



What is JMP® Pro?

JMP Pro, Version 9 is statistical discovery software from SAS that contains everything in JMP 9 plus automated analytic techniques for data mining and predictive modeling. It combines the power of data visualization, exploratory data analysis and data mining in an in-memory environment made for the desktop. JMP Pro is part of the SAS® Predictive Analytics Suite, a family of data mining software products that includes SAS® Enterprise Miner™ and other solutions that help individuals and enterprises make evidence-based decisions.

Why is JMP® Pro important?

With JMP Pro, your data can show you not just where your business has been, but where it's headed – and then help you determine how to take it where you want it to go. Automated model-fitting capabilities let JMP Pro users build accurate models using tens of millions of data points, find the relevant facts and make better decisions. With included 64-bit support, JMP Pro can process more data than ever before. And because it is built on the user-friendly JMP interface, JMP Pro lets you consolidate on a single platform that can serve as the analytic hub for all members of your organization, from beginners to power users.

Who should use JMP® Pro?

Analysts, statisticians, data scientists, data miners. JMP Pro is designed for the analytics A-team in any organization. As businesses collect more data than ever before, data mining and predictive modeling enable analysts and researchers to dig through huge data volumes to answer increasingly complex questions. JMP Pro helps decision makers across industries become more proactive and take greater control of the future.

www.jmp.com/pro

JMP® Pro

Visual analytics for creating robust predictive models

Predictions. It's hard to plan without them. You may ask yourself: How do online retailers seem to know what movie or books I like? How did my credit card company know that my spending last week was unusual?

In your business, you may need to know:

- Which customers are likely to accept credit card offers?
- How likely is a particular loan applicant to repay a specified amount?
- Which Web page would a customer most like to see next?
- What maintenance schedule will prevent costly repairs and downtime?
- Which customers are likely to upgrade?
- Which transactions will prove to be fraudulent?

To make good predictions, you need to start with quality data about what's happened in the past. These days, you've got plenty of operational data and data from other sources.

JMP Pro helps you use the data you have to better anticipate the future and plan for tomorrow. The predictive modeling methods in JMP Pro, along with the right data, ensure that you'll get a model that fits tomorrow well.

JMP Pro provides all the superior data access, preparation and visualization features that are hallmarks of JMP and adds more predictive modeling capabilities, exact measures of association, and nonparametric exact tests. All this comes in the in-memory, desktop-based environment familiar to JMP users.

Algorithms in JMP® Pro include:

- Bootstrap forests, a random forest technique.
- Boosted trees and neural networks.
- Multilayer neural networks.
- Cross-validated stepwise regression.
- Exact tests on multiway contingency tables and nonparametric exact tests.

Build models that generalize well

Descriptive modeling employs statistics and graphics to help you understand historic data. Useful predictive models have the extra burden of ensuring that they will describe new data just as well. Anyone can do a fair job of describing last year's performance. But without the right tools, building a model to predict next year's is much more difficult.

For effective predictive modeling, you need sound ways to validate your model.

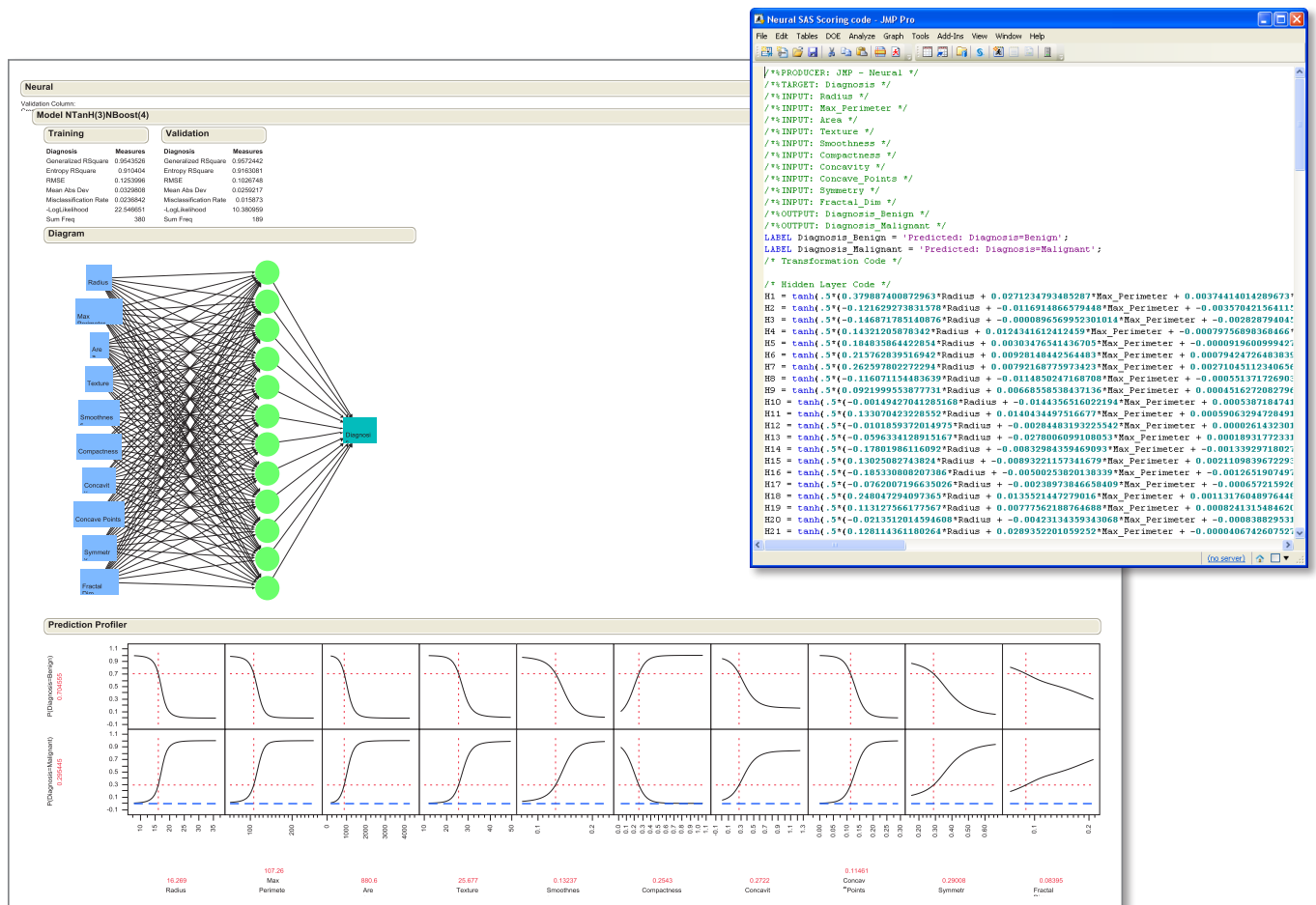
JMP Pro provides data partitioning, or holdback, as well as K-fold cross-validation for unbiased model assessment.

Dividing the data into training, validation and test data sets has long been used to avoid over-fitting, ensuring that the models you build are not overly reliant on the data used to build them. This produces models that generalize well to tomorrow's data — for example, about new customers, new processes, new risks — so you can make sound inferences about the future. Using the cross-validation methods in JMP Pro

helps you avoid modeling nuances that occur only in the data you collected and not in the general population.

Choose your model form

If your goal is to find the best predictive model, you'll have your choice of model forms. JMP Pro has all the linear, nonlinear and modeling capabilities that JMP offers, and it adds cross-validated stepwise regression, new automated decision-tree building techniques in the Partition platform, and an enhanced platform for neural networks.



Use cross-validation and build boosted neural network models with automatically generated SAS score code.

The Partition platform in JMP Pro automates the tree-building process with two new methods. A bootstrap forest grows dozens of decision trees using random subsets of the available data and averages the computed influence of each input factor in these trees. And the boosted tree technique builds many simple trees, repeatedly fitting any residual variation from one tree into the next.

Plus, for the ultimate in flexibility, you can build two-layer neural networks with your choice of three activation functions and automatic model construction using gradient boosting. The Neural platform in JMP Pro automatically handles missing values and automates transformation of continuous inputs, which saves time and effort. In addition, it includes a richer set of penalty functions to apply to inputs and provides capabilities to model multiple categorical responses and mixtures of continuous and categorical responses.

Measurements, transactions, calls, claims – data sources and quantities continue to grow. JMP Pro handles big data with ease, helping you filter out the noise to find the signals hidden within. With the 64-bit, in-memory capabilities of JMP Pro, you can build models using tens of millions of data points, find the relevant facts and make better decisions.

Boosted Tree for target churn

Specifications

Target Column:	target churn	Number of training rows:	2477
Validation Column:	Validation	Number of validation rows:	819
Number of Layers:	50	Number of test rows:	822
Splits Per Tree:	3		
Learning Rate:	0.1		
Overfit Penalty:	0.0001		

Overall Statistics

Measure	Training	Validation	Test	Definition
Entropy RSquare	0.3984	0.3418	0.3666	1-Loglike(model)/Loglike(0)
Generalized R-Square	0.5657	0.5029	0.5310	$(1-(L(0)/L(model))^{2/n})/(1-L(0)^{2/n})$
Mean -Log p	0.4164	0.4553	0.4386	$\sum -\log(p_{ij})/n$
RMSE	0.3621	0.3839	0.3749	$\sqrt{\sum (y_{ij}-p_{ij})^2/n}$
Mean Abs Dev	0.2974	0.3121	0.3086	$\sum y_{ij}-p_{ij} /n$
Misclassification Rate	0.1784	0.2100	0.2007	$\sum (p_{ij} \neq \text{Max})/n$
N	2477	819	822	n

Confusion Matrix

		Actual		Predicted	
		Actual	Predicted	Actual	Predicted
Training	No Churn	1056	234	336	95
	Churn	208	979	77	311
Validation	No Churn	336	95	336	90
	Churn	77	311	75	321
Test	No Churn	336	90		
	Churn	75	321		

Cumulative Validation

The graph plots five metrics against the number of layers (0 to 50). The y-axis is 'RSquare Validation' from 0.00 to 1.00. The x-axis is 'Number of Layers' from 0 to 50. The metrics are: RSquare (red line), Avg -Log p (blue line), RMS Error (green line), Avg Abs Error (orange line), and MR (black line). All metrics show a general downward trend as the number of layers increases, indicating improved model performance.

Tree Views

Layer3

```

graph TD
    A[Avg Days Delinquent] --> B[Percent Increase MOM]
    A --> C[Avg Calls]
    B --> D[ ]
    C --> D
    D --> E[ ]
    E --> F[ ]
    style D fill:none,stroke:none
    style E fill:none,stroke:none
    style F fill:none,stroke:none
            
```

Build boosted decision-tree models and generate SAS score code.

The screenshot shows a SAS window titled 'Gradient Boosting SAS Scoring Code - JMP Pro'. The code defines a PROC model for a boosted tree and generates SAS scoring code. Key parts of the code include:

- DATA: churn_final
- TARGET: target_churn
- INPUTS: Prob_No_Churn, target_churn, "No Churn"
- INPUTS: current_billmount, Avg_Calls, Avg_Calls_Weekdays, Account_Age, Percent_Increase_MOM, acct_plan_type, Complaint_Code, Avg_Days_Delinquent, current_TechSupportComplaints, Current_Days_OpenWorkOrders, Equipment_Age, Condition_of_Current_Handset, Avg_Hours_WorkOrderOpened
- MODEL: Prob_No_Churn = Predicted: target_churn = No Churn
- Scoring code using IF/THEN/ELSE logic to predict 'No Churn' based on the input variables.

Compare models

Because you won't know in advance which model form will give you the best predictions, JMP Pro makes it easy to try many different models and compare them numerically and visually.

JMP Pro uses the same training, validation and test data sets across different kinds of models – so you can be sure that models are congruent and, therefore, can be compared reliably.

By providing standard measures of assessment like misclassification rates and R-squares across model types, JMP Pro offers an unbiased appraisal of model performance.

The Prediction Profiler in JMP Pro shows you the relationships in the model and gives you the confidence to understand them, which is especially important in complex nonlinear models like neural networks. By visualizing the predictions of the model, you immediately see the influence of various inputs. When comparing different model forms, you may discover that each model

is picking up influence from different factors. This might tell you that you don't have the data to build the most useful model.

Visual discovery

JMP has always been about discovery. JMP Pro includes all the features of JMP, making your data accessible in ways you might never have experienced. Through dynamically linked statistics and graphics, JMP Pro can bring your data alive in a 3-D plot or an animated graph showing change over time.

Exploratory data analysis is a necessary first step in building models efficiently and effectively. With the easy interactivity of visual discovery, JMP Pro helps you make the most of your data.

In addition, using the JMP Scripting Language, you can call SAS and R to expand your data management and analytic repertoire as needed, creating analytic applications that have the familiar point-and-click feel of JMP.

“JMP Pro provides a highly interactive and visual environment that makes it easy to examine distributions, explore interactions, and spot anomalies before building models, along with an extensive collection of data mining techniques.”

Michael Berry, co-founder of Data Miners Inc., and co-author of *Data Mining Techniques for Marketing, Sales and Customer Relationship Management*

JMP Pro has an attitude toward data – even big data – that is close and personal. One challenge is getting data in shape to build useful models. With extensive reshaping and recoding tools, JMP Pro eases data preparation, the most time-consuming aspect of model building, to quickly get your data ready for analysis.

Key Features

New Platforms

- The new Degradation platform lets you analyze product deterioration data over time to help you predict product quality and warranty risk.
- The new Neural platform replaces the Neural Net platform and adds enhancements such as richer diagnostics, including several measures of fit and diagnostic plots. With JMP Pro, choose which data to use for cross-validation. Also in JMP Pro, get automated handling of missing data and automated transformation of input variables.

Microsoft Excel Add-In

- Use the JMP Profiler to visualize models contained in Excel spreadsheets.
- Optimize and simulate using your Excel spreadsheets.
- Use the add-in toolbar to copy data from Excel into JMP directly.

Interface to R

- Interact with R using JMP Scripting Language (JSL).
- Submit statements to R from within a JSL script.
- Exchange data between JMP and R.
- Display graphics produced by R.

Key Features (continued)

Graph Builder

- Incorporate geographic maps into graphs.
- Graph two independent Y variables on separate axes.
- Work with subsets of large data tables using the new Sampling function.
- See the shape of your data using density contours.
- Plot error bars and confidence intervals.
- A new drop zone under the Group Y area supports a Frequency (or Weight) variable.
- Graph Builder uses new custom color scale and gradient capabilities.

New Windows Environment

- User interface for Microsoft Windows has been completely revamped.
- All windows are now independent of one another, so it's easier to use JMP on multiple monitors.
- The Home window lists JMP files opened recently and all open JMP windows.

Partition

- Use bootstrap forests to help ensure your predictions will generalize well.
- Employ boosted trees to increase the accuracy of your predictions.
- Use a cross-validation column to easily compare different model types and make sure that predictions generalize well.

Design of Experiments (DOE)

- In Custom Design, choose a new optimality criterion: Minimum Aliasing Design.
- In Custom Design, model and alias terms are available, and an alias model always appears.
- In Custom Design, a color map of correlations of all model terms and aliasing terms appears.
- Accelerated Life Test Design, a new DOE platform, lets you design high stress tests to simulate failure quickly – so you can find product weaknesses more easily and faster.
- In demonstration plans, design a test to compare the reliability of a new product to a standard.
- In reliability test plans, determine the sample size or length of study needed to obtain a given precision about a fitted quantile or probability.

Distribution

- Save linked histograms for the Adobe Flash platform for use in presentations and Web pages.
- Fit multi-modal data using a mixture of normal distributions.

JMP® Scripting Language

- Enhanced scoping of variables means that each script can have its own namespace.
- Custom namespaces provide extra flexibility and avoid name collisions when writing production scripts.

Contingency

- Test for trends in binomial proportions across levels of a single variable using the Cochran Armitage Trend Test.
- Compare response proportions using analysis of means (ANOM).
- Get many different measures of association.

Oneway

- Compare means and variances across several groups with analysis of means (ANOM).
- Compare group means using nonparametric multiple comparison tests.

Bivariate

- New residual graphs provide diagnostics.

Time Series

- Fit a range of ARIMA models simultaneously.
- Updated Model Comparison report simplifies iterative modeling.

Scatterplot Matrix

- Display simple regression lines.
- Show nonparametric density contours to map where most of your data is.

Cell Plot

- Cell Plot uses new custom color scale and gradient capabilities.

Graphics/Display

- Add custom color themes to JMP.
- Geographic scaling options for axes are available in the Axis Specification window.
- Leverage powerful image manipulation and processing.
- Import ESRI SHP files.

Features Available Only in JMP® Pro, Version 9

Support for tens of millions of data points on 64-bit machines
Validation column role in many modeling platforms
Contingency platform
Exact tests on multiway contingency tables
Oneway platform
Nonparametric exact tests
Partition platform
Bootstrap forest and boosted tree techniques
Uses train, validate and test methodology
SAS DATA Step scoring code
Neural platform
Uses train, validate and test methodology
Automated handling of missing cells
Automatic selection of the number of hidden units using boosting
Automated transformation of input variables
Outlier-resistant loss function
Ability to fit both one- and two-layer neural nets
Ability to choose from three activation functions
Save transformed covariates
Save randomly generated cross-validation columns
SAS DATA Step scoring code
Fit Model platform
Confusion Matrix option for Nominal and Ordinal Logistic
Stepwise regression uses train, validate and test methodology

The software has the immediacy of a spreadsheet but allows you to interact with graphs, not just tables. Imagine what's possible when you can manipulate graphs at will, changing your viewpoint to identify natural groupings, using colors and markers to show what you find most interesting.

Got SAS®?

As one of the individual products in the SAS Predictive Analytics Suite, JMP Pro easily connects to SAS to expand your options and give you access to the unparalleled depth of SAS analytics and data integration. With or without an active connection to SAS, JMP Pro can output SAS code to score new data quickly and easily.

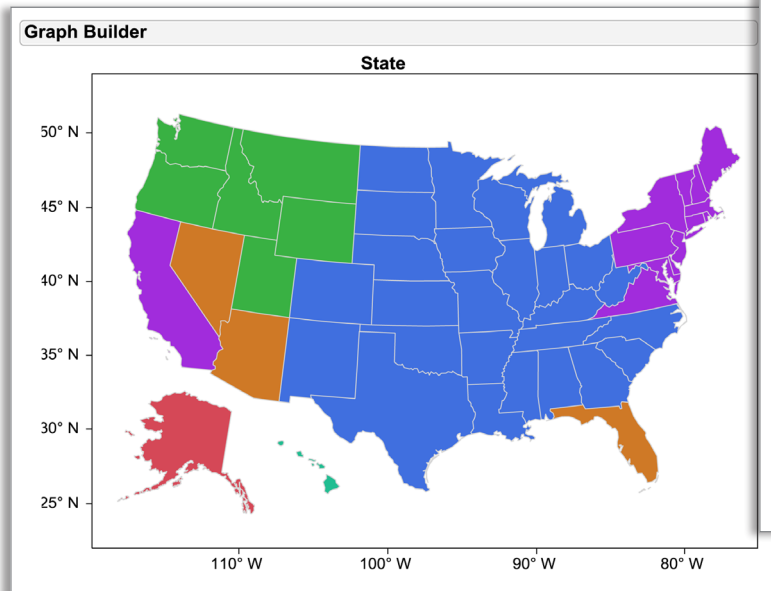
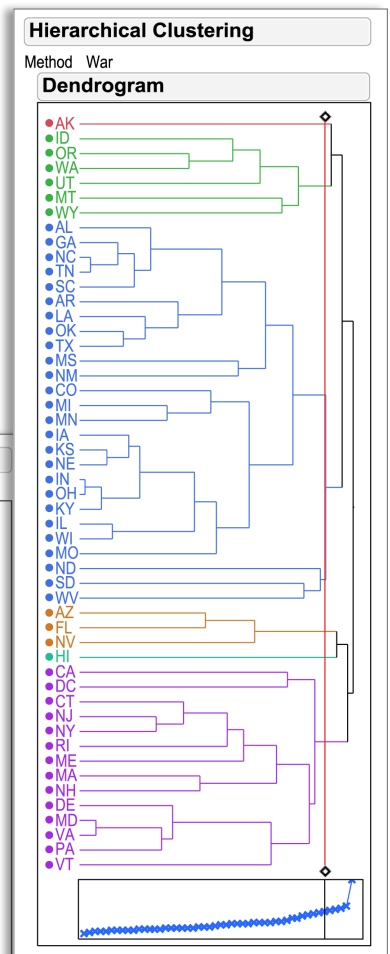
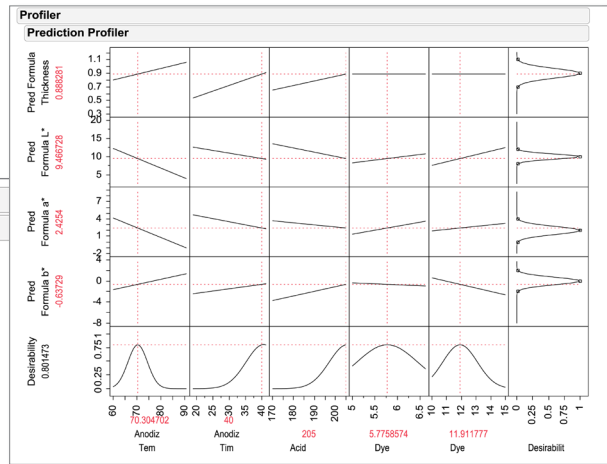
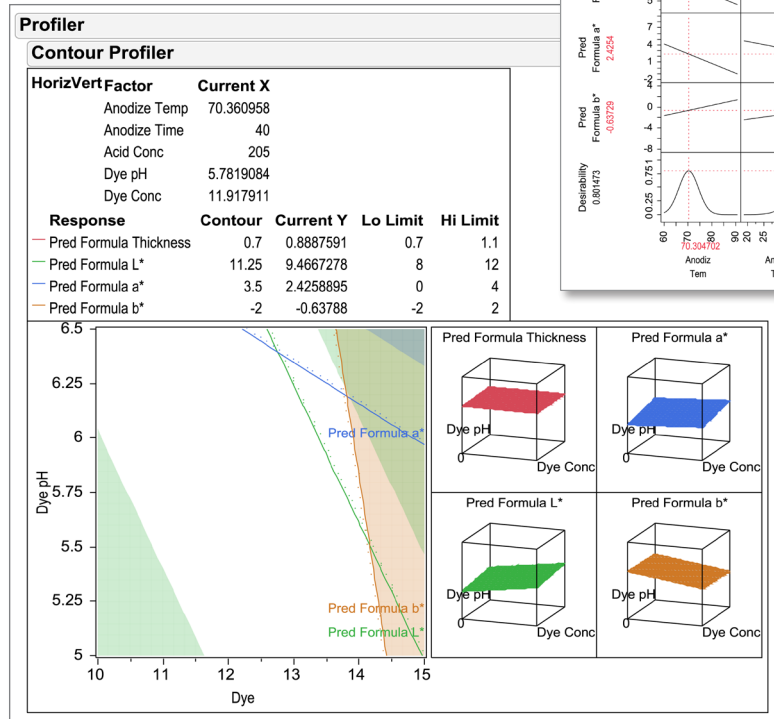
Supported operating systems

JMP Pro, Version 9 runs on Microsoft Windows and Macintosh computers. It includes support for both 32- and 64-bit systems. See jmp.com/system for complete system requirements.

JMP® Pro uses the same training, validation and test data sets across different kinds of models – so you can be sure that models are congruent, and therefore can be compared reliably.

With JMP® Pro you get the foundation of JMP, plus more predictive modeling capabilities, exact measures of association and nonparametric exact tests.

Model visualization and dynamically linked graphs are JMP features that add clarity and context to data.



Geographic maps are among the new capabilities introduced in JMP 9. Like all other JMP features, they are included in JMP Pro.



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