

IBM SPSS Statistics: What's New

Highlights

- Power your analysis with Quantile Regression and ROC Analysis
 - Take advantage of enhanced Bayesian Statistics with more probabilities
 - Apply even richer analysis to data with scripting command enhancements
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New and enhanced features accelerate, optimize and simplify data analysis

Analytics plays a vital role in helping your organization achieve its objectives. The IBM SPSS Statistics family delivers the core capabilities needed for end-to-end analytics. To ensure that the most advanced techniques are available to a broader group of analysts and business users, enhancements have been made to the features and capabilities of the IBM SPSS Statistics portfolio and its many specialized modules.

IBM SPSS Statistics 26 increases accessibility to advanced analytics through improved tools, integration, output and ease-of-use. This release focuses on increasing the analytic capabilities of the software through:

- New and advanced statistics
- Procedure and scripting advancements
- Enhanced productivity

The perpetual editions of SPSS Statistics 26—standard, professional and premium—deliver the long-term software access required for analytics groups. These editions group essential features, functionality and usage requirements to offer a convenient way to acquire the capabilities you need.

The latest features and functionality are available in both IBM SPSS Statistics Subscription and IBM SPSS Statistics 26.

Analyze your data with new and advanced statistics

SPSS Statistics 26 includes the following groundbreaking features, so you will be able to analyze your data with powerful new statistics.

Quantile regression

Quantile regression models the relationship between a set of predictor (independent) variables and specific percentiles (or "quantiles") of a target (dependent) variable, most often the median.

It is a type of regression analysis that is used when you want to estimate the conditional median of the target (dependent) variable. Essentially, quantile regression is an extension of linear regression and used when you make no assumptions about the distribution of the residuals.

Quantile regression helps you to obtain a more comprehensive analysis of the relationship between variables. Also, it tends to resist the influence of outlying observations. Quantile regression is widely used for research in industries as ecology, healthcare, financial economics and risk management.

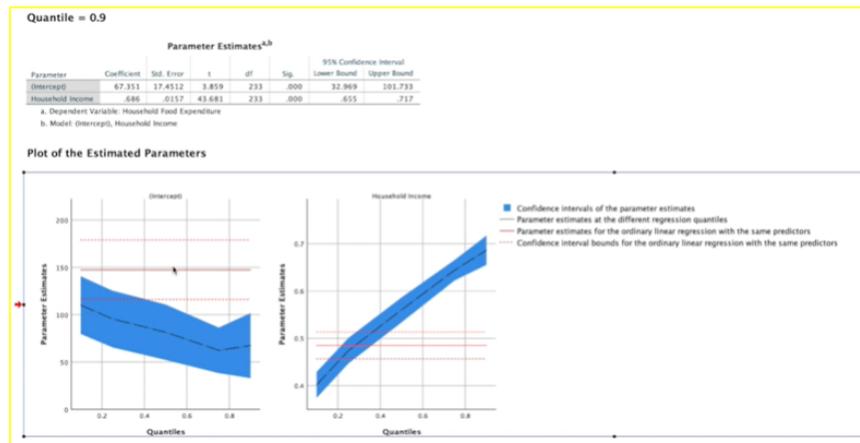
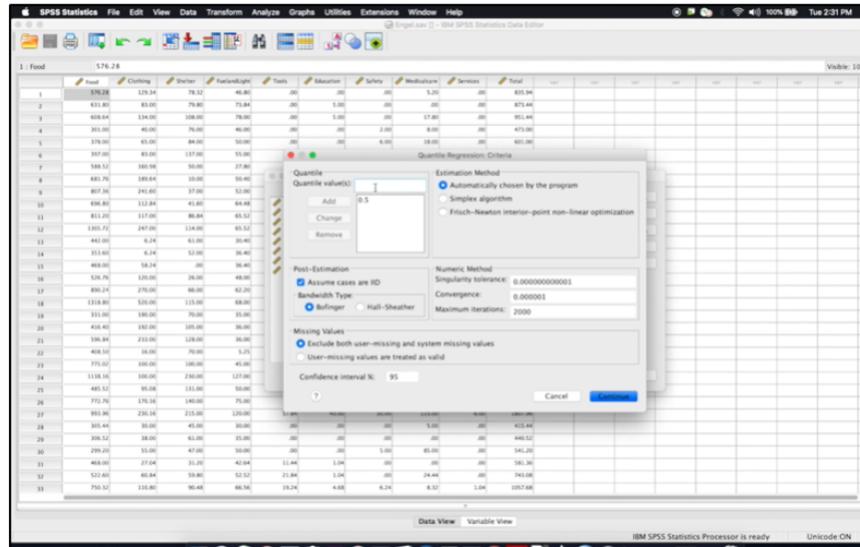


Figure 1: Quantile Regression

ROC analysis

ROC analysis assesses the accuracy of model predictions by plotting sensitivity vs (1-specificity) of a classification test. The area under the ROC curve, or AUC, is a measure of the usefulness of a test in general, where a greater area means a more useful test. It supports the inference regarding a single AUC and precision-recall (PR) curves, and provides options for comparing two ROC curves that are generated from either independent groups or paired subjects.

ROC curves are widely used for research in industries such as psychology, medicine, biometrics, meteorology, model performance assessment and others.

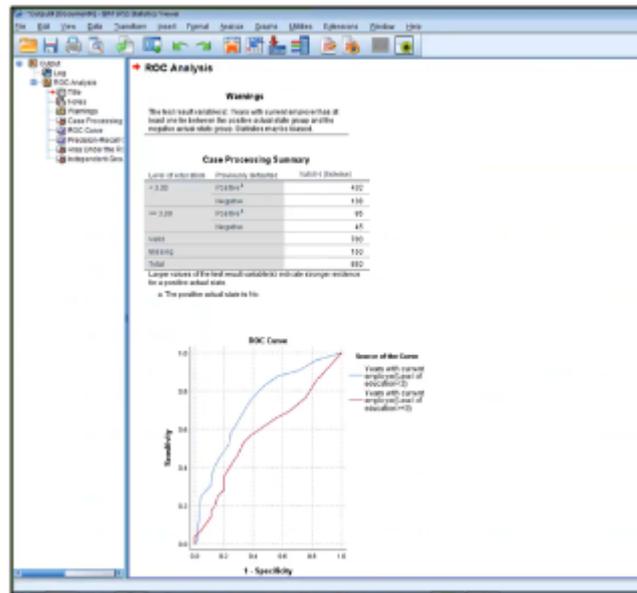


Figure 2: Comparing ROC Curves

Procedure and scripting advancements

SPSS Statistics 26 includes quite a few enhancements to existing procedures and scripting commands, so you can apply even richer analysis to your data.

Bayesian Statistics enhancements

Bayesian Statistics is an alternate to standard statistical tests (for example, p-values). It is becoming very popular because it circumvents a lot of the misunderstandings created by standard statistics. Instead of using a p-value to reject or fail to reject a null hypothesis, Bayesian places an uncertainty on parameters and captures all relevant information from observed data.

In SPSS Statistics 26 offers enhancements to Bayesian, such as:

- **One-way repeated measures ANOVA.** Measures one factor from the same subject at each distinct time point or condition and allows subjects to be crossed within the levels.

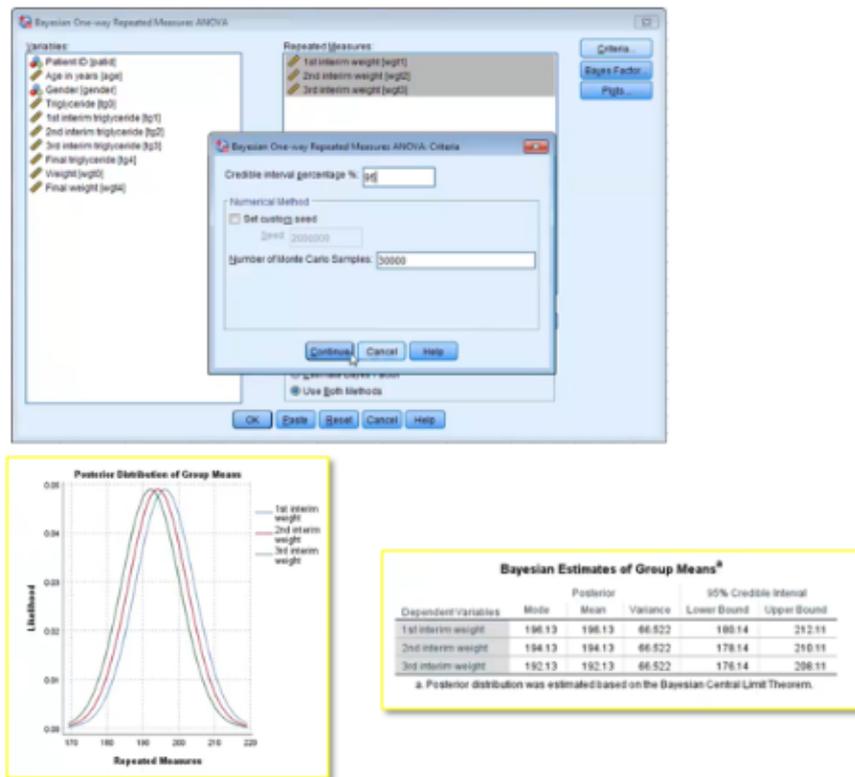
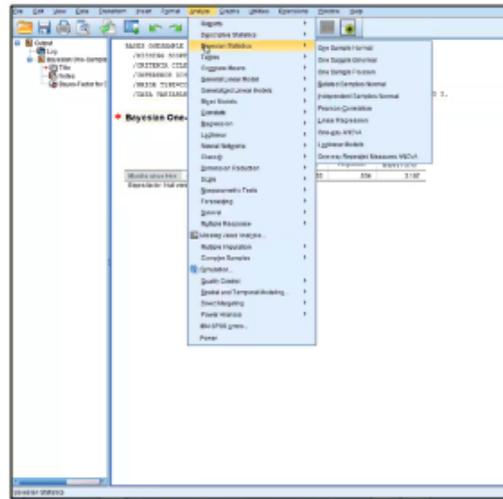


Figure 3: One way repeated measures ANOVA - Bayesian Statistics

- **One-sample binomial.** A binomial random variable shows the sum of a fixed number of independent Bernoulli trials.



Bayes-Factor for Binomial Proportion Test

Success Category	N	Observed		Bayes Factor
		Successes	Proportion	
Gender = Female	474	216	.456	1.145

Bayes factor: Null versus alternative hypothesis.

Figure 4: One sample Binomial - Bayesian Statistics

- **One-sample Poisson.** A conjugate prior in the Gamma distribution family is used when drawing Bayesian statistical inference on a Poisson distribution.

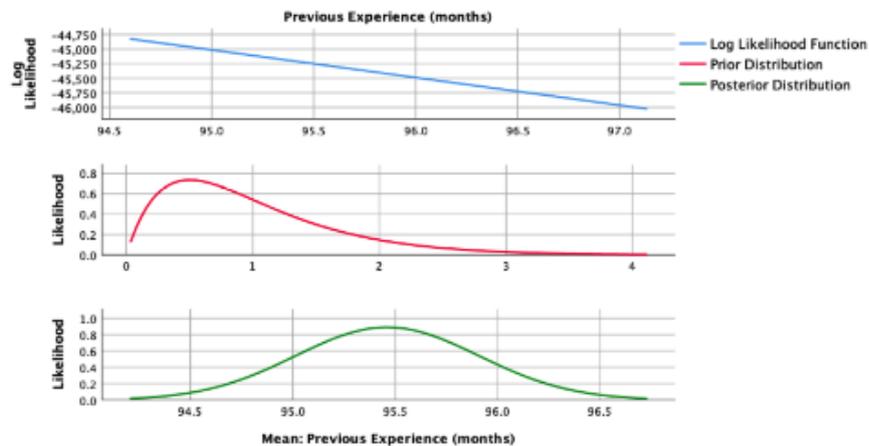
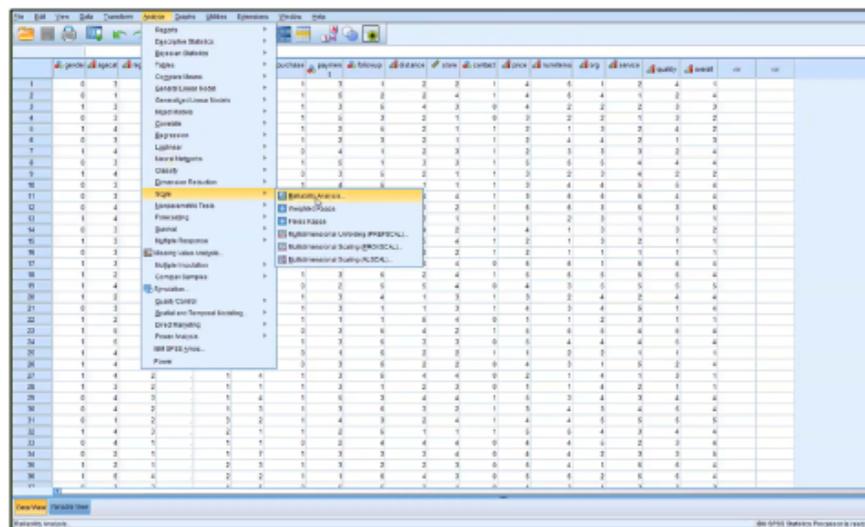


Figure 5: One sample Poisson - Bayesian Statistics

Reliability analysis enhancements

Now reliability analysis in SPSS Statistics 26 provides Fleiss' Multiple Rater Kappa statistics that assess the interrater agreement to determine the reliability among the various raters. A higher agreement offers more confidence in the ratings, reflecting the true circumstance.



Fleiss Multirater Kappa

	Overall Agreement ^a				Asymptotic 95% Confidence Interval	
	Kappa	Standard Error	Asymptotic		Lower Bound	Upper Bound
			z	Sig.		
Overall Agreement	-.014	.005	-2.619	.009	-.014	-.014

a. Sample data contains 474 effective subjects and 2 raters.

Figure 6: Reliability Analysis

Scripting enhancements

The MATRIX, Mixed Linear Models (MIXED) and Generalized Linear Mixed Models (GENLINMIXED) commands have been enhanced. The MATRIX - END MATRIX command has new features, including:

- Long variable names (up to 64 bytes) can be used to name a matrix or vector (such as COMPUTE, CALL, PRINT, READ, WRITE, GET, SAVE, MGET, MSAVE, DISPLAY, RELEASE, and so on).
- Long variable names are supported in GET and SAVE commands.
- Statistical functions that were previously only supported by the COMPUTE command (for example IDF.CHISQ, CDF.NORMAL, NCDF.F, and so on) are now supported.

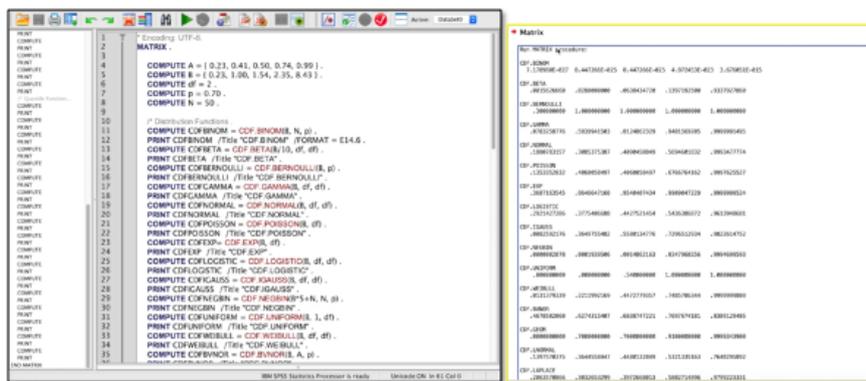


Figure 7: MATRIX scripting enhancements

The Generalized Linear Mixed Models (**GENLINMIXED**) command has been enhanced with new features including:

- **New Covariance Type structures, ARH1 and CSH, for random effects.** The CSH and ARH1 options were added to the /RANDOM subcommand (keyword COVARIANCE_TYPE).
- **New Covariance Type structures, ARH1 and CSH, for repeated effects.** The CSH and ARH1 options were added to the /DATA_STRUCTURE subcommand (keyword COVARIANCE_TYPE).
- **Kenward-Roger Degree of Freedom method.** The KENWARD_ROGER option was added to the /BUILD_OPTIONS subcommand (keyword DF_METHOD).
- **Kronecker Covariance types.** The options UN_AR1, UN_CS, UN_UN were added to the /DATA_STRUCTURE subcommand (keyword COVARIANCE_TYPE).
- **New KRONECKER_MEASURES keyword.** The keyword is used for specifying a list of variables for the /DATA_STRUCTURE subcommand.

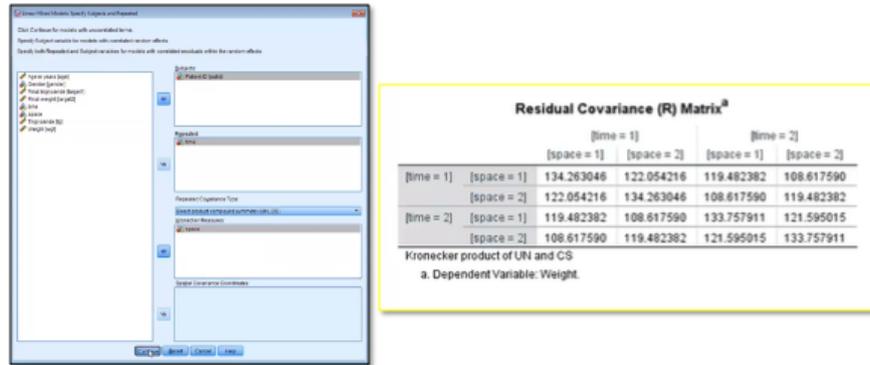


Figure 8: GENLINMIXED scripting enhancement

The Mixed Linear Models (**MIXED**) command has been enhanced with new features including:

- DFMETHOD keyword introduced on the CRITERIA subcommand.
- KRONECKER keyword added to the REPEATED subcommand. The keyword should be used only when COVTYPE is one of three following Kronecker types.
- UN_AR1, UN_CS, and UN_UN options added to the COVTYPE keyword on the REPEATED subcommand.

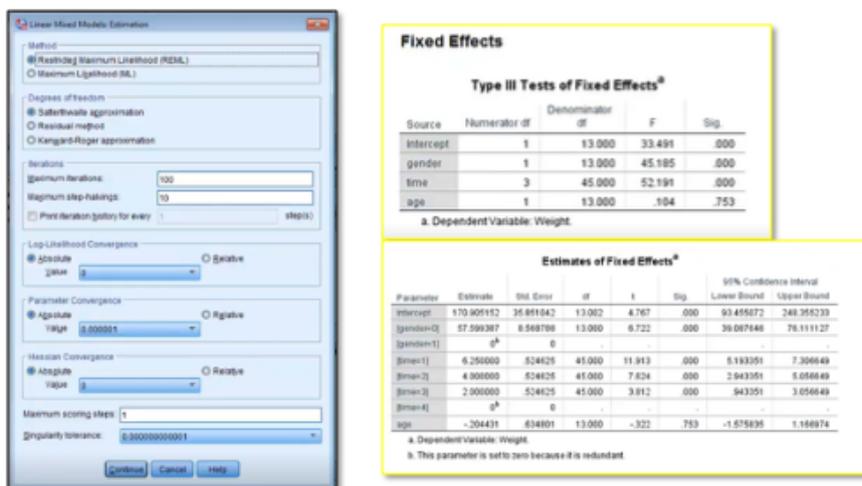


Figure 9: MIXED scripting enhancement

Productivity enhancements

In SPSS Statistics 26, the SPSS Statistics production facility has been enhanced with updates to reporting and batch job scheduling:

- You can use the INSERT HIDDEN feature in the Production Facility command line interface to submit jobs to the SPSS Statistics Server.
 - When the Production Facility command line interface is used with Microsoft Windows Task Scheduler or MacOS Automator for scheduling jobs, you can effectively replace IBM SPSS Collaboration and Deployment Services for processing SPSS Statistics jobs.
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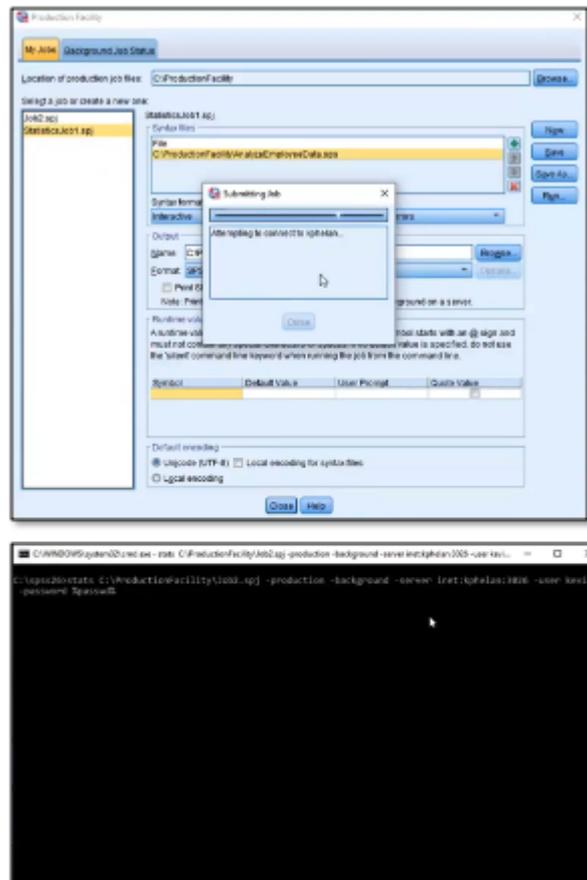
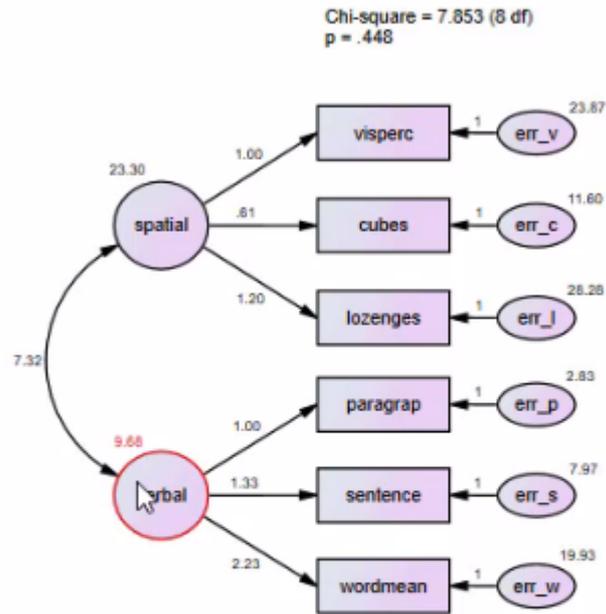


Figure 10: Production facility updates

SPSS Amos 26 enhancements

SPSS Amos 26 enhancements now allow you to:

- Automatically display the output on the path diagram.
- Specify a model without drawing a path diagram via syntax.



Example 8
Factor analysis: Girls' sample
Holzinger and Swineford (1939)
Unstandardized estimates

Figure 11: SPSS Amos path diagram

Why IBM?

IBM Analytics software delivers data-driven insights that help organizations work smarter and outperform their peers. This comprehensive portfolio includes solutions for business intelligence, data science, decision optimization, predictive analytics, performance management and risk management. IBM Analytics solutions enable companies to identify and visualize trends and patterns—in areas such as customer analytics—that can have a profound effect on business performance. They can compare scenarios; anticipate potential threats and opportunities; better plan, budget and forecast resources; balance risks against expected returns; and work to meet regulatory requirements. By making analytics widely available, organizations can align tactical and strategic decision making to achieve business goals.

For further information please visit:

ibm.com/analytics

Next steps

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