



## SAS® Enterprise Miner™ 6.1

Unearthing valuable insight – profitable data mining results with less time and effort

### What does SAS® Enterprise Miner™ do?

SAS Enterprise Miner streamlines the data mining process to create highly accurate predictive and descriptive models based on analysis of vast amounts of data from across an enterprise. Forward-thinking organizations today are using SAS data mining software to detect fraud, minimize credit risk, anticipate resource demands, increase response rates for marketing campaigns and curb customer attrition.

### Why is SAS® Enterprise Miner™ important?

SAS offers the industry's most comprehensive suite of predictive analytics and interactive visualization capabilities that empower users to explore and exploit corporate data for strategic business advantage.

### For whom is SAS® Enterprise Miner™ designed?

SAS Enterprise Miner is designed for data miners, marketing analysts, database marketers, risk analysts, fraud investigators, business managers, engineers and scientists who need to use the increasing amounts of data to make fast and accurate decisions and those who play key roles in identifying and solving critical business or research issues.

Turning increasing amounts of raw data into useful information remains a challenge for most organizations because the answers that identify key opportunities often lie buried in mountains of data.

Which customers will purchase what products and when? Which customers are leaving and what can be done to retain them? How should insurance rates be set to ensure profitability? How are maintenance schedules and operational influences affecting a component's time-to-failure?

To get answers to complex questions and gain an edge in today's competitive market, powerful advanced analytic solutions are required to extract knowledge from vast stores of data. Discovering previously unknown patterns can help decision makers across your enterprise create effective strategies. Those who choose to implement data mining into their business processes will be able to stay competitive in today's fast-moving markets.

Unfortunately, digging through large volumes of data without a proper process and without the right tools can be unwieldy and inefficient. New approaches and techniques for conducting data mining investigations are rapidly evolving. While one analytical approach may work well on one data collection, it may not perform well given new data sources or new business challenges.

Thus, it is crucial to have a wide selection of analysis tools at hand. Different tools produce different models, and

only when you compare models side-by-side can you see which data mining approach produces the best "fit." If you start with a workbench that has limited analytical tools (i.e., only regression or only decision trees), the end result could be a model with limited predictive value.

The demand for usable analytical information is growing in every industry, putting increased pressure on data miners and business analysts to produce more and better models in less time. Functional and industry-specific business issues can all benefit from incorporating analytics in a secure and scalable manner. This requires collaboration across the organization and calls for a powerful, multipurpose data mining solution that can be tailored to meet different needs.

SAS® Enterprise Miner™ provides an optimized architecture so data miners and business analysts have more time to create highly accurate predictive and descriptive models. Results can be shared throughout an organization to deliver analytical information and incorporate models into business processes. SAS Analytics are a key component of the SAS Business Analytics Framework. The framework extends the value of your existing systems, ensures a clean, consistent view across your enterprise and helps you predict with precision to reduce uncertainty and gain marketplace advantage.



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## Key benefits

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- **An efficient, integrated data mining process is supported by a broad set of tools.** Regardless of your data mining preferences or skill level, SAS provides flexible software that addresses complex problems. Going from raw data to accurate, business-driven data mining models becomes a seamless process, enabling the statistical modeling group, business managers and the IT department to collaborate more efficiently.
- **Both business analysts and statisticians can build more models, faster with a powerful, easy-to-use GUI.** SAS Enterprise Miner's process flow diagram environment dramatically shortens model development time for both business analysts and statisticians. SAS Enterprise Miner 6.1 includes an intuitive user interface that incorporates common design principles established for SAS software as well as additional navigation tools. The process flow diagram provides a complete documentation trail of the analyses, and along with user-defined notes, is useful for version control. The GUI can be tailored for all analysts' needs via the flexible, interactive property sheets, quick search code editors and display settings.
- **More accurate predictions and the ability to easily share reliable information improve the quality of decisions.** Better-performing models with new innovative algorithms enhance the stability and accuracy of predictions, which can be verified easily by visual model assessment and validation metrics. Both analytical and business users enjoy a common, easy-to-interpret visual view of the data mining process. Predictive results and assessment statistics from models built with different approaches can be displayed side-by-

side for easy comparison. The resulting diagrams serve as self-documenting templates that can be updated easily or applied to new problems without starting over.

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## Product overview

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SAS Enterprise Miner is delivered as a modern, distributed client-server system. To enhance the data mining process, this software is designed to work seamlessly with SAS' data integration, analytics and reporting technologies.

### **An integrated, complete view of all your enterprise data**

Data mining is most effective when it is part of an integrated information delivery strategy that includes data gathered from diverse sources, including the Web, call centers, surveys, customer feedback forms and transactional point-of-sale systems. With the addition of SAS Text Miner, both structured and unstructured data analysis can be incorporated into an integrated predictive modeling solution that encompasses a full spectrum of data analysis and knowledge discovery.

### **Designed around an organized and logical GUI for data mining success**

The data mining power of SAS Enterprise Miner is delivered via an easy-to-use, drag-and-drop interface designed to appeal to experienced statisticians as well as less-seasoned business analysts. The advanced analytic algorithms are organized under the core tasks that are performed in any successful data mining endeavor. SAS' data mining process encompasses five primary steps: sampling, exploration, modification, modeling and assessment (SEMMA). In each step, you perform an array of actions as the data mining project develops. By deploying nodes

from the SEMMA toolbar, you can apply advanced statistics, identify the most significant variables, transform data elements with expression builders, develop models to predict outcomes, validate accuracy and generate a scored data set with predicted values to deploy into your operational applications.

### **An unmatched suite of modeling techniques and methods**

SAS Enterprise Miner provides superior analytical depth with an unmatched suite of predictive and descriptive modeling algorithms, including decision trees, bagging and boosting, neural networks, memory-based reasoning, hierarchical clustering, linear and logistic regression, associations, sequence and Web path analysis, and more. The assortment and breadth of analytical algorithms has grown to include state-of-the-art methods such as gradient boosting, least angular regression splines and partial least squares regression.

### **Sophisticated set of data preparation, summarization and exploration tools**

Preparing data for mining usually is the most time-consuming aspect of data mining endeavors. SAS Enterprise Miner provides a powerful set of interactive data preparation tools for optimally addressing missing values, filtering outliers and developing segmentation rules. Core data preparation tools include File Import, Append, Merge and Drop variables. Extensive descriptive summarization features and interactive data exploration tools enable even the most novice users to examine large amounts of data in dynamically linked, multidimensional plots that support critical business decisions. The outcome? Quality data mining results that are tailored and optimally suited to specific business problems.

### **Business-based model comparisons, reporting and management**

Assessment features for comparing models in terms of lift curves and overall ROI profitability metrics offer valuable collaboration opportunities for data miners to discuss results with business domain experts. Models generated with different modeling algorithms can be evaluated consistently using a highly visual assessment interface. An innovative Cutoff node examines posterior probability distributions to define the optimal decisions for the business problem at hand.

### **An automated scoring process delivers faster results**

Scoring is the process of regularly applying a model to new data for implementation into a real operational environment. This process can be tedious, especially when it entails manually rewriting or converting code, which can delay model implementation and introduce potentially costly mistakes. Scoring code must mirror the entire process that led to the final predictive model, including every data preprocessing step.

SAS Enterprise Miner automatically generates score code in SAS, C, Java and PMML. The scoring code can be deployed in a variety of real-time or batch environments within SAS, on the Web or directly in relational databases. Combined with SAS Scoring Accelerator for Teradata, SAS Enterprise Miner models can be published into Teradata specific scoring functions for execution directly in a Teradata database. Results from SAS Enterprise Miner can be passed directly to other SAS business solutions, such as SAS Marketing Automation, SAS Model Manager and SAS Real-Time Decision Manager, for further deployment of data mining results into a real-time operational environment.

### **Open, extensible design for ultimate flexibility**

The customizable environment of SAS Enterprise Miner provides the ability to add tools and include personalized SAS code via the Extension node. Existing SAS models developed outside of the SAS Enterprise Miner environment can be integrated easily into the customizable process flow environment while maintaining full control of each syntax statement. The Extension node facility includes interactive editor features for training and score codes. Users can edit and submit code interactively while viewing the log and output listings. Default selection lists can be extended with custom-developed tools written with SAS code or XML logic, which opens the entire world of SAS to data miners.

### **High-performance grid enabled workbench**

The innovative Java client/SAS server architecture provides unprecedented flexibility for configuring an efficient installation that scales from a single-user system to very large enterprise solutions. Powerful servers may be dedicated to computing, while users move from office to home to remote sites without losing access to mining projects or services. Many process-intensive tasks, such as data sorting, summarization, variable selection and regression modeling, are multithreaded, and processes can be run in parallel for distribution and workload balancing across a grid of servers or scheduled for batch processing.

### **Modern, distributable data mining system suited for large enterprises**

SAS Enterprise Miner is deployable via a thin-client Web portal for distribution to multiple users with minimal maintenance of the clients. Alternatively, the complete system can be configured on a standalone PC. SAS Enterprise Miner supports Windows servers and UNIX platforms, making it the software of choice for organizations with large-scale data mining projects. The SAS Enterprise Miner batch-processing facility enables large training and scoring processes to be scheduled during off-peak computing hours.

Reports that span the entire analysis can be easily created and distributed for internal documentation and external reporting. Model result packages can be created and registered to the SAS Metadata Server for promotion to SAS Model Manager, SAS Data Integration Studio (a component of SAS Enterprise Data Integration Server and SAS Data Integration Server), and SAS® Enterprise Guide®. Data miners, business managers and data managers can effectively manage large model portfolios throughout the organization via the platform for SAS Business Analytics.

## Key Features

### Multiple interfaces

- Easy-to-use GUI for building process flow diagrams:
  - Build more and better models faster.
  - Deliverable via the Web.
  - Access the SAS programming environment.
  - Provides XML diagram exchange.
  - Reuse diagrams as templates for other projects or users.
- Batch processing:
  - Encapsulates all features of the GUI.
  - SAS macro based.
  - Embed training and scoring processes into customized applications.

### Scalable processing

- Server-based processing.
- Asynchronous model training.
- Ability to stop processing cleanly.
- Grid computing:
  - Distribute mining process across a cluster.
  - Schedule training and scoring tasks.
  - Balance loads and resource allocation.
- Parallel processing – run multiple tools and diagrams concurrently.
- Multithreaded predictive algorithms.
- All storage located on servers.

### Accessing and managing data

- Access to more than 50 file structures.
- File Import node for easy access to Microsoft Excel, comma-delimited files, SAS, JMP® and other common file formats.
- Enhanced Explorer window to quickly locate and view table listings or to develop a plot using interactive graph components.
- SAS Library Explorer and Library Assignment wizard.
- Drop variables node.
- Merge data node.
- Append node.
- Filter outliers:
  - Apply various distributional thresholds to eliminate extreme interval values.
  - Combine class values with fewer than  $n$  occurrences.
  - Interactively filter class and numeric values.
- Metadata node for modifying columns metadata such as role, measurement level and order.

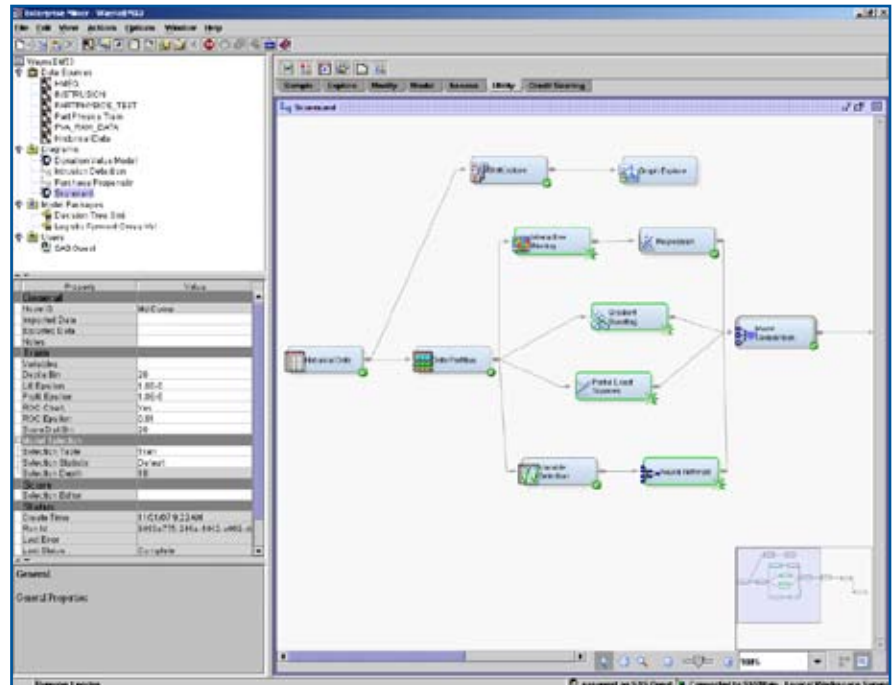


Figure 1: With SAS Enterprise Miner's GUI, projects are persisted on the analytical server, enabling data miners to collaborate on the analyses. The process flow diagram is a self-documenting template that can be easily updated or applied to new problems and shared with other analysts.

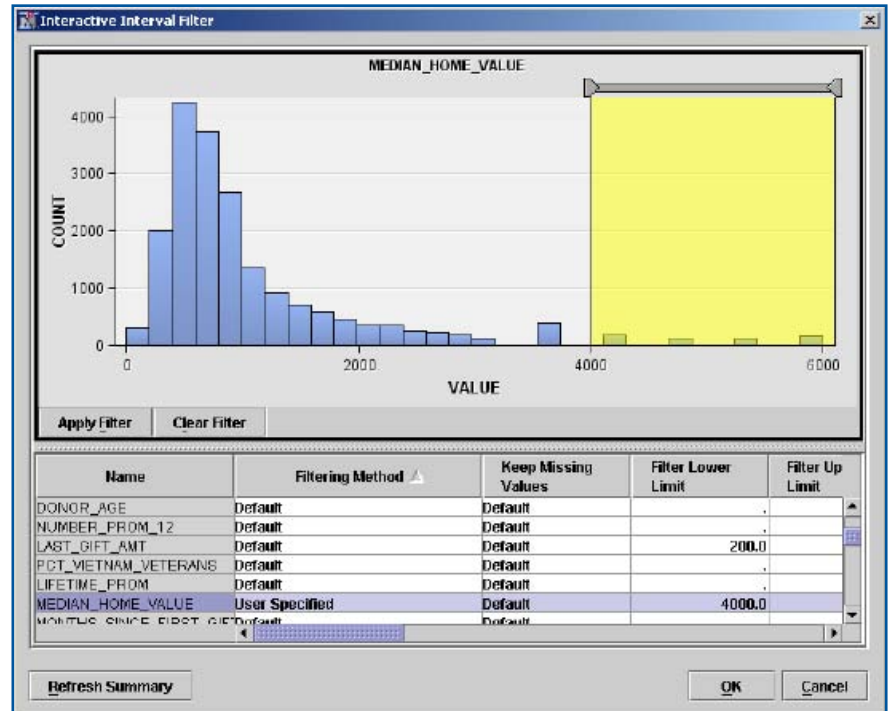


Figure 2: Filter extreme values interactively with the Filter node. The shaded region defines the variable range to keep.

- Integrated with SAS Data Integration Studio and SAS Enterprise Guide through SAS Metadata Server:
  - Build training tables for mining.
  - Deploy scoring code.

### Sampling

- Simple random.
- Stratified.
- Weighted.
- Cluster.
- Systematic.
- First *N*.
- Rare event sampling.

### Data partitioning

- Create training, validation and test data sets.
- Ensure good generalization of your models through use of holdout data.
- Default stratification by the class target.
- Balanced partitioning by any class variable.
- Output SAS tables or views.

### Transformations

- Simple: log, square root, inverse, square, exponential, standardized.
- Binning: bucketed, quantile, optimal binning for relationship to target.
- Best power: maximize normality, maximize correlation with target, equalize spread with target levels.
- Interactions editor: define polynomial and *n*th degree interaction effects.
- Interactively define transformations:
  - Define customized transformations using the Expression Builder or SAS code editor.
  - Compare the distribution of the new variable with the original variable.
- Predefine global transformation code for reuse.

### Interactive variable binning

- Quantile or bucket.
- Gini variable selection.
- Handle missing values as separate group.
- Fine and coarse classing detail.
- Profile bins by target.
- Modify groups interactively.
- Save binning definitions.

### Rules Builder node

- Create ad hoc data driven rules and policies.
- Interactively define the value of the outcome variable and paths to the outcome.

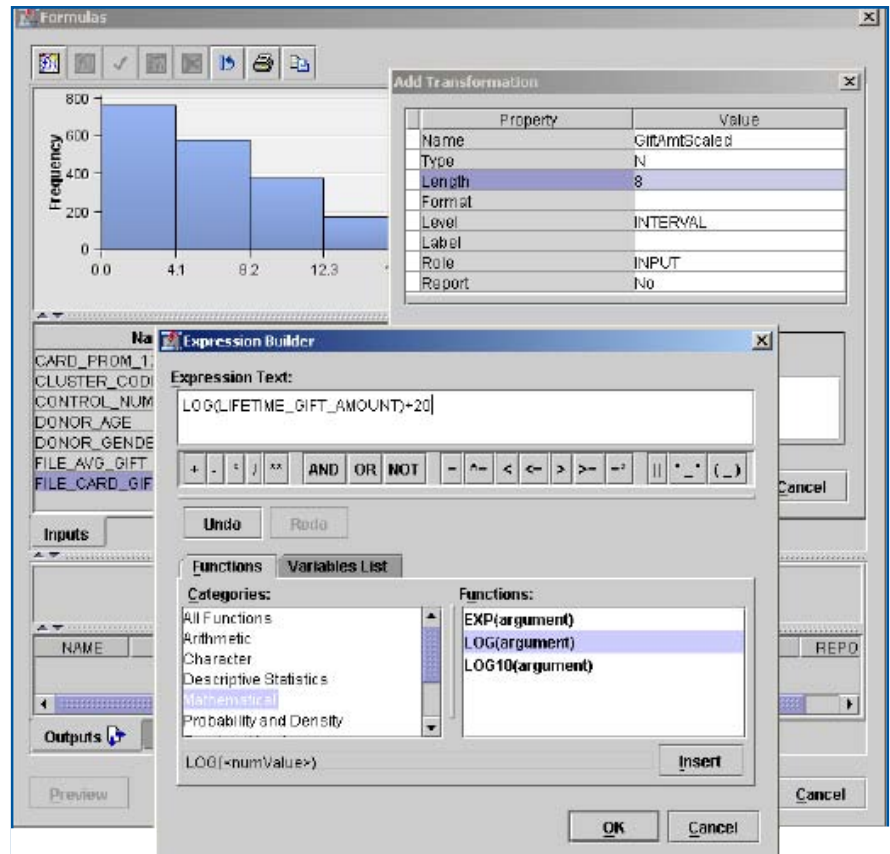


Figure 3: Develop customized transformations using the interactive Transform Variables node Expression Builder.

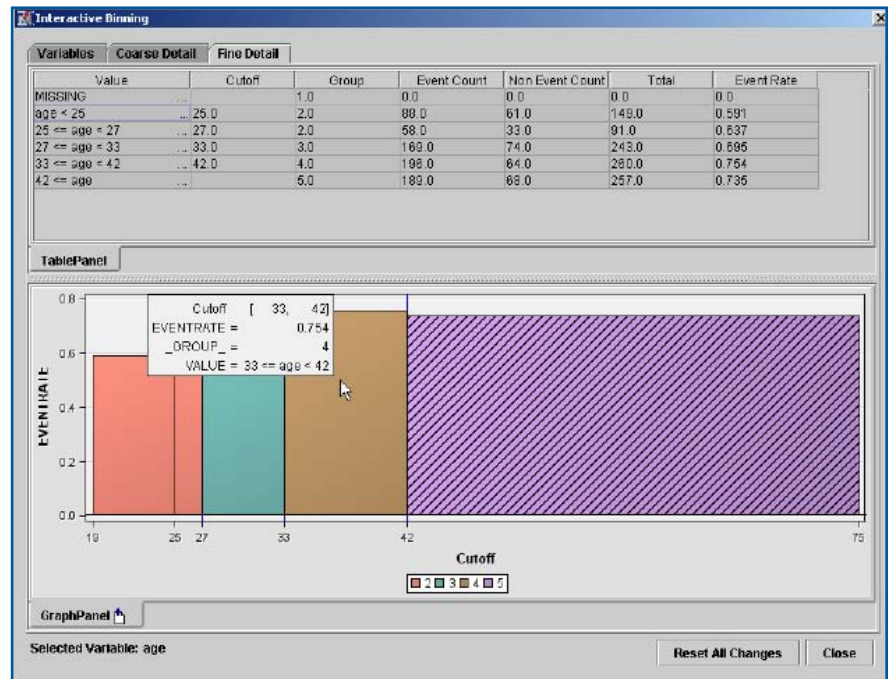


Figure 4: Interactively bin variables to maximize relationship with the target or conform to business policies. Split or combine bins interactively and save the grouping definitions for reuse.

## Data replacement

- Measures of centrality.
- Distribution-based.
- Tree imputation with surrogates.
- Mid-medium spacing.
- Robust M-estimators.
- Default constant.
- Replacement Editor:
  - Specify new values for class variables.
  - Assign replacement values for unknown values.
  - Interactively cap extreme interval values to a replacement threshold.

## Descriptive statistics

- Univariate statistics and plots:
  - Interval variables:  $n$ , mean, median, min, max, standard deviation, scaled deviation and percent missing.
  - Class variables: number of categories, counts, mode, percent mode, percent missing.
  - Distribution plots.
  - Statistics breakdown for each level of the class target.
- Bivariate statistics and plots:
  - Ordered Pearson and Spearman correlation plot.
  - Ordered chi-square plot with option for binning continuous inputs into  $n$ bins.
  - Coefficient of variation plot.
- Variable selection by logworth.
- Other interactive plots:
  - Variable worth plot ranking inputs based on their worth with the target.
  - Class variable distributions across the target and/or the segment variable.
- Scaled mean deviation plots.

## Graphs/visualization

- Batch and interactive plots: scatter plots, matrix plots, box plots, constellation plots, contour plots, needle plots, lattice plots, 3-D charts, density plots, histograms, multidimensional plots, pie charts and area bar charts.
- Segment profile plots:
  - Interactively profile segments of data created by clustering and modeling tools.
  - Easily identify variables that determine the profiles and the differences between groups.

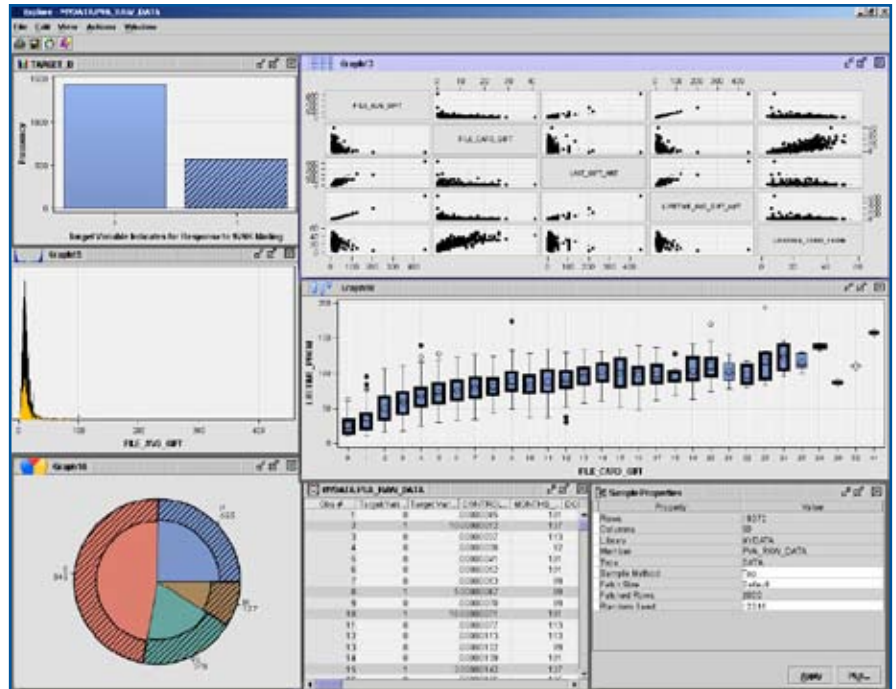


Figure 5: Explore your data interactively with parallel axis, density, 3-D rotating scatter plots and other plots. Interactive graphs are automatically saved within the results of the Graphics Explore node.

- Easy-to-use Graphics Explorer wizard and Graphics Explore node:
  - Create titles and footnotes.
  - Apply a WHERE clause.
  - Choose from several color schemes.
  - Easily rescale axes.
  - Surface the underlying data from standard SAS Enterprise Miner results to develop customized graphics.
- Plots and tables are interactively linked supporting tasks such as brushing and banding.
- Data and plots can be easily copied and pasted into other applications or saved as BMP files.
- Interactive graphs are automatically saved in the Results window of the node.

## Clustering and self-organizing maps

- Clustering:
  - User defined or automatically chooses the best clusters.
  - Several strategies for encoding class variables into the analysis.
  - Handles missing values.
  - Variable segment profile plots show the distribution of the inputs and other factors within each cluster.
  - Decision tree profile uses the inputs to predict cluster membership.
  - PMML score code.
- Self-organizing maps:
  - Batch SOMs with Nadaraya-Watson or local-linear smoothing.
  - Kohonen networks.
  - Overlay the distribution of other variables onto the map.
  - Handles missing values.

## Market basket analysis

- Associations and sequence discovery:
  - Grid plot of the rules ordered by confidence.
  - Statistics line plot of the lift, confidence, expected confidence, and support for the rules.

- Statistics histogram of the frequency counts for given ranges of support and confidence.
- Expected confidence versus confidence scatter plot.
- Rules description table.
- Network plot of the rules.
- Interactively subset rules based on lift, confidence, support, chain length, etc.
- Seamless integration of rules with other inputs for enriched predictive modeling.
- Hierarchical associations:
  - Derive rules at multiple levels.
  - Specify parent and child mappings for the dimensional input table.

### Web path analysis

- Scalable and efficient mining of the most frequently navigated paths from clickstream data.
- Mine frequent consecutive subsequences from any type of sequence data.

### Dimension reduction

- Variable selection:
  - Remove variables unrelated to target based on a chi-square or R2 selection criterion.
  - Remove variables in hierarchies.
  - Remove variables with many missing values.
  - Reduce class variables with large number of levels.
  - Bin continuous inputs to identify nonlinear relationships.
  - Detect interactions.
- LARS (Least Angle Regression) variable selection:
  - AIC, SBC, Mallows C(p), cross validation and other selection criterion.
  - Plots include: parameter estimates, coefficient paths, iteration plot, score rankings and more.
  - Generalizes to support LASSO (least absolute shrinkage and selection operator).
  - Supports class inputs.
  - Score code generation.
- Principal components:
  - Calculate Eigenvalues and Eigenvectors from correlation and covariance matrices.
  - Plots include: principal components coefficients, principal components matrix, Eigenvalue, Log Eigenvalue, Cumulative Proportional Eigenvalue.

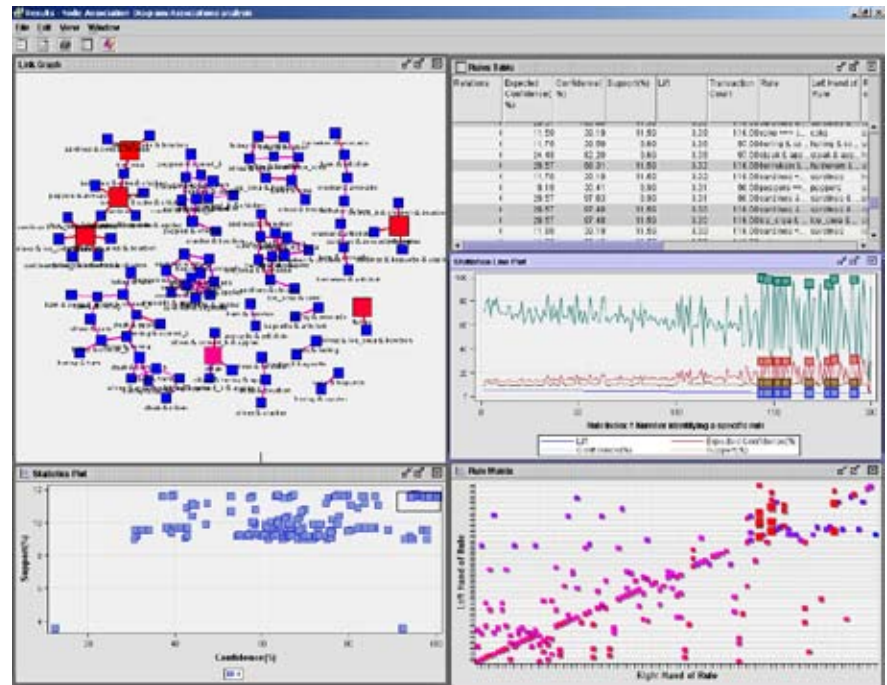


Figure 6: View market basket profiles. Interactively subset the rules based on lift, confidence, support, chain length, etc.

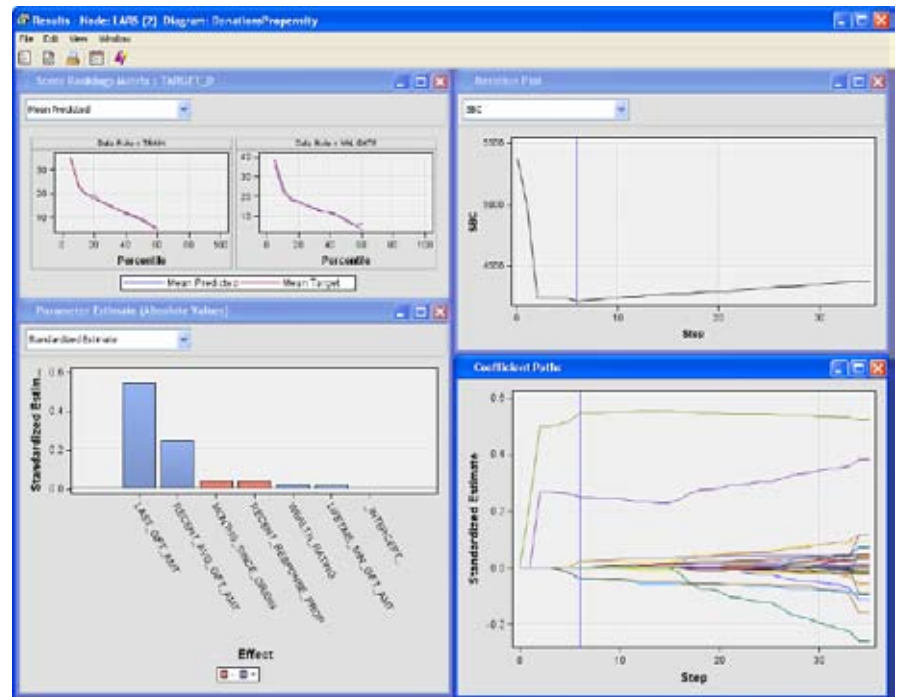


Figure 7: Preselect the important variable predictors using Least Angular Regression Splines.

- Interactively choose the number of components to be retained.
- Mine the selected principal components using predictive modeling techniques.
- Variable clustering:
  - Divide variables into disjoint or hierarchical clusters.

- Eigenvalue or Principal Components learning.
- Includes class variable support.
- Dendrogram tree of the clusters.
- Selected variables table with cluster and correlation statistics.
- Cluster network and R-Square plot.
- Interactive user override of selected variables.
- Time series mining:
  - Reduce transactional data into a times series using several accumulation methods and transformations.
  - Analysis methods include seasonal, trend, time domain, seasonal decomposition.
  - Mine the reduced time series using clustering and predictive modeling techniques.
- Manage time metrics with descriptive data.

### SAS Code node

- Write SAS code for easy-to-complex data preparation and transformation tasks.
- Incorporate procedures from other SAS products.
- Develop custom models.
- Create SAS Enterprise Miner extension nodes.
- Augment score code logic.
- Easy-to-use program development interface:
  - Macro variables to reference data sources, variables, etc.
  - Interactive code editor and submit.
  - Separately manage training, scoring and reporting code.
  - SAS Output and SAS LOG.
- Create graphics.

### Consistent modeling features

- Select models based on either the training, validation (default) or test data using several criteria such as profit or loss, AIC, SBC, average square error, misclassification rate, ROC, Gini, KS (Kolmogorov-Smirnov).
- Incorporate prior probabilities into the model development process.
- Supports binary, nominal, ordinal and interval inputs and targets.
- Easy access to score code and all partitioned data sources.

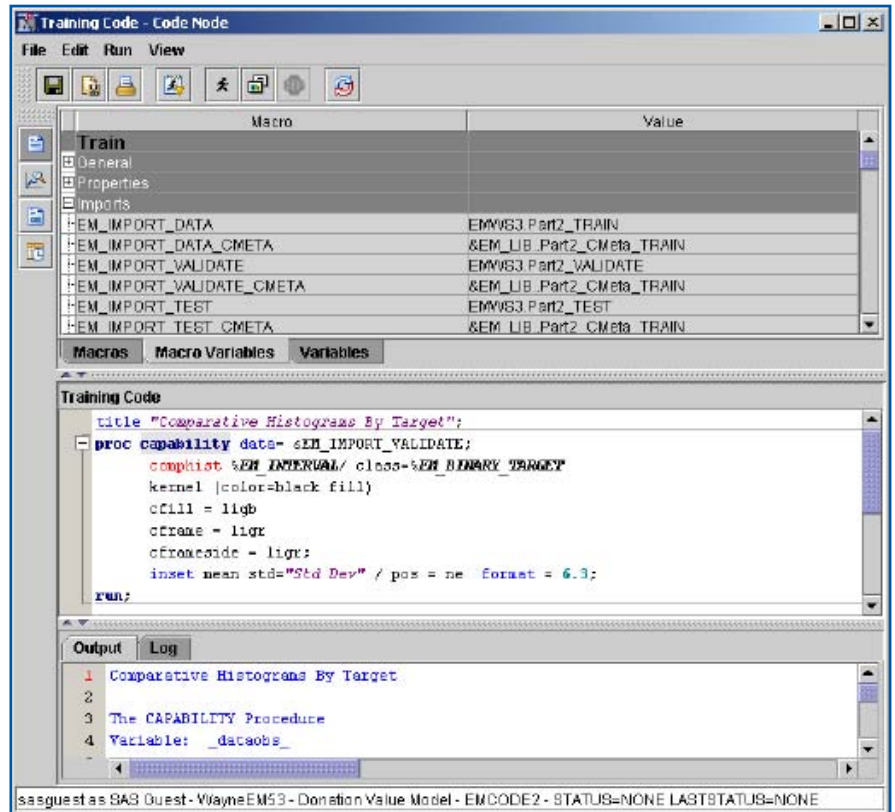


Figure 8: Integrate customized SAS code to create variable transformations, incorporate SAS procedures, develop new nodes, augment scoring logic, tailor reports and more.

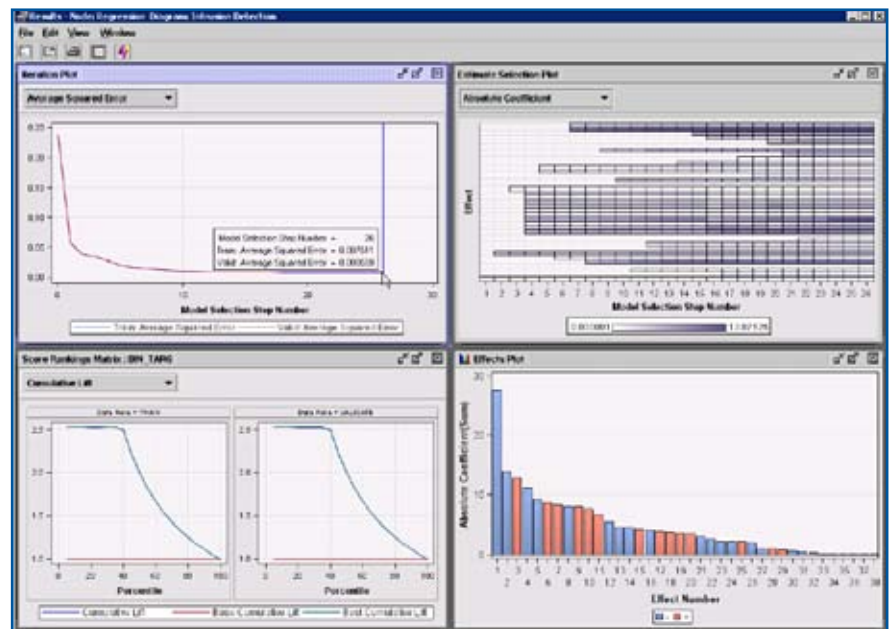


Figure 9: Develop linear and logistic regression models using stepwise selection methods along with several model selection diagnostics.

- Display multiple results in one window to help better evaluate model performance.
- Decisions node for setting target event and defining priors and profit/loss matrices.

### Regression

- Linear and logistic.
- Stepwise, forward and backward selection.
- Equation terms builder: polynomials, general interactions, effect hierarchy support.
- Cross validation.
- Effect hierarchy rules.
- Optimization techniques include: Conjugate Gradient, Double Dogleg, Newton-Raphson with Line Search or Ridging, Quasi-Newton, Trust Region.
- Dmine Regression Node:
  - Fast forward stepwise least squares regression.
  - Optional variable binning to detect nonlinear relationships.
  - Optional class variable reduction.
- Include interaction terms.
- PMML score code.

### Decision trees

- Methodologies:
  - CHAID, classification and regression trees, bagging and boosting, gradient boosting.
  - Tree selection based on profit or lift objectives and prune accordingly.
  - K-fold cross validation.
- Splitting criterion: Prob Chi-square test, Prob F-test, Gini, Entropy, variance reduction.
- Switch targets for designing multi-objective segmentation strategies.
- Automatically output leaf IDs as inputs for modeling and group processing.
- Displays English rules.
- Calculates variable importance for preliminary variable selection and model interpretation.
- Unique consolidated tree map representation of the tree diagram.
- Interactive tree desktop application:
  - Interactive growing/pruning of trees; expand/collapse tree nodes.
  - Define customized split points including binary or multiway splits.
  - Split on any candidate variable.
  - Copy split.

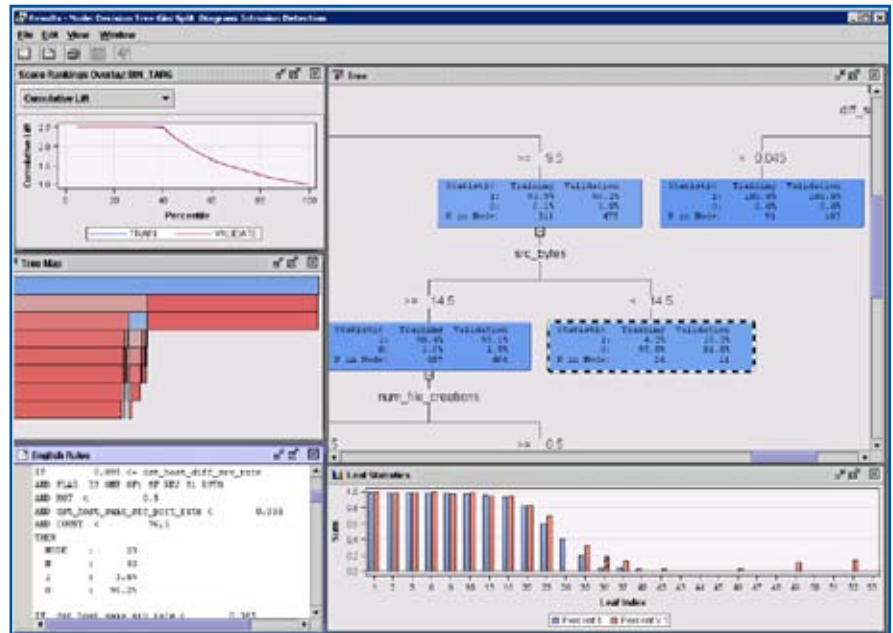


Figure 10: Develop decision trees interactively or in batch. Numerous assessment plots to help gauge overall tree stability are included.

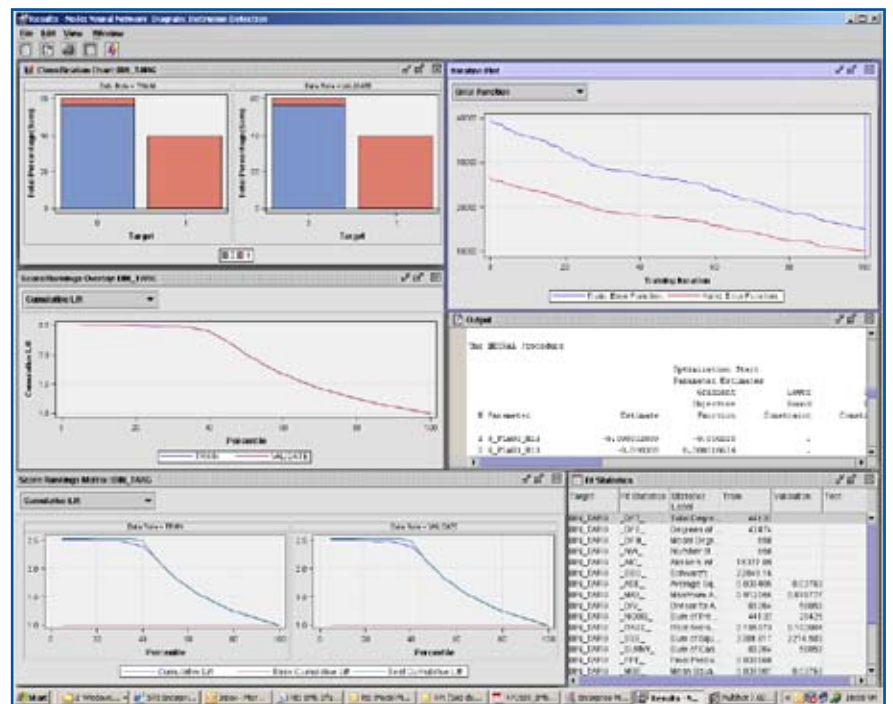


Figure 11: Fit highly complex nonlinear relationships using the SAS Enterprise Miner Neural Network node. Architectures include general linear models, multilayer perceptrons, radial basis functions, along with a wide range of combination, activation and error functions.

- More than 13 tables and plots are dynamically linked to better evaluate the tree performance.
- Easy to print tree diagrams on a single page or across multiple pages.
- Based on the fast ARBORETUM procedure.
- PMML score code.

### Neural networks

- Neural Network node:
  - Flexible network architectures with combination and activation functions.
  - 10 training techniques.
  - Preliminary optimization.
  - Automatic standardization of inputs.
  - Supports direction connections.
- Autoneural Neural node:
  - Automated multilayer perceptron building searches for optimal configuration.
  - Type and activation function selected from four different types of architectures.
- PMML score code.
- DM Neural node:
  - Model building with dimension reduction and function selection.
  - Fast training; linear and nonlinear estimation.

### Partial Least Squares node

- Especially useful for extracting factors from a large number of potential correlated variables.
- Also performs principal components regression and reduced rank regression.
- User or automatic selection of the number of the factors.
- Choose from five cross validation strategies.
- Supports variable selection.

### Rule induction

- Recursive predictive modeling technique.
- Especially useful for modeling rare events.

### Two-stage modeling

- Sequential and concurrent modeling for both the class and interval target.
- Choose a decision tree, regression or neural network model for each stage.
- Control how the class prediction is applied to the interval prediction.
- Accurately estimate customer value.

### Memory-based reasoning

- *k*-nearest neighbor technique to categorize or predict observations.
- Patented Reduced Dimensionality Tree and Scan.

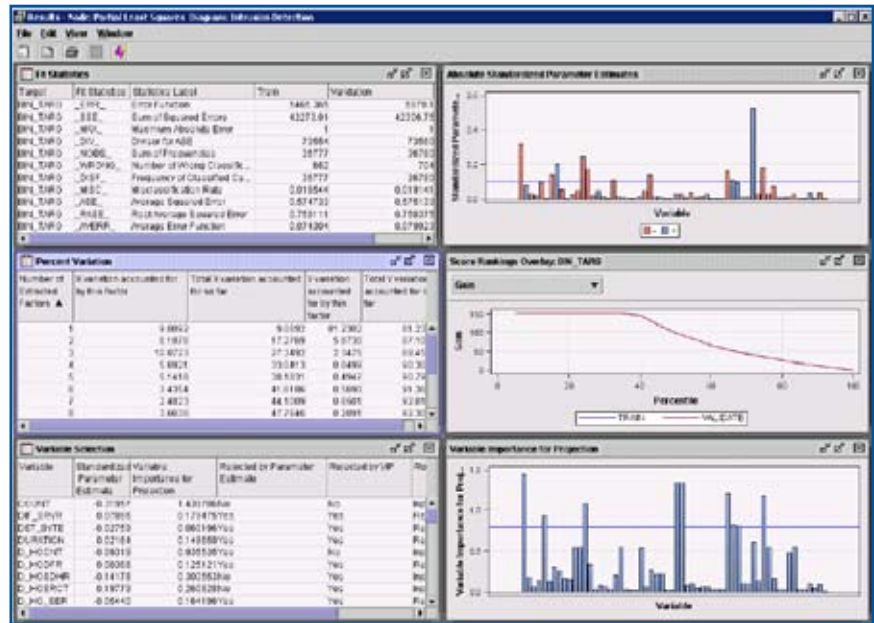


Figure 12: Extract a candidate set of uncorrelated latent factors or components using the Partial Least Squares node. Standard SAS Enterprise Miner model fit statistics are produced for comparison with other challenger modeling methods.

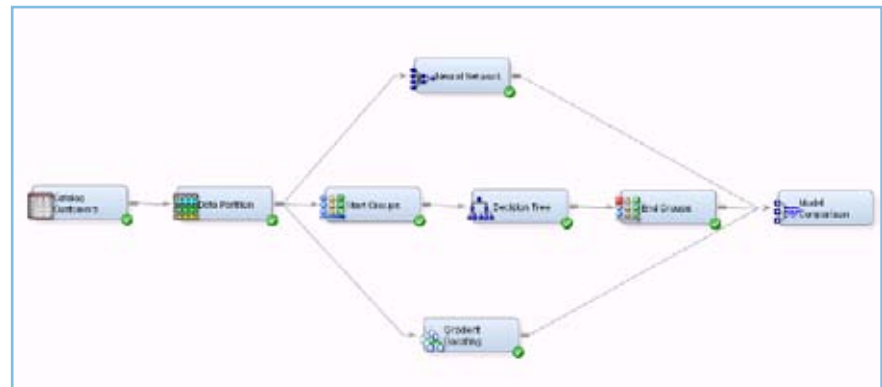


Figure 13: Create bagging and boosting models using the Start and End Groups nodes along with the Decision Tree node. Here, separate random samples of the training data are used to develop decision trees, which are combined to form a potentially more stable and stronger classifier. The Decision Tree ensemble is then compared against Neural Network and Gradient Boosting challenger models using the Model Comparison node.

### Model ensembles

- Combine model predictions to form a potentially stronger solution.
- Methods include: Averaging, Voting and Maximum.

### Group processing with the Start and End Groups nodes

- Repeat processing over a segment of the process flow diagram.
- Use cases: stratified modeling, bagging and boosting, multiple targets, cross validation.

### Model Import node

- Register SAS Enterprise Miner models for reuse in other diagrams and projects.
- Import and evaluate external models.

### Model evaluation

- Model Comparison node to compare multiple models in a single framework for all holdout data sources.

- Automatically selects the best model based on the user-defined model criterion.
- Supports user override.
- Extensive fit and diagnostics statistics.
- Lift charts; ROC curves.
- Profit and loss charts with decision selection; confusion (classification) matrix.
- Class probability score distribution plot; score ranking matrix plots.
- Interval target score rankings and distributions.
- Cutoff node to determine probability cutoff point(s) for binary targets.
- User override for default selection.
- Max KS Statistic.
- Min Misclassification Cost.
- Maximum Cumulative Profile.
- Max True Positive Rate.
- Max Event Precision from Training Prior.
- Event Precision Equal Recall.

#### Reporter node

- Uses SAS Output Delivery System to create a PDF or RTF document of a process flow.
- Helps document the analysis process and facilitate results sharing.
- Document can be saved and is included in the SAS Enterprise Miner Results Packages.
- Includes image of the process flow diagram.
- User-defined notes entry.

#### Scoring

- Score node for interactive scoring in the SAS Enterprise Miner GUI.
- Score node creates optimized score code by default, eliminating unused variables.
- Automated score code generation in SAS, C, Java and PMML (Version 3.1).
- SAS, C and Java scoring code capture modeling, clustering, transformations and missing value imputation code.
- Score SAS Enterprise Miner models directly inside the Teradata database with SAS Scoring Accelerator for Teradata.
- Deploy models in multiple environments.

#### Model registration and viewing

- Register SAS Enterprise Miner models to a SAS Metadata Server.
- Provides integration with SAS Model Manager enabling:
  - Version control of the scoring code.
  - Lifecycle management of the models from development to production.
  - Model monitoring.

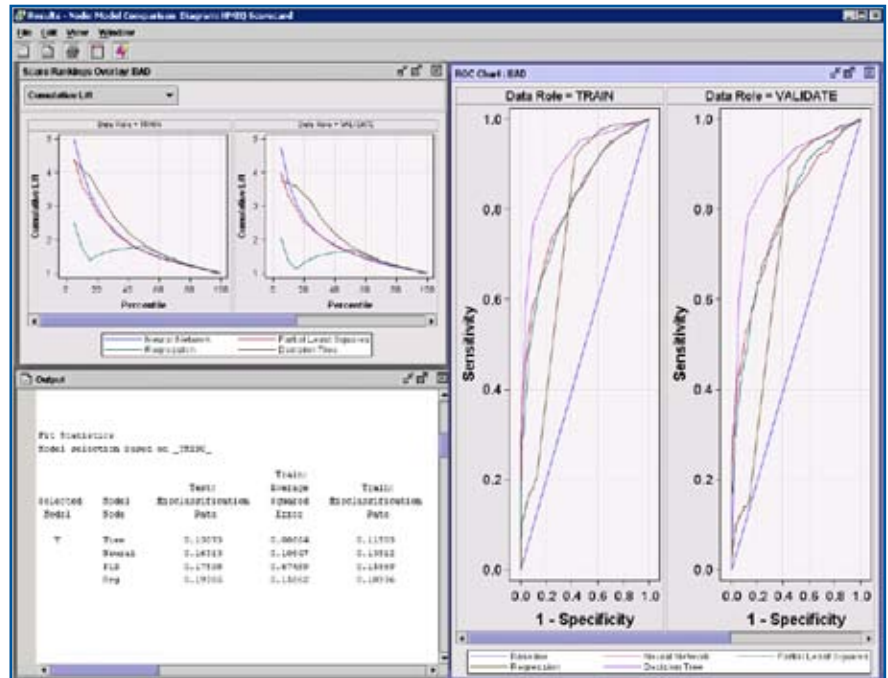


Figure 14: Evaluate multiple models together in one easy-to-interpret framework using the Model Comparison node.

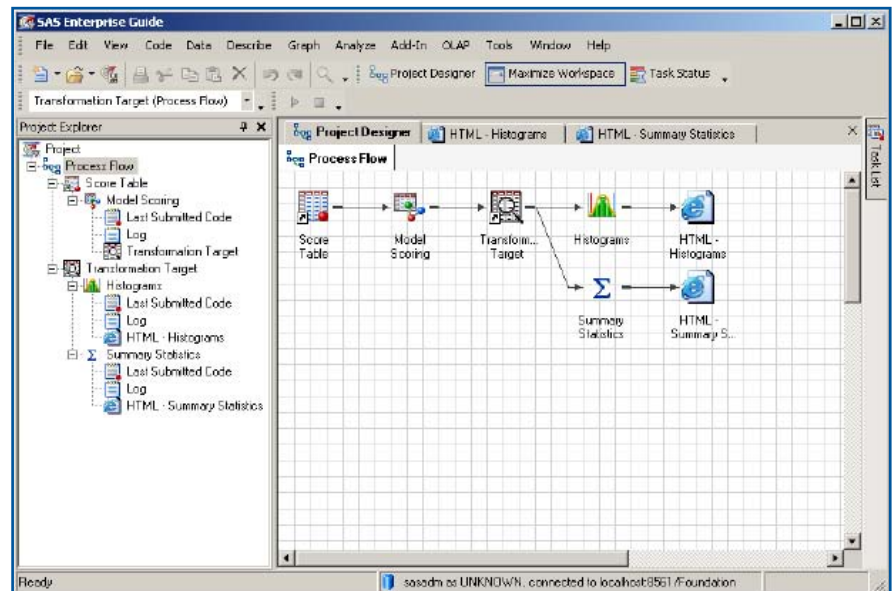


Figure 15: Score SAS Enterprise Miner models using the SAS Enterprise Guide Model Scoring Task. Data miners can register SAS Enterprise Miner models that can be deployed by business analysts using SAS Enterprise Guide.

- Version control of the scoring code.
- Lifecycle management of the models from development to production.
- Model monitoring.
- Provides integration with SAS Enterprise Guide and SAS Data Integration Studio:
  - Score models using the SAS Enterprise Guide Model Scoring Task.
  - Score models using the SAS Data Integration Studio Mining Results Transformation.

## **SAS® Enterprise Miner™ 6.1** **Technical Requirements**

### **Client environment**

- Linux for x86 (x86-32): RHEL 4 and 5, SuSE SLES 9 and 10
- Microsoft Windows (x86-32): Windows XP Professional, Windows Server 2003, Windows Vista\*
- Microsoft Windows on x64 (EM64T/AMD64): Windows XP Professional for x64, Windows Vista\* for x64, Windows Server 2003 for x64
- Solaris on SPARC: Version 9, 10
- Solaris on x64: Version 10

\* NOTE: Windows Vista Editions that are supported include Enterprise, Business and Ultimate.

### **Server environment**

- AIX: Release Version 5.3 and Version 6.1 on POWER architectures
- HP-UX PA-RISC: HP-UX 11iv2 (11.23), 11iv3 (11.31)
- HP-UX Itanium: HP-UX 11iv2 (11.23), 11iv3 (11.31)
- Linux for x86 (x86-32): RHEL 4 and 5, SuSE SLES 9 and 10
- Linux for x64 (EM64T/AMD64): RHEL 4 and 5, SuSE SLES 9 and 10
- Microsoft Windows (x86-32): Windows XP Professional, Windows Server 2003, Windows Vista\*
- Microsoft Windows on x64 (EM64T/AMD64): Windows XP Professional for x64, Windows Vista\* for x64, Windows Server 2003 for x64
- Microsoft Windows (on Itanium): Windows Server 2003
- Solaris on SPARC: Version 9, 10
- Solaris on x64: Version 10

\* NOTE: Windows Vista Editions that are supported include Enterprise, Business and Ultimate.

### **Required software**

- Base SAS
- SAS/STAT®



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