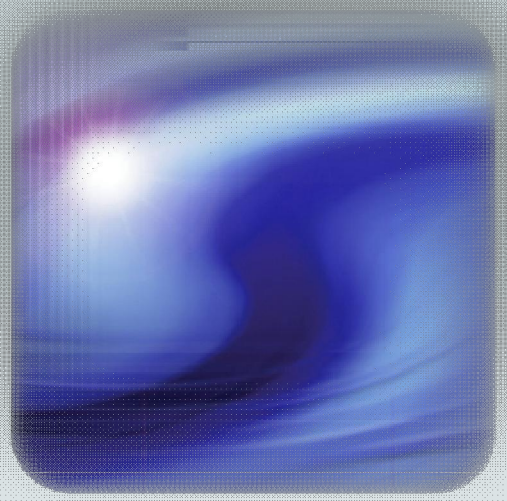

Vancouver SAS Users Group

07OCT2009

What's new with statistics in SAS 9.2

Sylvain Tremblay

SAS Canada – Education

New release of SAS: 9.2

SAS GLOBAL FORUM 2008 SAN ANTONIO TEXAS
March 16-19
Warren E. Stinson, Conference Chair

SAS Foundation:
BASE
STAT
...

SAS GLOBAL FORUM 2009 Washington, D.C.
March 22-25
Lori Griffin, Conference Chair

Tools & Solutions
Enterprise Guide 4.2
Enterprise Miner 6.1
...

Agenda

- SAS 9.2 - Key highlights for statisticians
- Graphics
- Improved capabilities
- Brand new tools
- Conclusion / questions

SAS 9.2 - Key Highlights for Statisticians

- **Graphics galore**
  - ODS Statistical Graphics, Editor, Designer & GTL
  - New SAS/Graph Statistical Procs
- **Improved capabilities**
  - Generalized Linear Models
  - Replication variance estimation
  - Model selection methods
  - Enterprise Guide
- **Brand new tools**
  - Bayesian analysis
  - SAS/IML Studio (Stat Studio)

Agenda

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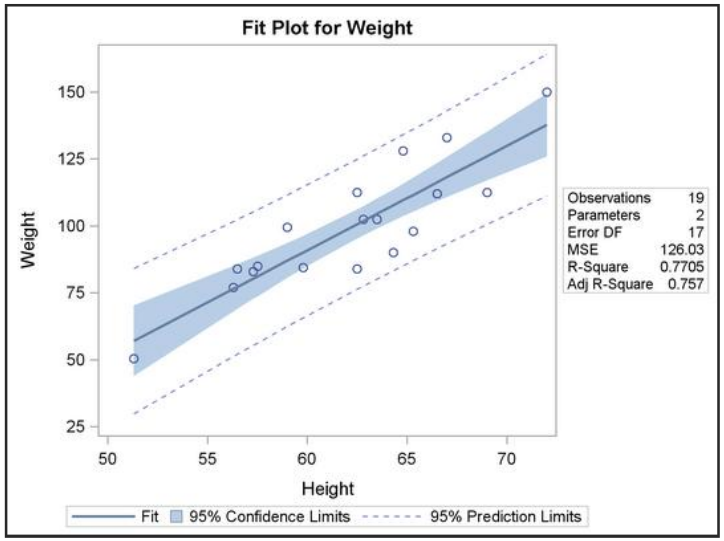
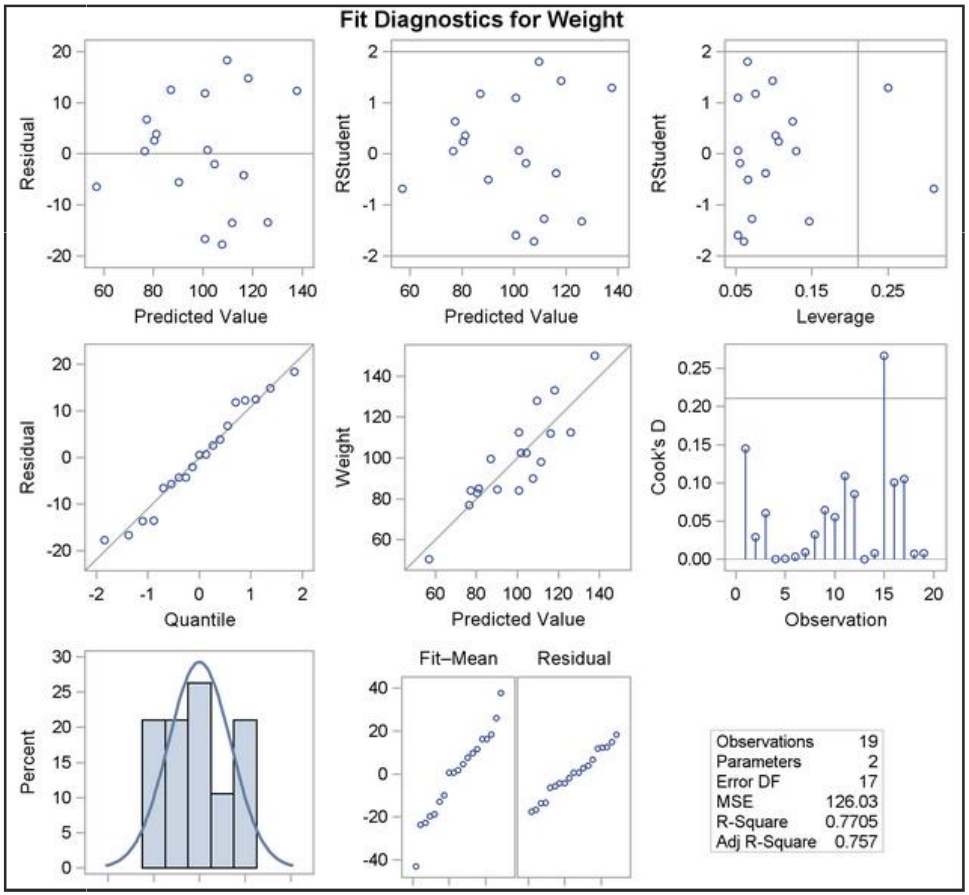
Graphics

ODS Statistical Graphics are now production

```
ods graphics on;

proc reg data=Class;
   model Weight = Height;
run; quit;
```





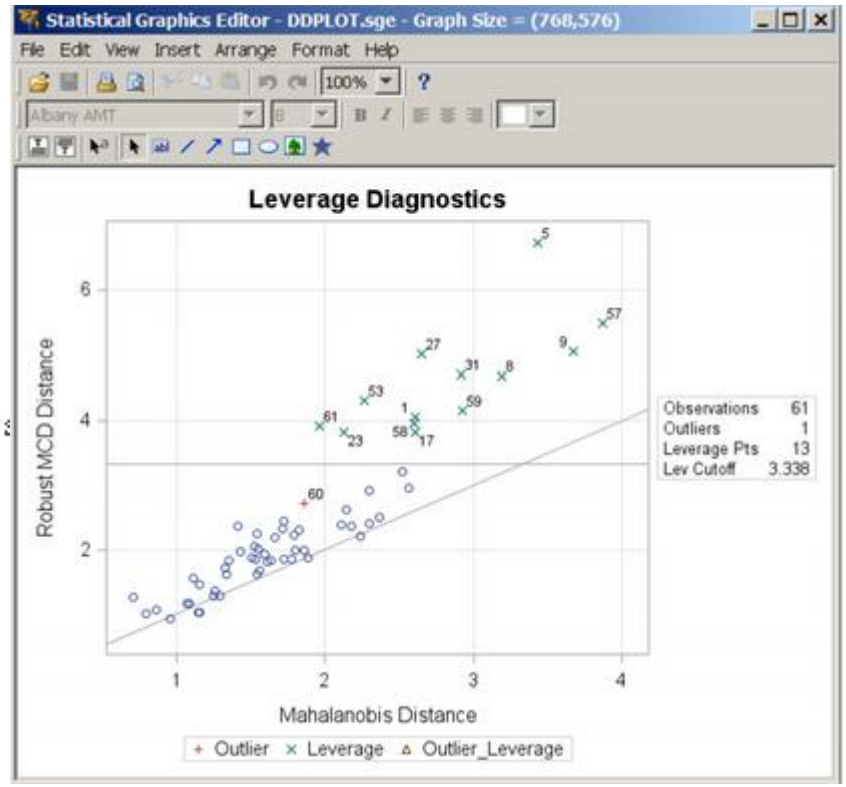
Graphics

ODS Graphics Editor

```
ods graphics on;
ods listing style=statistical sge=on;

proc robustreg data=sasuser.growth
                plots=(ddplot histogram);
   model GDP  = LFG GAP EQP NEQ / diagno
   output out=robout r=resid sr=stdres;
run;

ods listing sge=off;
```

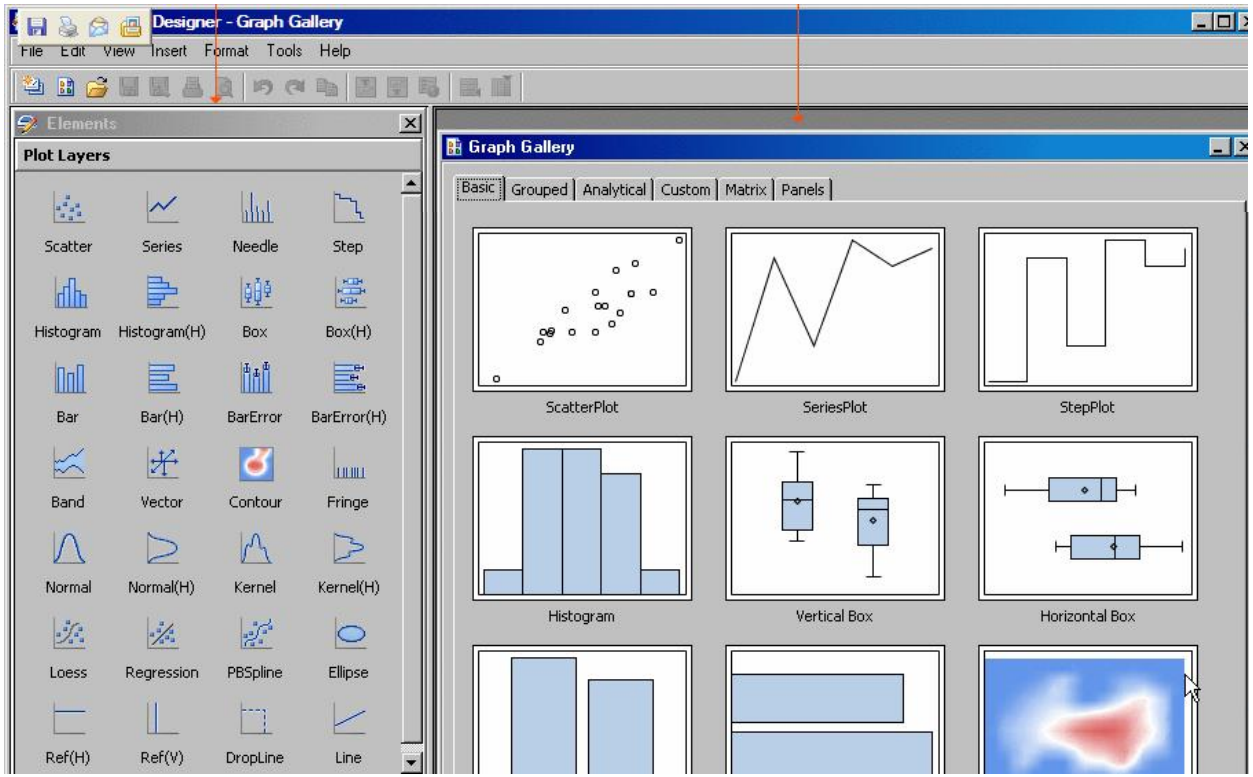


Graphics

ODS Graphics Designer

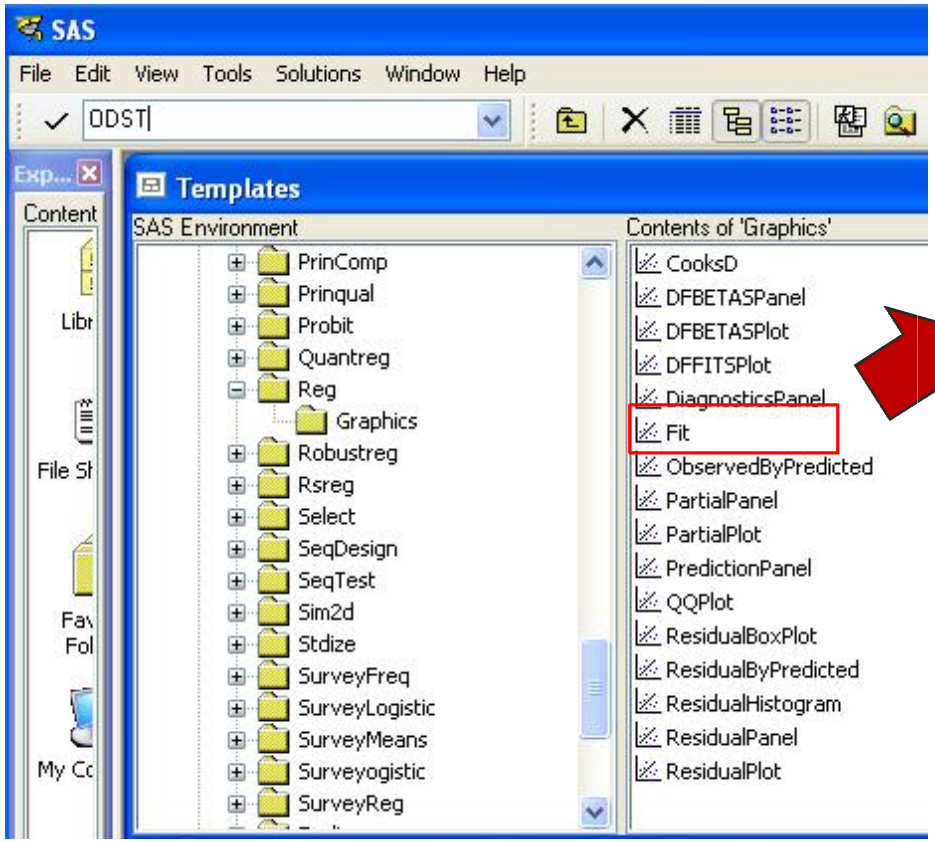
In a SAS session,

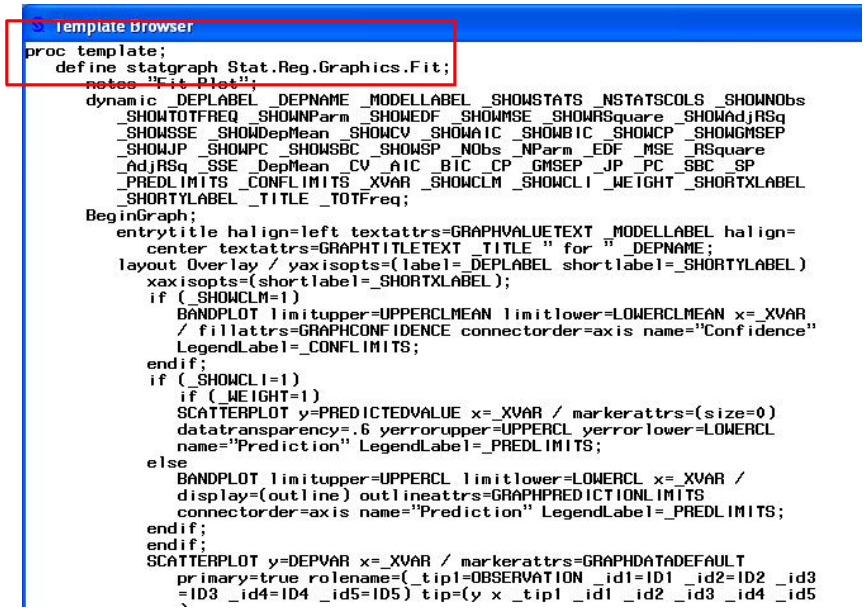
```
%sgdesign;
```



Graphics

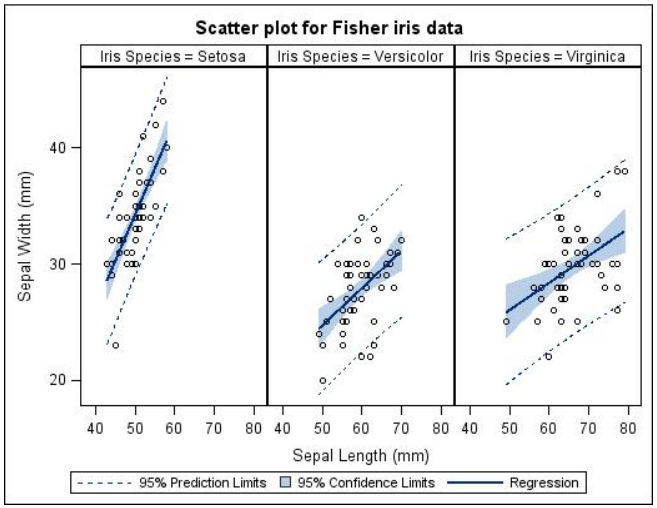
ODS Graph Template Language



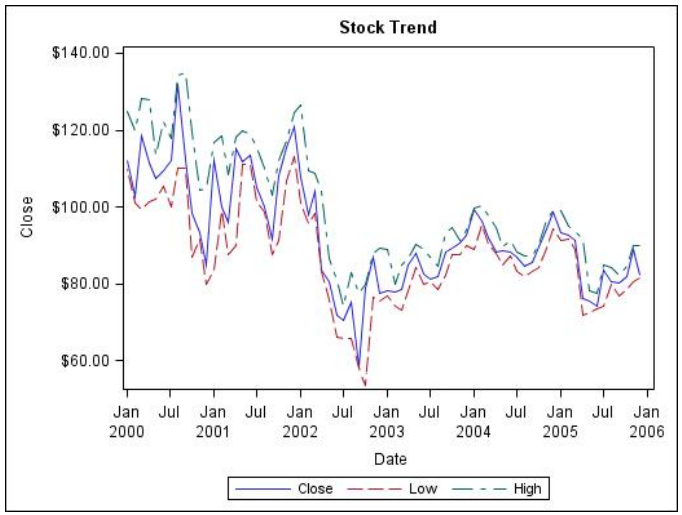


Graphics

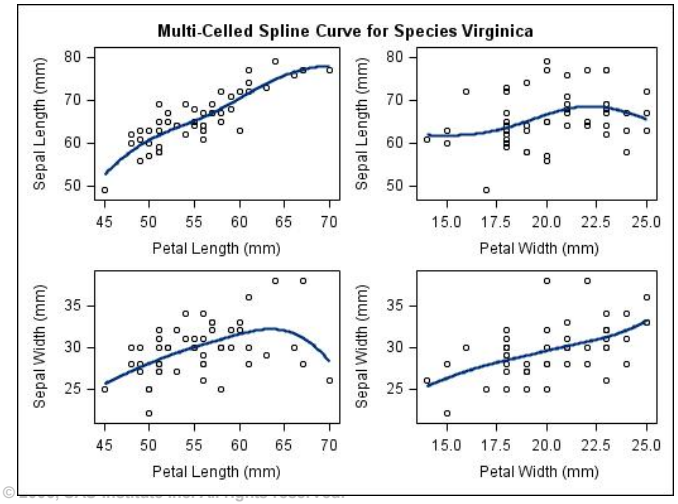
New SAS/Graph Statistical Procs



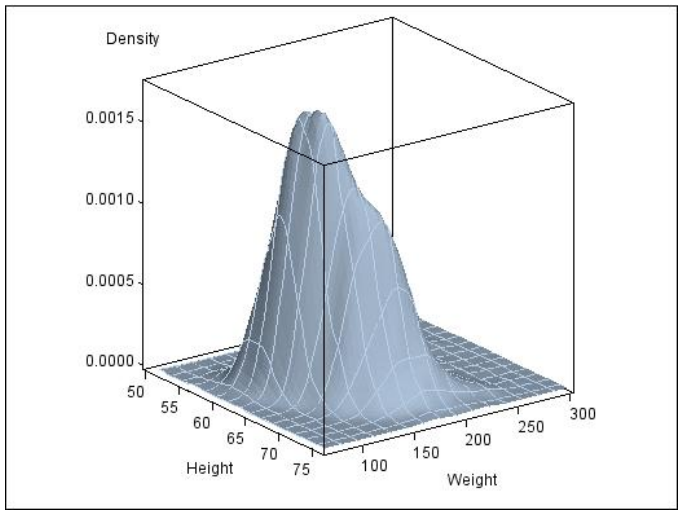
Proc SGPANEL



Proc SGPLOT



Proc SGSCATTER



Proc SGRENDER

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Generalized Linear Models

GLIMMIX Procedure

- Fits statistical models to data with correlations or non-constant variability and where the response is not necessarily normally distributed.
- External download for 9.1.3, production in 9.2
- COVTEST statement enables likelihood-based inference about covariance parameters
- Estimation methods now include Laplace and adaptive quadrature estimation

Replication variance estimation

SURVEYFREQ, MEANS, LOGISTIC & REG Proc

- variance estimation by balanced repeated replication (BRR) and jackknife methods

```
title1 'Ice Cream Spending Analysis';
title2 'Use the jackknife method to estimate the variance';
proc surveyreg data=IceCream
   varmethod=JACKKNIFE(outweights=JKWeights);
   strata Grade;
   class Kids;
   model Spending = Income Kids / solution;
   weight Weight;
run;
```

Model selection methods

GLMSELECT Procedure

- Forward, backward, and stepwise selection
- Least angle regression (LAR) and LASSO
- Selection from very large number of effects (tens of thousands)
- Internal partitioning of data into training, validation, and testing roles
- Selection based on information criteria and predictive performance

Model selection methods

GLMSELECT Procedure

```
ods graphics on;

proc glmselect data=analysisData testdata=testData
               seed=1 plots(stepAxis=number)=(criterionPanel ASEPlot)
   partition fraction(validate=0.5);
   class c1 c2 c3(order=data);
   model y =  c1|c2|c3|x1|x2|x3|x4|x5|x5|x6|x7|x8|x9|x10
             |x11|x12|x13|x14|x15|x16|x17|x18|x19|x20 @2
          / selection=stepwise(choose = validate
                               select = sl)
             hierarchy=single stb;
run;
```

Number of Observations Tables

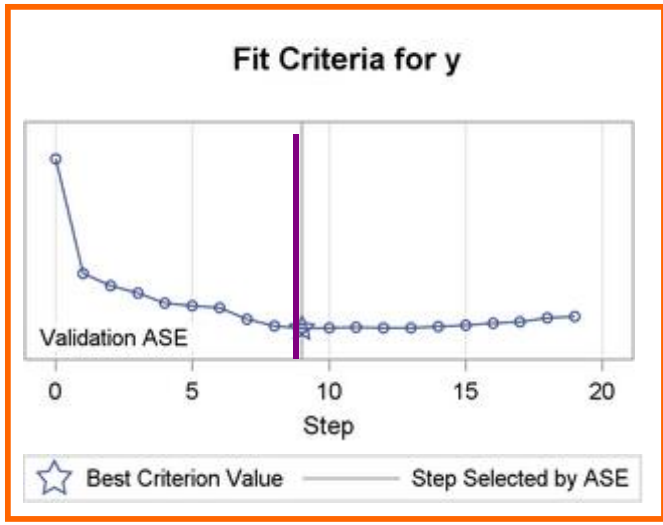
The GLMSELECT Procedure

Observation Profile for Analysis Data	
Number of Observations Read	1010
Number of Observations Used	1010
Number of Observations Used for Training	510
Number of Observations Used for Validation	500

Model Information

The GLMSELECT Procedure

Data Set	WORK.ANALYSISDATA
Test Data Set	WORK.TESTDATA
Dependent Variable	y
Selection Method	Stepwise
Select Criterion	Significance Level
Stop Criterion	Significance Level
Choose Criterion	Validation ASE
Entry Significance Level (SLE)	0.15
Stay Significance Level (SLS)	0.15
Effect Hierarchy Enforced	Single
Random Number Seed	1



Enterprise Guide

New version: 4.2

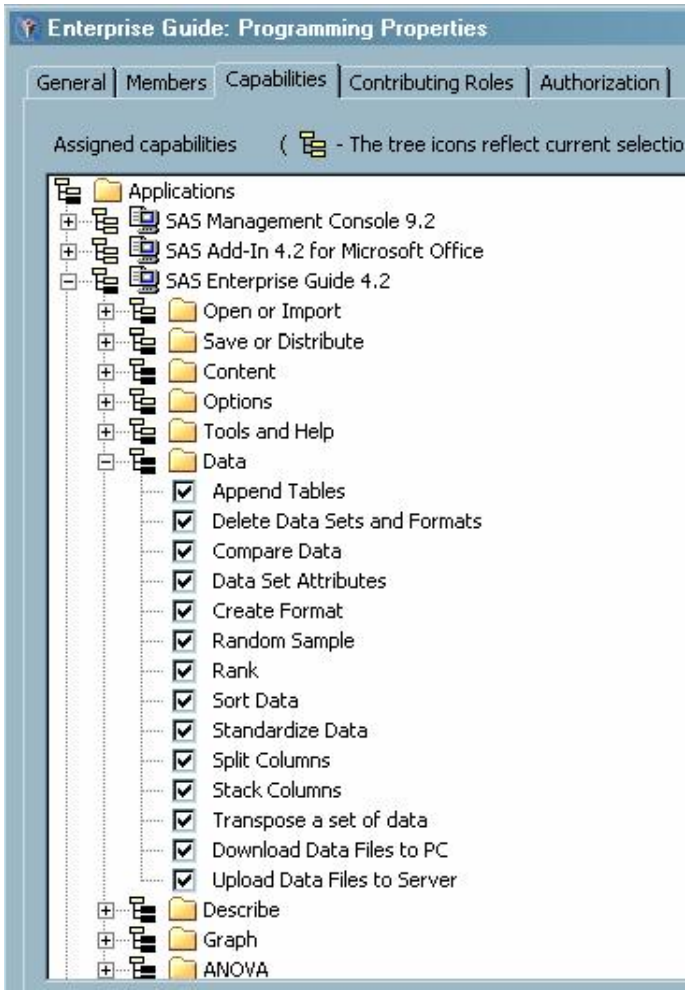
- The following tasks now support ODS statistical graphics

- ANOVA: Linear Models, One-Way ANOVA, t Test
- Describe: Distribution Analysis, One-Way Frequencies, Summary Statistics
- Multivariate: Cluster Analysis, Correlations, Factor Analysis, Mixed Models, Principal Components
- Regression: Generalized Linear Models, Linear Regression, Logistic Regression
- Survival Analysis: Life Tables, Proportional Hazards
- Time Series: Create Time Series Data

Enterprise Guide

New version: 4.2

- Role-based settings



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Bayesian analysis

Bayesian analysis

- Most Bayesian analyses require sophisticated computations, including the use of simulation methods
- BAYES statement in GENMOD, LIFEREG & PHREG Procs
- Proc MCMC procedure (experimental) is a general purpose Markov chain Monte Carlo (MCMC) simulation procedure that is designed to fit Bayesian models

SAS IML Studio

New Graphical User Interface

- SAS IML Studio was formely known as "SAS Stat Studio"
- It is included with the SAS/IML 9.2 module
- It is intended for data analysts who write SAS programs to solve statistical problems but need more versatility for data exploration and model building
- The programming language in IML Studio, which is called IMLPlus, is an enhanced version of the IML programming language
- It is also the successor to the SAS/INSIGHT product and provides the same interactive functionality

SAS IML Studio

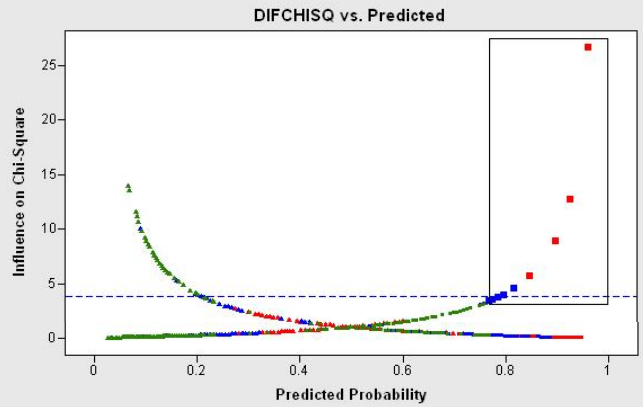
SAS Stat Studio - titanicpassengers (TitanicPassengers)

File Edit View Program Graph Analysis Tools Window Help

titanicpassengers:1

	survived	class	sex	age	name
	Nom	Nom	Nom	Int	Nom
1	1	1	female	29	Allen, Miss. Elisabeth Walton
2	1	1	male	0.9167	Allison, Master. Hudson Trevor
3	0	1	female	2	Allison, Miss. Helen Loraine
4	0	1	male	30	Allison, Mr. Hudson Joshua Creig
5	0	1	female	25	Allison, Mrs. Hudson J C (Bessie
6	1	1	male	48	Anderson, Mr. Harry
7	1	1	female	63	Andrews, Miss. Kornelia Theodosi
8	0	1	male	39	Andrews, Mr. Thomas Jr
9	1	1	female	53	Appleton, Mrs. Edward Dale (Char
10	0	1	male	71	Artagaveytia, Mr. Ramon
11	0	1	male	47	Astor, Col. John Jacob
12	1	1	female	18	Astor, Mrs. John Jacob (Madelein
13	1	1	female	24	Aubart, Mme. Leontine Pauline
14	1	1	female	26	Barber, Miss. Ellen "Nellie"
15	1	1	male	80	Barkworth, Mr. Algernon Henry Wi
16	0	1	male	60	Baumann, Mr. John D
17	0	1	male	24	Baxter, Mr. Quigg Edmond
18	1	1	female	50	Baxter, Mrs. James (Helene DeLau
19	1	1	female	32	Bazzani, Miss. Albina
20	0	1	male	36	Beattie, Mr. Thomson
21	1	1	male	37	Beckwith, Mr. Richard Leonard

Scatter Plot of titanicpassengers:2



Output1

Analysis of Maximum Likelihood Estimates

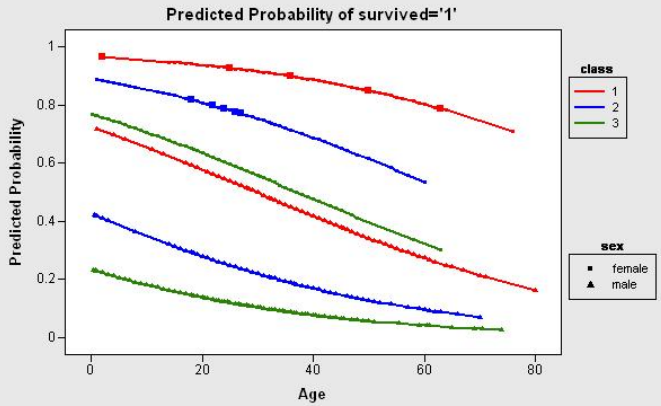
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	1.0192	0.1967	26.8622	<.0001
class	1	1	1.1344	0.1246	82.8424	<.0001
class	2	1	-0.1256	0.1127	1.2422	0.2650
sex	female	1	1.1902	0.0747	253.7092	<.0001
age		1	-0.0324	0.00585	30.6223	<.0001

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
class 1 vs 3	8.526	5.714	12.721
class 2 vs 3	2.418	1.692	3.456
sex female vs male	10.809	8.064	14.487
age	0.968	0.957	0.979

Association of Predicted Probabilities and Observed Responses

Line Plot of titanicpassengers:3



TitanicPassengers

Ready 0 Error(s) 0 Warning(s)

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- **Brand new tools**
  - Bayesian analysis
  - SAS/IML Studio (Stat Studio)

To learn more

What's new SAS 9.2

http://support.sas.com/documentation/whatsnew/index.html

SAS 9.2 Technical Documentation

http://support.sas.com/cdlsearch?ct=80000

New Courses for SAS 9.2

http://support.sas.com/training/canada/curric.html

Questions?

Thanks!

Sylvain Tremblay
sylvain.tremblay@sas.com