Overview

SAS/STAT 14.2 introduces two new procedures and adds capabilities to many existing analyses. This software is available with the fourth maintenance release for Base SAS® 9.4. Highlights of this new release follow.

Propensity Score Analysis

If you work with observational data, you need to consider confounding, which can occur if some covariates are associated with both the treatment assignment and the outcome. If there are systematic differences between the distributions of the covariates in the treatment and control groups, a regression analysis will not produce valid inference. One way to proceed is to perform a propensity score analysis to reduce the potential bias. The new PSMATCH procedure provides a variety of tools for propensity score analysis. It computes propensity scores, which estimate the probability that a subject is assigned to treatment given a set of pretreatment covariates. PROC PSMATCH provides the following methods:

2. Stratification of observations that have similar propensity scores for use in a subsequent outcome analysis.
3. Matching each treated unit with one or more control units that have a similar propensity score for use in a subsequent outcome analysis.
4. The PSMATCH procedure also provides statistical and graphical methods for assessing how well the distributions of the propensity score and the covariates are balanced between the adjusted treatment and control groups.

Causal Analysis

The new CAUSALTRT procedure estimates the average causal effect of a binary treatment variable T on a continuous or discrete outcome Y. Depending on the application, the variable T can represent an intervention, an exposure to a condition, or an existing characteristic of subjects. The CAUSALTRT procedure estimates two types of causal effects: the average treatment effect and the average treatment effect for the treated.

The causal inference methods that the CAUSALTRT procedure implements are designed primarily for use with data from nonrandomized trials or observational studies, where you observe T and Y without assigning subjects randomly to the treatment conditions. Instead, subjects select themselves into the treatment conditions according to their pretreatment characteristics. If these characteristics are also associated with the outcome Y, they confound the relationship between T and Y, clouding the causal interpretation of T on Y. Therefore, estimating the causal effect of T usually requires adjustments that remove or reduce the effects of confounding.

You can adjust for confounding by using the CAUSALTRT procedure to model the treatment assignment or the outcome or both. Modeling the treatment assignment leads to inverse probability weighting methods, and modeling the outcome leads to regression adjustment methods. Modeling both leads to doubly robust methods that can provide unbiased estimates for the treatment effect even if one of the models is misspecified.

Survival Modeling

The PHREG procedure now provides concordance statistics and time-dependent ROC curves for assessing predictive accuracy.

The ROC statement specifies a model to be used in computing concordance statistics or ROC curves. The CONCORDANCE option in the PROC PHREG statement produces concordance statistics for the model that is specified in the MODEL statement and for a model that is specified in an ROC statement. The PLOTS=ROC option in the PROC PHREG statement plots time-dependent ROC curves for the model that is specified in the MODEL statement and for a model that is specified in an ROC statement. The PLOTS=AUC option displays the areas under the ROC curves, and the PLOTS=AUCDIFF option
displays the difference of the AUC curves between models. You can specify the time points at which the ROC curves are computed and to create tables and output data sets for the analysis of the ROC curves.

The SURVEYSELECT procedure now provides balanced bootstrap selection and sequential Poisson selection. The new ROUND= option provides additional rounding methods to use when converting the sampling rate to an integer-valued sample size.

Bayesian Capabilities

In PROC MCMC the new NORMALCAR option in the RANDOM statement specifies a spatial conditional autoregressive (CAR) prior that can be used to model spatial correlations among sites and neighbors.

Other Enhancements

- The POWER procedure performs power and sample size analyses for extensions of existing analyses that involve the chi-square, F, t, normal, or correlation coefficient distribution.
- The NLMIXED supports multithreading in models that have more than one RANDOM statement.
- The GEE Procedure includes the EFFECTPLOT, LSMESTIMATE, and SLICE statements and provides the STORE statement.
- The HPSPLIT procedure provides the ASE in the cost-complexity plot.
- The FREQ procedure provides addition options for agreement statistics.
- The IRT procedure enables you to specify fixed values for parameters, specify the factor means of a confirmatory IRT model, and provides options for prior distributions.
- The NLIN procedure now provides ESTIMATE and CONTRAST statement.

For More Information

For complete information about all SAS/STAT procedures, see the documentation available at support.sas.com/statistics/.

Survey Analyses

PROC SURVEYIMPUTE procedure, introduced last release, now includes two-stage fully efficient fractional imputation and fractional hotdeck imputation. These methods are especially useful for imputing missing values in continuous variables such as age or salary. The new METHOD=FHDI option in the PROC SURVEYIMPUTE statement produces two-stage fully efficient fractional imputation.

The REPWTADJ= option for METHOD=FHDI provides three replicate weight adjustment methods, and the SELECTION= option for METHOD=FHDI provides two donor selection methods for fractional hot-deck imputation.

The SURVEYFREQ procedure now provides the AGREE(KAPPADETAILS) option which displays the following information: observed agreement and chance-expected agreement components of the simple kappa coefficient, maximum possible kappa, prevalence index, and bias index. The AGREE(WTKAPDETAILS) option displays the observed agreement and chance expected agreement components of the weighted kappa coefficient.

PROC SURVEYFREQ also provides the estimate, confidence limits, and test of the difference between discordant proportions in 2 X 2 tables with the DISCORDDIFF option.

With the SURVEYMEANS procedure you can now compare domain means for continuous variables by specifying the DIFFMEANS options in the DOMAIN statement. PROC SURVEYMEANS also provides differences between domain means for pairwise levels of a defined domain, the standard error of the difference, and the t test. You can also specify ADJUST=BON option to request a Bonferroni multiple comparison adjustment of the p-values for the t tests.