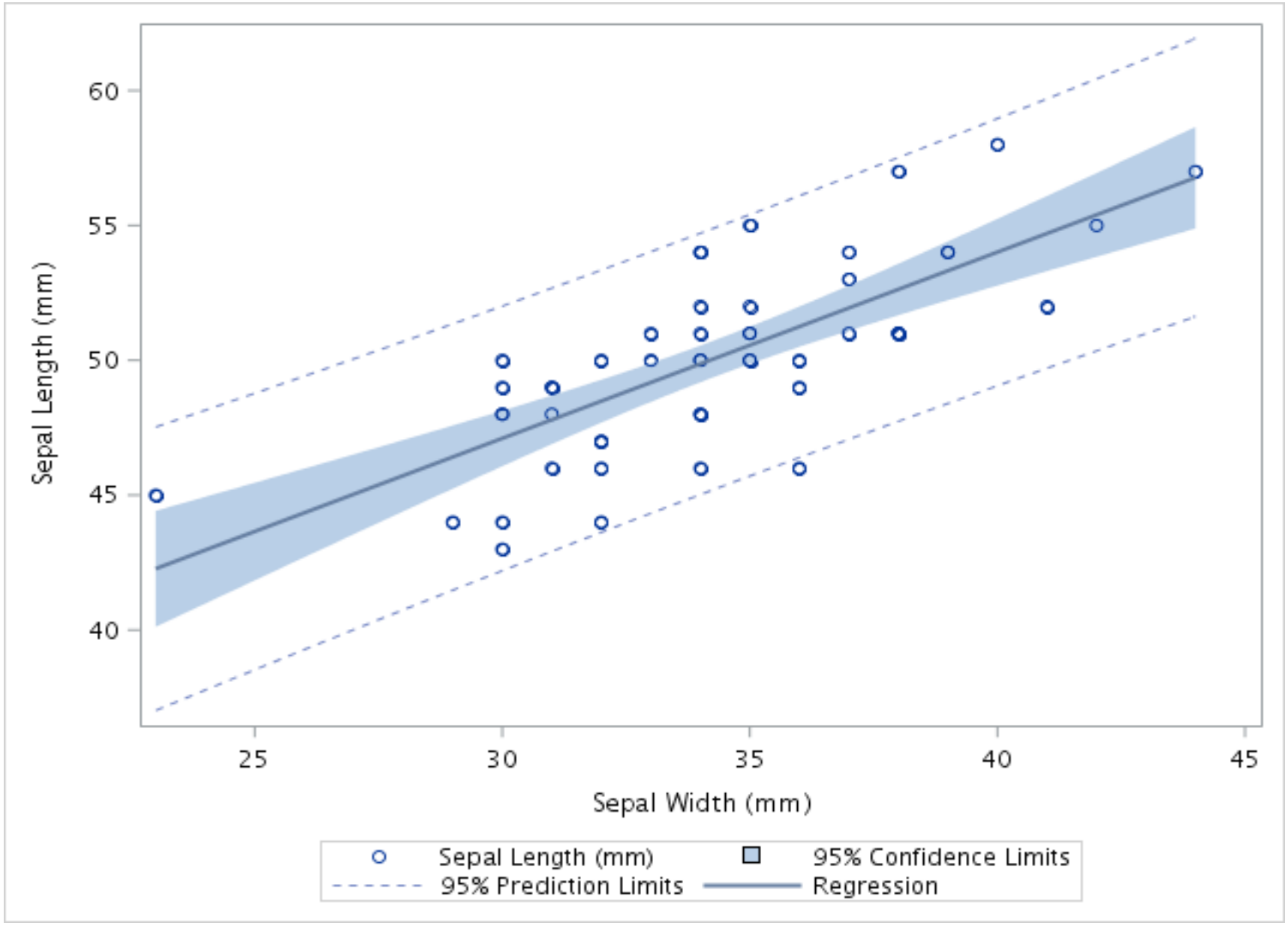

Modify sgplot code to create a panel plot for all species

- Change sgplot to sgpanel
- Add panelby statement for species

```
proc sgpanel data=sashelp.iris;
 panelby species;
 scatter x=sepalwidth y=sepallength;
 title "Scatter plot of Sepal Width (x)
against Sepal Length (y)";
 reg x=sepalwidth y=sepallength /clm cli;
run;
```

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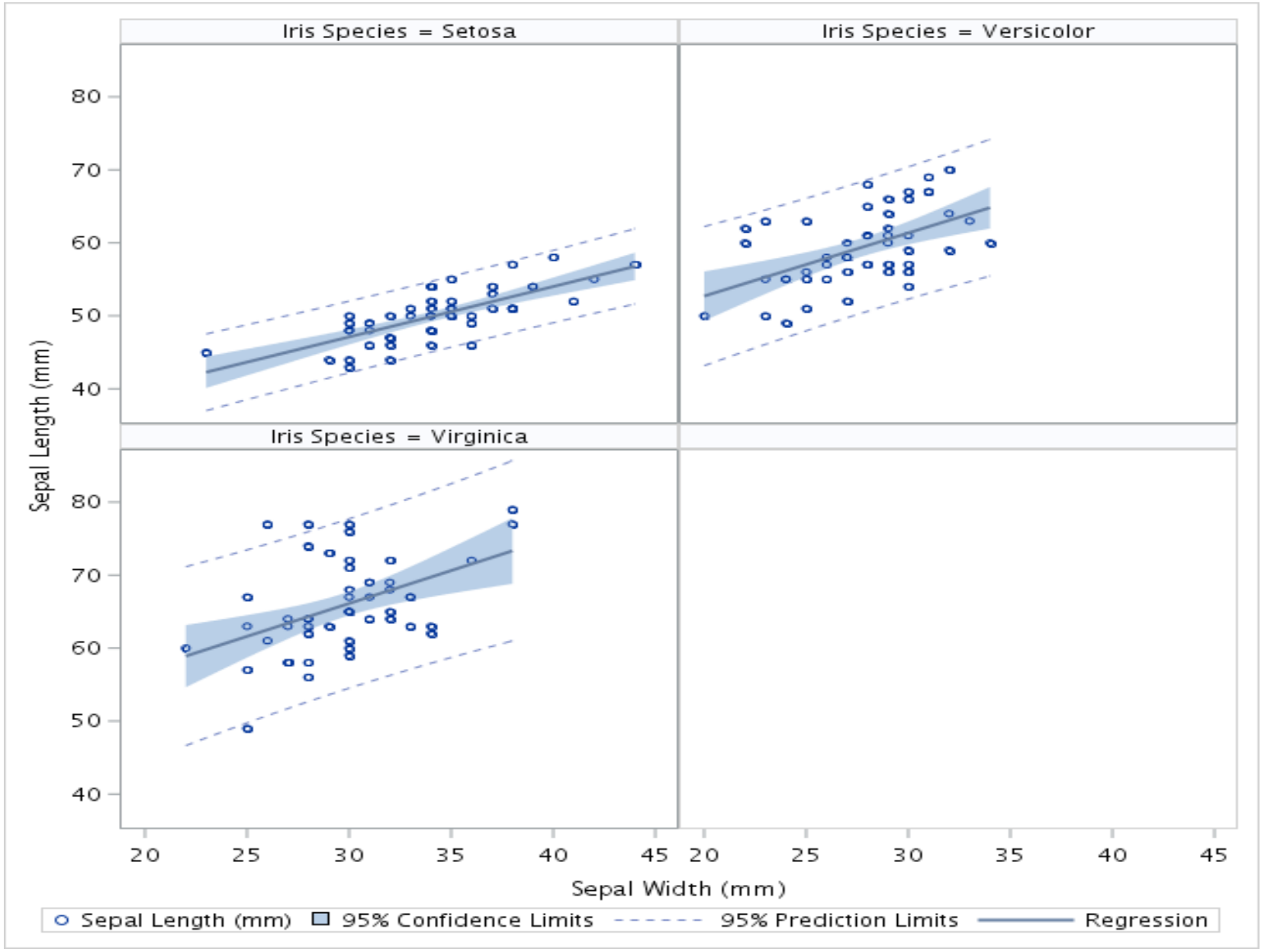


Demo 2: Compare sales data by quarter between 1999 and 2002

- Use SASHELP.ORSALES
- Aggregate and format input data for line chart with 2 y axes

```
proc sql;
 create table orsales_qtr as
 select year
       ,substr(quarter,5,2) as qtr format $2.
      ,sum(profit) as profit format dollar13.
      ,sum(quantity) as quantity format comma15.
 from sashelp.orsales
 group by year,calculated qtr
 order by year,calculated qtr;
quit;
```

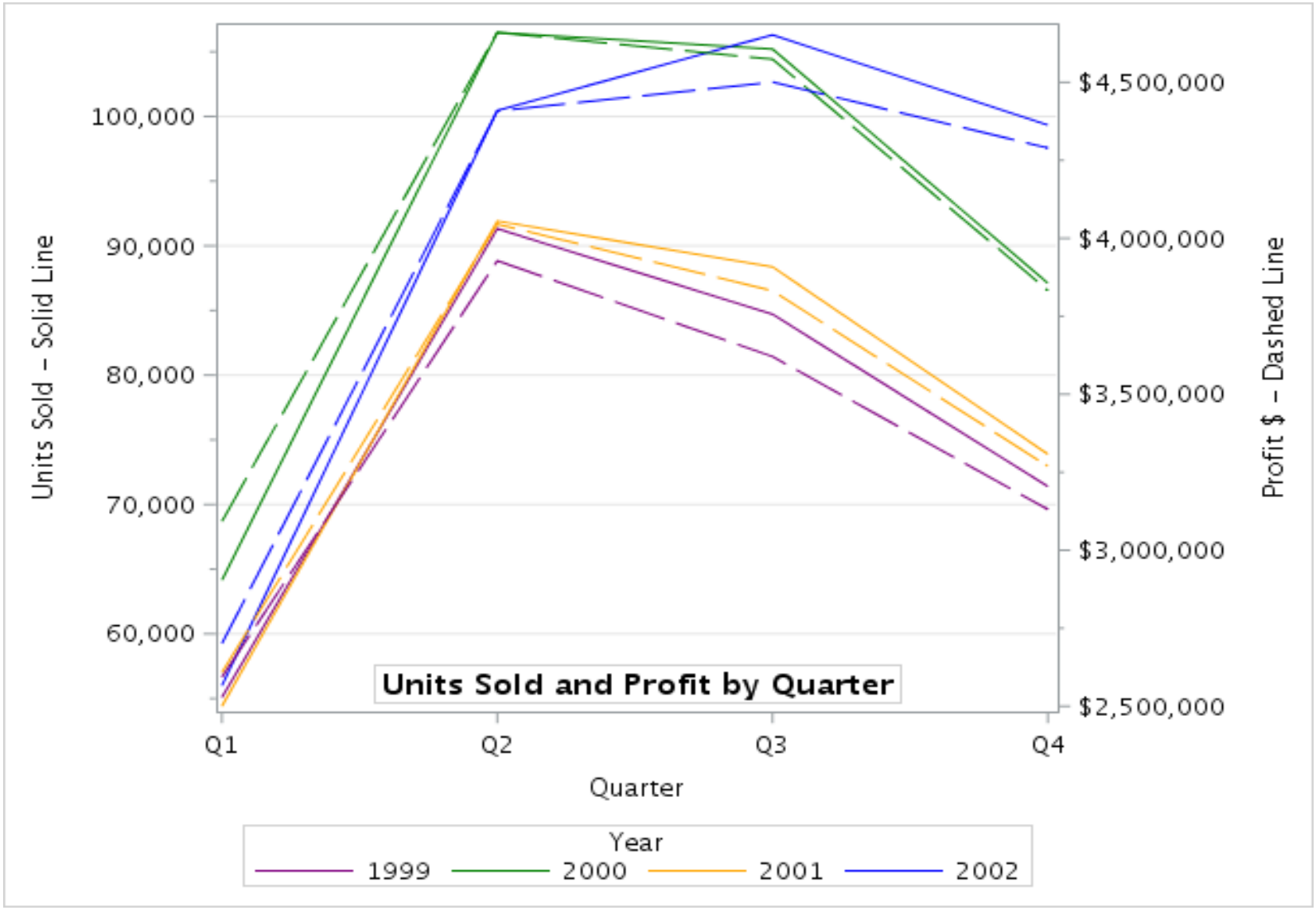
Use SGPLOT to create a line chart with 2 y axes

```
proc sgplot data=orsales_qtr;
 title;
 title1 color=black "Orion Sales 1999 - 2002";
    styleattrs datacontrastcolors=(purple green orange
blue);
    xaxis type=discrete label='Quarter';
    yaxis label='Units Sold - Solid Line' grid minor;
    y2axis label='Profit $ - Dashed Line' minor;
    series x=qtr y=quantity / group=year
lineattrs=(pattern=solid);
    series x=qtr y=profit / group=year
lineattrs=(pattern=longdash) y2axis;
    INSET 'Units Sold and Profit by Quarter'/ POSITION
= BOTTOM BORDER TEXTATTRS=(Size=11 Weight=Bold);
run;
```

Use SGPLOT to create line chart with 2 y axes

- Use one color for each of four years, datacontrastcolors
- Use solid line for quantity, lineattrs=(pattern=solid)
- Use dashed line for profit, lineattrs=(pattern=longdash)
- Group lines by year, group=year
- Use yaxis and y2axis to reference left and right hand vertical axes
- Inset description at bottom of plot, inset 'text' / position=bottom

Orion Sales 1999 - 2002



Demo 3: Plotting in 3 dimensions with SGRENDER

Example from SAS® 9.4 ODS Graphics: Procedures Guide, Sixth Edition

```
/* Create stat graph template */
proc template;
  define statgraph surface;
  begingraph;
     layout overlay3d;
      surfaceplotparm x=height y=weight
z=density;
     endlayout;
   endgraph;
  end;
run;
```

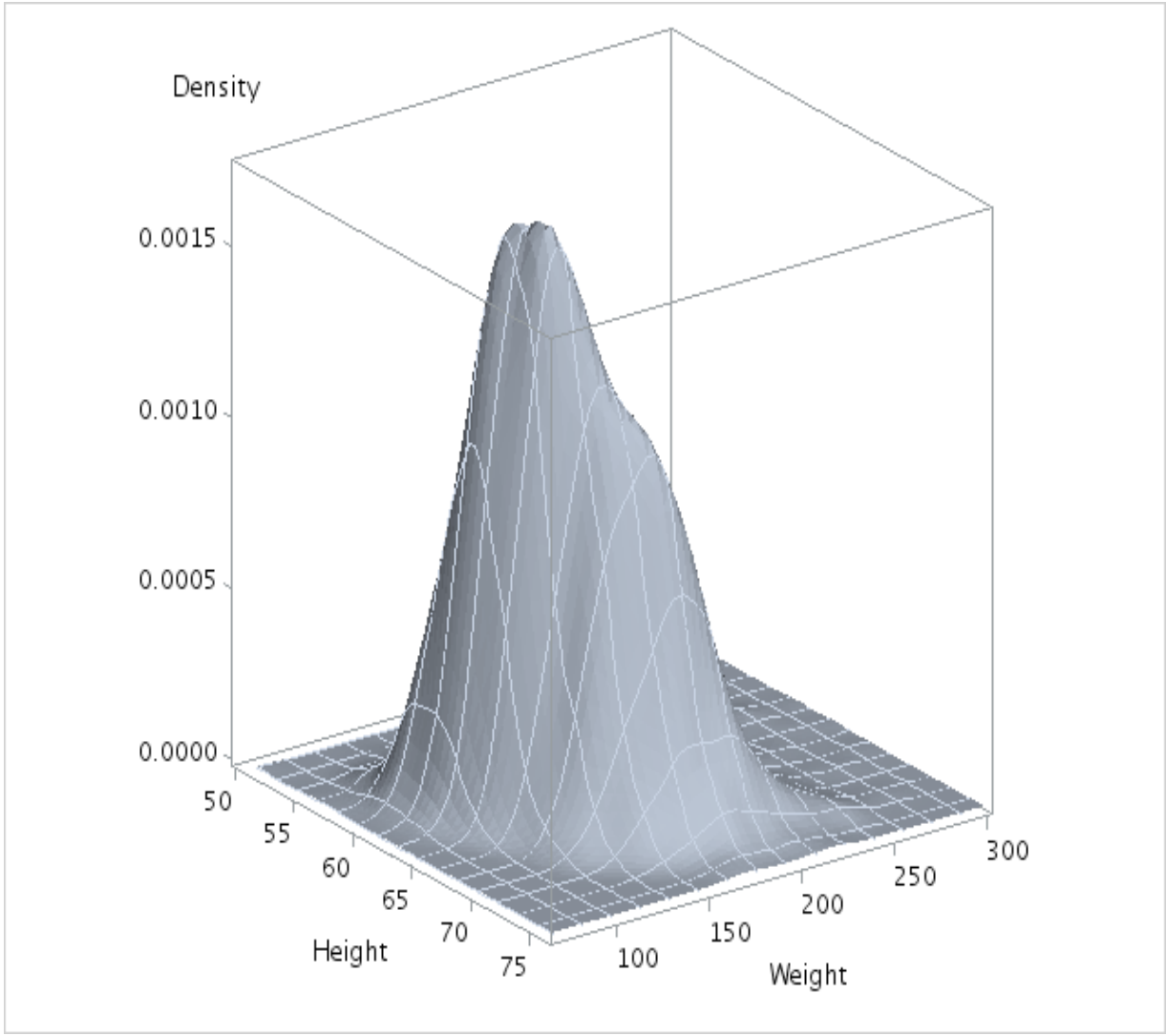
Plotting in 3 dimensions using SGRENDER

Generate graphics output from the template

- SASHELP.GRIDDED contains information on height, weight and density

```
title;
title1 'Height, weight and density plot based
on a custom statgraph template';
proc sgrender data=sashelp.gridded
template=surface;
run;
title;
title1
```

Height, weight and density plot based on a custom statgraph template



References

Cano, Gabe. *Convert Your Old Plots and Charts to New SG Plots and Charts: Here's How,* SGF 2012
http://support.sas.com/resources/papers/proceedings12/083-2012.pdf

Iris flower data set
https://en.wikipedia.org/wiki/Iris_flower_data_set

SAS® 9.4 ODS Graphics: Procedures Guide, Sixth Edition
https://go.documentation.sas.com/?docsetId=grstatproc&docsetTarget=n0y3i6hxxcrnkmn1mq6zc61bsxrn.htm&docsetVersion=9.4&locale=en

References

Slaughter, Susan L and Delwiche, Laura D. *Using PROC SGPLOT for Quick High-Quality Graphs,* SGF 2010
http://support.sas.com/resources/papers/proceedings10/154-2010.pdf

Slaughter, Susan L and Delwiche, Laura D. *Graphing Made Easy with SGPLOT and SGPANEL Procedures*, SGF 2015
https://support.sas.com/resources/papers/proceedings15/2441-2015.pdf

QUESTIONS